



रेलवे भर्ती बोर्ड / RAILWAY RECRUITMENT BOARD
सी०ई०एन० ०९/२०२५-७ वें सीपीसी वेतन मैट्रिक्स के लेवल १ में विभिन्न पदों हेतु
CEN 09/2025 - Various Posts in Level 1 of 7th CPC Pay Matrix



RRB Group D 2025

Level-1 · CEN 09/2025 · General Science — Topic-wise

English

40 Chapters · 1200 Questions · Official Answer Key

About this Compilation

Every **General Science** question asked across all shifts of the **RRB Group D (Level-1) 2025** examination (CEN 09/2025), regrouped by **chapter** instead of by shift, so you can revise one topic end to end. The correct option is marked as per the official answer key.

How to use

- Use the **Index** to jump to any chapter (clickable).
- Within a chapter, questions on the same idea are placed together.
- The correct answer is highlighted in green with a tick.
- The same paper is also available shift-wise and section-wise at rank.qmaths.in.



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Physics

10 Questions • Answer Key

Q1 Branches of science

The study of metals and their properties belongs to which branch of chemistry?

- A. Physical chemistry
- B. Biochemistry
- C. Inorganic chemistry ✓
- D. Analytical chemistry

Q2 Branches of science

Which branch of chemistry is most concerned with reactions taking place within living cells?

- A. Analytical chemistry
- B. Physical chemistry
- C. Inorganic chemistry
- D. Biochemistry ✓

Q3 Measuring instruments

What does a sphygmomanometer measure in the human body?

- A. Blood pressure ✓
- B. Blood sugar
- C. Heart rate
- D. Body temperature

Q4 SI and derived units

If the unit of force is newton, which combination of fundamental SI units makes up one newton?

- A. Kilogram meter per second squared ✓
- B. Kilogram per meter per second
- C. Kilogram meter per second
- D. Meter per kilogram per second squared

Q5 SI and derived units

Which of the following best describes why the unit of force is chosen as newton?

- A. It makes mass and acceleration equal in value
- B. It makes the constant k in the formula " $F = k ma$ " equal to 1 ✓
- C. It changes the value of acceleration
- D. It simplifies the calculation of velocity

Q6 SI units

Which of the following best represents the correct unit for average velocity in the SI system?

- A. kilometer per hour
- B. meter per second ✓
- C. centimeter per minute
- D. foot per second

Q7 SI units

The numerical value of an object's potential energy is measured in which SI unit?

- A. Pascal (Pa)
- B. Watt (W)
- C. Joule (J) ✓
- D. Newton (N)

Q8 SI units of quantities

A student calculates the work done on an object and its kinetic energy. In which SI unit should both quantities be expressed?

- A. Joule (J) ✓
- B. Watt (W)
- C. Newton (N)
- D. Pascal (Pa)

Q9 Scientists and their contributions

A policymaker is evaluating the large-scale deployment of solar power in India. Which historical contribution provided the foundational data for solar insolation mapping?

- A. Government weather forecasts
- B. University climate models
- C. NASA satellite data collection
- D. Anna Mani's solar radiation measurements ✓

Q10 Units of work and energy

Which of the following is NOT a correct unit of work done?

- A. newton-meter
- B. pascal ✓
- C. watt-second
- D. joule



Q1 Acceleration

Acceleration is defined as:

- A. Distance per unit time
- B. Displacement per unit time
- C. Change in displacement per unit time
- D. Change in velocity per unit time**

Q2 Acceleration calculation

A car increases its velocity from 10 m/s to 30 m/s in 5 seconds. What is the acceleration of the car?

- A. 6 m/s²
- B. 2 m/s²
- C. 10 m/s²
- D. 4 m/s²**

Q3 Acceleration definition

Which of the following describes the rate at which an object changes its velocity?

- A. Acceleration**
- B. Speed
- C. Displacement
- D. Distance

Q4 Acceleration definition

Which physical quantity is defined as the rate of change of velocity with respect to time?

- A. Acceleration**
- B. Speed
- C. Distance travelled
- D. Displacement

Q5 Average speed

A car travels 150 kilometers in 3 hours. What is the average speed of the car, and what is the correct unit for this quantity?

- A. 150 kilometers per hour
- B. 50 kilometers per hour**
- C. 0.02 kilometers per hour
- D. 50 kilometers per minute

Q6 Average speed and velocity

A runner moves 60 meters north and then 80 meters south in 20 seconds. Which statement is correct about her average speed and average velocity?

- A. Average speed is less than average velocity
- B. Average speed is greater than average velocity**
- C. Average speed equals average velocity
- D. Average speed is zero

Q7 Average speed and velocity

A cyclist travels 60 metres north and then 80 metres south in 20 seconds. What is the magnitude of his average velocity?

- A. Five metres per second
- B. Seven metres per second
- C. Zero metres per second
- D. One metre per second**

Q8 Average speed calculation

A cyclist covers a distance of 30 kilometers in 1.5 hours. What is the average speed of the cyclist?

- A. 15 kilometers per hour
- B. 20 kilometers per hour**
- C. 2 kilometers per hour
- D. 45 kilometers per hour

Q9 Average speed calculation

A car moves at a constant speed of 20 m/s for 5 seconds. What is the total distance travelled by the car during this time?

- A. 100 meters**
- B. 4 meters
- C. 400 meters
- D. 25 meters



Q10 Distance and displacement

What is required to fully describe the displacement of a moving body?

- A. Only magnitude
- B. Both magnitude and direction ✓
- C. Position at the origin
- D. Only direction

Q11 Distance and displacement

Which quantity can never be negative in one-dimensional motion?

- A. Path length ✓
- B. Change in position
- C. Velocity
- D. Displacement

Q12 Distance and displacement

What does the displacement vector represent in two-dimensional motion?

- A. The average speed of the object
- B. The distance traveled along the path
- C. The path followed by the object
- D. The change in position from the initial point to the final point ✓

Q13 Distance and displacement

Which statement best describes the difference between path length and displacement for an object moving in a straight line and returning to its starting point?

- A. Path length is either equal to or greater than displacement ✓
- B. Path length is always equal to displacement
- C. Displacement is always negative
- D. Displacement is greater than path length

Q14 Distance and displacement

Which statement correctly describes the difference between position vector and displacement vector?

- A. Both always have the same magnitude
- B. Position vector locates a point; displacement vector shows the change between two points ✓
- C. Both always point in the same direction
- D. Position vector always shows the path traveled

Q15 Distance and displacement

Which of the following vectors correctly represents the displacement if an object moves from the point (0, 0) to the point (4, -3) in a plane?

- A. (-4, 3)
- B. (-3, 4)
- C. (4, -3) ✓
- D. (3, -4)

Q16 Distance and displacement

If a person walks 5 meters east, then 12 meters west along a straight path, which value represents the magnitude of the person's displacement?

- A. 5 meters
- B. 12 meters
- C. 17 meters
- D. 7 meters ✓

Q17 Distance-time graph

What does a position-time graph with a straight line parallel to the time axis represent in the context of an object's motion?

- A. The object accelerates over time
- B. The object moves with uniform speed over time
- C. The object is at rest, covering no distance over time ✓
- D. The object moves with varying speed

Q18 Distance-time graph

From a distance-time graph, how can the uniform speed of an object be calculated?

- A. By measuring the slope of the graph ✓
- B. By measuring the area under the graph
- C. By measuring the total time only
- D. By measuring the total distance only

Q19 Distance-time graph

A car starts from rest and gradually increases its speed. Which of the following best describes its distance-time graph?

- A. A horizontal line starting from the origin
- B. A curve starting from the origin with decreasing slope
- C. A straight line with constant slope starting from the origin
- D. A curve starting from the origin with increasing slope ✓



Q20 Distance-time graph

Which statement best describes a straight line sloping upwards on a distance-time graph for an object moving with uniform speed?

- A. The object is stationary at all times
- B. The object covers equal distances in equal intervals of time ✓
- C. The object moves with varying speed throughout
- D. The object returns to its starting point repeatedly

Q21 Distance-time graph

Which of the following best describes the appearance of a distance-time graph for an object moving at a uniform speed?

- A. A horizontal line parallel to the time axis
- B. A vertical line parallel to the distance axis
- C. A straight line with a constant positive slope ✓
- D. A curved line with a changing slope

Q22 Distance-time graph

Which of the following best describes the shape of a distance-time graph for an object moving at a uniform speed?

- A. A straight line with varying slope
- B. A horizontal straight line
- C. A straight line with a constant slope ✓
- D. A curved line upward

Q23 Distance-time graph

A Distance-Time graph shows a curve that starts steep and gradually becomes flatter (slope decreasing). This motion represents _____.

- A. Positive acceleration
- B. Constant, negative velocity
- C. Deceleration ✓
- D. Zero acceleration

Q24 Distance-time graph

Which of the following situations shows an object with zero linear velocity on a position-time graph?

- A. A horizontal straight line parallel to the time axis. ✓
- B. A downward-sloping straight line from the origin.
- C. A curved line rising from left to right.
- D. An upward-sloping straight line from the origin.

Q25 Distance-time graph

A distance-time graph for an object moving at uniform speed is characterized by which of the following features?

- A. A straight line with a constant positive slope ✓
- B. A horizontal straight line
- C. A curved line with changing slope
- D. A straight line with a negative slope

Q26 Distance-time graph

For a car moving with accelerated motion, the distance-time graph is:

- A. Vertical line
- B. Non-linear curve ✓
- C. Horizontal line
- D. Straight line

Q27 Distance-time graph

Two objects, P and Q, move with uniform speeds. The distance-time graph of P is steeper than that of Q. What does this indicate?

- A. Both have equal speed
- B. P has lower speed than Q
- C. P is accelerating
- D. P has greater speed than Q ✓

Q28 Equations of motion

A car starts from rest and accelerates uniformly at 2 m/s^2 for 5 seconds. What is the distance it travels during this time?

- A. 50 meters
- B. 20 meters
- C. 25 meters ✓
- D. 10 meters

Q29 Slope of motion graphs

Which quantity is represented by the slope of a position-time graph for an object moving in a straight line?

- A. Momentum
- B. Force
- C. Linear velocity ✓
- D. Acceleration



Q30 Slope of motion graphs

Which of the following quantities does the slope of a velocity-time graph represent for an object in motion?

- A. Force
- B. Speed
- C. Acceleration ✓
- D. Displacement

Q31 Speed and average speed

If the distance between two points on a straight line distance-time graph is 120 meters and the corresponding time interval is 4 seconds, what is the uniform speed?

- A. 15 m/s
- B. 60 m/s
- C. 30 m/s ✓
- D. 24 m/s

Q32 Speed and velocity

Which quantity does linear velocity describe in the context of motion?

- A. The amount of force applied
- B. The rate of change of position along a straight path ✓
- C. The total distance covered in all directions
- D. The direction of motion only

Q33 Speed and velocity

How does velocity differ from speed in the context of describing motion?

- A. Velocity specifies both the magnitude (speed) and the definite direction of motion. ✓
- B. Velocity applies only to non-uniform motion, while speed applies only to uniform motion.
- C. Velocity is calculated using average speed, while speed uses instantaneous speed.
- D. Velocity specifies distance covered, while speed specifies displacement.

Q34 Speed, distance and time

If a car moves with a speed of 10 m/s for 5 seconds, what distance does it cover?

- A. 15 meters
- B. 50 meters ✓
- C. 100 meters
- D. 5 meters

Q35 Uniform and non-uniform motion

Two objects, Object P and Object Q, move along a straight road. Object P travels 20 meters every 2 seconds, while Object Q covers 20 meters in the first 2 seconds and 30 meters in the next 2 seconds. Which statement is correct about their motions?

- A. Both objects are in uniform motion.
- B. Object P is in uniform motion, while Object Q is in non-uniform motion. ✓
- C. Object P is in non-uniform motion, while Object Q is in uniform motion.
- D. Both objects are in non-uniform motion.

Q36 Uniform and non-uniform motion

A cyclist covers 2 km in the first 10 minutes and 3 km in the next 10 minutes. What type of motion is this?

- A. periodic motion
- B. circular motion
- C. uniform motion
- D. non-uniform motion ✓

Q37 Uniform circular motion

Which of the following statements best defines uniform circular motion?

- A. Motion along a circular path with constant velocity and zero acceleration.
- B. Motion along a circular path with changing speed but constant velocity.
- C. Motion along a circular path with constant speed and changing direction of velocity. ✓
- D. Motion along a straight path with constant speed and constant velocity.

Q38 Uniform circular motion

Which statement best describes uniform circular motion in the context of motion and force?

- A. An object moves in a straight line at changing speed.
- B. An object moves in a circle at constant speed but its velocity changes due to change in direction. ✓
- C. An object moves in a circle with changing speed and constant direction.
- D. An object moves in a circle with both constant speed and constant direction.



Q39 Uniform circular motion

Which statement best describes the velocity of an object undergoing uniform circular motion?

- A. The velocity remains unchanged in both magnitude and direction throughout motion.
- B. The object's speed increases and decreases as it moves around the circle.
- C. The magnitude of velocity remains constant, but its direction continuously changes around the circle. ✓
- D. The object moves with a changing velocity along a straight path.

Q40 Uniform circular motion

Which quantity changes continuously for an object in uniform circular motion?

- A. The direction of velocity changes ✓
- B. The kinetic energy changes
- C. The mass changes
- D. The speed changes

Q41 Uniform circular motion

Which of the following best describes uniform circular motion?

- A. An object moving at a constant speed in a straight line
- B. An object moving at a constant speed along a circular path ✓
- C. An object moving at a changing speed along a curved path
- D. An object at rest in a circular path

Q42 Uniform circular motion

Which of the following best describes the motion of a car traveling at a constant speed around a circular track?

- A. The car moves with uniform motion as its velocity remains constant in both magnitude and direction.
- B. The car experiences non-uniform motion because it moves along a curved path at constant speed.
- C. The car moves with uniform circular motion because its speed is constant, but its direction changes continuously. ✓
- D. The car moves in a straight line at constant speed since its direction never changes.

Q43 Uniform circular motion

A toy train moves around a circular track at a constant speed. Which statement correctly describes its motion?

- A. The train changes its direction continuously while moving with constant speed. ✓
- B. The train moves with increasing speed along the circular track.
- C. The train remains at rest because its speed does not change.
- D. The train moves in a straight line with constant speed.

Q44 Uniform circular motion

Which statement best describes the direction of velocity in uniform circular motion?

- A. It is always tangent to the circle at any point ✓
- B. It is always directed towards the center
- C. It is always along the radius away from the center
- D. It is always perpendicular to the plane of the circle

Q45 Uniform motion

Which of the following describes an object moving with uniform motion along a straight line?

- A. An object traveling at a constant speed in one direction ✓
- B. An object changing direction at intervals
- C. An object stopping and starting repeatedly
- D. An object accelerating as it moves forward

Q46 Velocity-time graph

Which statement best describes the velocity-time graph for an object moving with uniform acceleration?

- A. It is a horizontal line parallel to the time axis
- B. It is a curve bending upwards
- C. It is a straight line parallel to the velocity axis
- D. It is a straight line with a constant slope ✓

Q47 Velocity-time graph

A velocity-time graph is represented by a straight line parallel to the time axis and lying above it. What does this indicate about the motion of the object?

- A. The object is at rest
- B. The object is moving with decreasing velocity
- C. The object is moving with constant velocity ✓
- D. The object is moving with increasing velocity



Q48 Velocity-time graph

In a velocity-time graph, which type of line represents motion with no change in velocity?

- A. Curved line
- B. Slanted straight line
- C. Parabola
- D. Horizontal straight line ✓

Q49 Velocity-time graph

Which feature of a velocity-time graph for uniform acceleration determines the value of acceleration?

- A. The slope of the velocity-time graph ✓
- B. The area under the velocity-time graph
- C. The maximum value on the velocity axis
- D. The intercept on the velocity axis

Q50 Velocity-time graph

On a velocity-time graph, what does a horizontal straight line above the time axis indicate about the motion of the object?

- A. Constant velocity ✓
- B. Changing direction
- C. Increasing velocity
- D. Constant acceleration

Q51 Velocity-time graph

A velocity-time graph for a body moving with uniform acceleration is a straight line that slopes upwards. What does the area under this line between two time points represent?

- A. The average velocity during that time interval
- B. The acceleration of the body during that time interval
- C. The displacement of the body during that time interval ✓
- D. The total change in velocity during that time interval

Q52 Velocity-time graph

When interpreting a velocity-time graph, what physical quantity is represented by the area under the graph during a specific time interval?

- A. Speed of the car
- B. Acceleration of the car
- C. Change in velocity
- D. Distance (or displacement) travelled ✓

Q53 Velocity-time graph

A velocity-time graph for a car moving with uniform velocity starts at $t=0$ s and ends at $t=10$ s, always at 5 m/s. What is the shape of the graph?

- A. A curve rising above 5 m/s
- B. A straight line rising from 0 to 5 m/s
- C. A straight horizontal line at 5 m/s ✓
- D. A straight line falling from 5 to 0 m/s

Q54 Velocity-time graph

If the velocity-time graph of a moving object shows a straight line parallel to the time axis, what can be concluded about the object's acceleration?

- A. The object has zero acceleration ✓
- B. The object has changing acceleration
- C. The object has negative acceleration
- D. The object has uniform acceleration

Q55 Velocity-time graph

Which method is appropriate for finding the distance travelled by an object when its velocity-time graph is a straight line sloping upwards from the origin?

- A. Read the final velocity value from the graph
- B. Subtract the initial time from the final time
- C. Calculate the area under the velocity-time graph for the given interval ✓
- D. Calculate the slope of the velocity-time graph

Q56 Velocity-time graph

Which of the following best describes the slope of the velocity-time graph for uniform velocity?

- A. The slope is negative and constant
- B. The slope changes at every point
- C. The slope is positive and constant
- D. The slope is zero at all points ✓



Q57 Velocity-time graph

A student observes a speed-time graph for a car that moves with constant speed for 10 seconds, then accelerates for 5 seconds. How can the student use the graph to calculate the total distance travelled during these 15 seconds?

- A. By calculating the area under the speed-time graph for each section and adding them ☒
- B. By using only the area under the acceleration section
- C. By multiplying the total time by the average speed shown on the graph
- D. By reading the final speed at 15 seconds and multiplying by 15



Q1 Balanced and unbalanced forces

What is the effect of unbalanced forces on an object at rest?

A. It causes the object to start moving



B. It always increases the mass of the object

C. It keeps the object at rest

D. It changes the color of the object

Q2 Balanced and unbalanced forces

Which scenario best demonstrates an unbalanced force acting on an object?

A. A picture hanging stationary on a wall

B. A soccer ball starts rolling after being kicked



C. A cup sitting on a desk not moving

D. A car parked at rest in a garage

Q3 Balanced and unbalanced forces

Which example indicates that forces acting on an object are balanced?

A. A car accelerating down a road

B. A ball falling to the ground

C. A ball at rest begins to move

D. A book lying motionless on a shelf

**Q4** Balanced and unbalanced forces

If an object continues moving in the same direction at the same speed, what can be inferred about the forces acting on it?

A. The forces are unbalanced

B. The forces are balanced



C. All forces are in same direction as direction of motion

D. The forces always cancel gravity

Q5 Conservation of momentum

Two ice skaters push off from each other on a frictionless surface. What will be observed about their motion?

A. Both skaters move in circles around each other.

B. One skater moves while the other remains stationary.

C. Both skaters move together in the same direction.

D. Both skaters move away from each other in opposite directions with equal and opposite forces.

**Q6** Inertia in daily life

When a motorcar makes a sharp turn at a high speed, the passengers tend to get thrown to one side. This can be explained using which of the following laws?

A. Law of Conservation of Momentum

B. Law of static friction

C. Newton's First Law of Motion



D. Newton's Law of Gravitation

Q7 Inertia in daily life

Which scenario best demonstrates the first law of motion as stated by Newton regarding an object's tendency to maintain its state of at rest or uniform motion?

A. A tree sways in the wind

B. A ball rolling down a hill accelerates

C. A car speeds up as the driver presses the accelerator

D. A book lying on a table stays still until someone pushes it

**Q8** Inertia in daily life

Seat belts in cars are provided to protect passengers during sudden braking or collision because of:

A. Inertia of motion



B. Friction

C. Inertia of rest

D. Inertia of direction



Q9 Momentum and impulse

If two bodies of equal mass are acted upon by unequal forces for the same time, then the body on which the larger force acts will have _____.

- A. less change in momentum
- B. equal change in momentum
- C. more change in momentum ✓
- D. no change in momentum

Q10 Momentum and second law

If a car is gradually pushed to a speed of 1 m/s, what determines the change in its momentum according to the second law of motion?

- A. Only the direction of motion changes the momentum.
- B. Only the mass of the car determines the change in momentum.
- C. The magnitude of force alone is enough to determine the change.
- D. Both the magnitude of the force and the time during which the force is applied determine the change in momentum. ✓

Q11 Newton's first law and inertia

According to the first law of motion, what will happen to a ball rolling on a smooth, horizontal surface if no external force acts on it?

- A. The ball will continue to roll at a constant speed in the same direction. ✓
- B. The ball will change its direction automatically.
- C. The ball will gradually slow down and stop by itself.
- D. The ball will speed up on its own.

Q12 Newton's first law and inertia

Why is it difficult to push a heavy box from rest, according to the first law of motion?

- A. The box has no wheels to roll
- B. The box resists changes to its state due to inertia ✓
- C. The box is glued to the floor
- D. The box is pulled back by gravity

Q13 Newton's first law and inertia

What property of an object does the first law of motion primarily describe?

- A. Momentum
- B. Acceleration
- C. Energy
- D. Inertia ✓

Q14 Newton's second law

When a net force acts on a body, what does Newton's second law predict will happen to the body?

- A. The body will remain stationary
- B. The body will always move in the opposite direction
- C. The body will accelerate in the direction of the force ✓
- D. The body will move at constant speed

Q15 Newton's second law

If an object's mass is doubled while the applied force remains constant, what happens to its acceleration according to the formula for force?

- A. The acceleration remains unchanged
- B. The acceleration becomes zero
- C. The acceleration is halved ✓
- D. The acceleration is doubled

Q16 Newton's second law

A car with a mass 2000 kg accelerates at 4 m/s^2 . According to Newton's Second Law, what is the magnitude of the force applied to the car?

- A. 1000 N
- B. 8000 N ✓
- C. 2500 N
- D. 500 N

Q17 Newton's second law

If the mass of a body is doubled and acceleration remains constant, the force will:

- A. Become half
- B. Become double ✓
- C. Become four times
- D. Remain the same



Q18 Newton's second law

If the same force is applied to two objects of different masses, what happens to their accelerations?

- A. The object with less mass will have greater acceleration.** ✓
- B. Acceleration depends only on the force, not on the mass.
- C. Both objects will have the same acceleration.
- D. The object with more mass will have greater acceleration.

Q19 Newton's second law

A car of mass 1000 kg increases its velocity from 10 m/s to 20 m/s in 5 seconds. What is the force exerted on the car?

- A. 1500 N
- B. 2000 N** ✓
- C. 1000 N
- D. 2500 N

Q20 Newton's second law

A student pushes two carts, one heavy and one light, with the same force. According to Newton's second law, what will happen to their accelerations?

- A. The lighter cart will accelerate more than the heavier cart** ✓
- B. Both carts will accelerate equally
- C. The heavier cart will accelerate more than the lighter cart
- D. The heavier cart will move with zero acceleration

Q21 Newton's second law

A 0.6 kg soccer ball and a 1.0 kg basketball are kicked with the same acceleration. Which will experience a greater force, according to Newton's second law?

- A. The ball with higher acceleration, regardless of mass
- B. The soccer ball, because it is lighter
- C. Both experience the same force
- D. The basketball, because it has greater mass** ✓

Q22 Newton's second law

Which situation demonstrates Newton's second law of motion?

- A. A ball rolling at a constant speed on a flat surface
- B. A heavy truck requires more force to accelerate than a small car** ✓
- C. A swimmer pushes water backward and moves forward
- D. A stationary object resting on a table

Q23 Newton's second law

If a car and a truck are pushed with the same force, which will accelerate more according to the second law of motion?

- A. The truck will accelerate more
- B. Both will accelerate equally
- C. The car will accelerate more** ✓
- D. Neither will accelerate

Q24 Newton's second law

A 6 kg body is subjected to a force that brings it from rest to a velocity of 18 m/s in 3 seconds. What is the value of the force?

- A. 18 N
- B. 12 N
- C. 54 N
- D. 36 N** ✓

Q25 Newton's second law

If a 2 kg ball initially at rest is pushed with a force of 8 N for 5 seconds, what is its velocity at the end of 5 seconds?

- A. 10 m/s
- B. 5 m/s
- C. 20 m/s** ✓
- D. 8 m/s

Q26 Newton's second law

A constant force is applied to a 5 kg object for 4 seconds, causing its velocity to increase from 2 m/s to 10 m/s. What is the magnitude of this force?

- A. 5 N
- B. 20 N
- C. 2 N
- D. 10 N** ✓



Q27 Newton's second law numericals

A force of 60 N is used to push a box, causing it to accelerate at 3 m/s^2 . What is the mass of the box?

- A. 180 kg
- B. 20 kg
- C. 15 kg
- D. 18 kg

**Q28 Newton's second law numericals**

Which situation demonstrates the correct application of the force formula?

- A. A 4 kg object accelerates at 3 m/s squared and a force of 20 N is applied
- B. A 5 kg object accelerates at 2 m/s squared and a force of 10 N is applied
- C. A 2 kg object accelerates at 5 m/s squared and a force of 15 N is applied
- D. A 10 kg object accelerates at 1 m/s squared and a force of 5 N is applied

**Q29 Newton's third law**

Which scenario does NOT correctly represent an action-reaction pair as per Newton's third law?

- A. A book pressing down on a table and gravity pulling the book down
- B. Rocket exhaust gases pushing backward and air pushing the rocket forward
- C. A bat hitting a ball and the ball pushing back on the bat
- D. Feet pushing the ground and the ground pushing back while walking

**Q30 Newton's third law**

During the firing of a gun, the bullet moves forward while the gun recoils backward. Which option correctly identifies the action and the corresponding reaction in this situation?

- A. The gun and bullet both move because the trigger is pulled, not because of action-reaction forces.
- B. The bullet pushes the gun forward, and the gun pushes the bullet backward.
- C. The gun exerts a forward force on the bullet; the bullet exerts an equal backward force on the gun.
- D. The bullet moves forward due to gunpowder only, and the gun moves backward due to its own weight.

**Q31 Newton's third law**

In a tug-of-war, Team A pulls Team B with a force of 300 N. According to Newton's Third Law, what force does Team B exert on Team A?

- A. 600 N in the opposite direction
- B. 300 N in the same direction
- C. 150 N in the same direction
- D. 300 N in the opposite direction

**Q32 Newton's third law**

According to the Newton's Third Law of Motion, what happens to a stationary rowing boat when a sailor jumps forward from it?

- A. The boat remains stationary since only the sailor moves.
- B. The boat moves backward due to an equal and opposite reaction force
- C. The boat moves forward along with the sailor.
- D. The boat moves unpredictably due to water resistance.

**Q33 Newton's third law**

Which situation does NOT correctly illustrate an action-reaction pair as per Newton's third law?

- A. A foot kicks a ball, ball pushes foot back
- B. A hammer strikes a nail, nail pushes hammer back
- C. A hand pushes a wall, wall pushes hand back
- D. A car accelerating due to its engine

**Q34 Newton's third law**

Why does a gun recoil backward when it is fired?

- A. The bullet pushes forward, and the gun experiences an equal and opposite backward force
- B. The trigger causes the gun to move backward
- C. The gun is heavy and naturally moves backward
- D. The air resistance pushes the gun backward

**Q35 Newton's third law**

A horse pulls a cart with a force of 500 N. The force experienced by the horse due to the cart is:

- A. 250 N
- B. 0 N
- C. 1000 N
- D. 500 N equal and opposite to the motion



Q36 Newton's third law

What happens to the magnitude of action and reaction forces in Newton's third law pairs?

- A. They depend on which object is heavier
- B. They cancel each other completely
- C. They combine to make a stronger force
- D. They are always equal in magnitude and opposite in direction ☒



Physics

68 Questions • Answer Key

Q1 Conditions for work done

Which of the following is NOT necessary for work to be done?

- A. Force must act
- B. Displacement must occur
- C. Energy must be stored ☒
- D. Force and displacement both must be present

Q2 Conditions for work done

A student holds a heavy school bag while waiting for the bus without moving. Which of the following statements are correct?

- (1) Force is applied by the student.
- (2) The bag is displaced.
- (3) Work is done on the bag.
- (4) No work is done in the scientific sense.

- A. (1) and (3) only
- B. (1) and (4) only ☒
- C. (1), (2), (3)
- D. (2) and (3) only

Q3 Conditions for work done

For work to be considered done on an object, which two conditions must be met?

- A. A force must act on the object, and the object must move. ☒
- B. The object must move fast, and the force must be constant.
- C. The object must be heavy, and the force must be large.
- D. The force must be applied for a long time, and the object must be at rest.

Q4 Conservation of energy

A child swings on a swing. At which point is the child's kinetic energy the greatest, based on the law of conservation of energy?

- A. At the highest point of the swing
- B. In the middle between highest and lowest points
- C. Kinetic energy is equal at all points
- D. At the lowest point of the swing ☒

Q5 Conservation of energy

A roller coaster car relies solely on gravitational potential energy to travel along a track. Which engineering modification will most effectively maximize the maximum speed of the car at its lowest point?

- A. Introducing a secondary hill of equivalent height
- B. Replacing the underlying track with wider rails
- C. Increasing the starting elevation of the first hill ☒
- D. Decreasing the structural mass of the loaded car

Q6 Conservation of energy

Which statement best describes the law of conservation of energy?

- A. Energy can be destroyed but not created.
- B. Energy cannot be created or destroyed; it only changes form. ☒
- C. Energy always increases in a closed system.
- D. Energy is used up during physical processes and disappears.

Q7 Conservation of energy

A roller coaster car of mass 500 kg moves down a steep track, converting its potential energy into kinetic energy. At the lowest point, it is moving at 20 m/s. If the car encounters a section with friction that removes 30,000 J of energy, what is its new speed, assuming no other forces act?

- A. ≈ 20 m/s
- B. ≈ 15 m/s
- C. ≈ 10 m/s
- D. ≈ 18 m/s ☒

Q8 Conservation of energy

A diver jumps off a diving board into a pool. At the moment just before entering the water, which statement best applies according to the law of conservation of energy?

- A. The diver's potential energy stays the same throughout
- B. The diver's total energy increases during the fall
- C. The diver's loss in potential energy equals the gain in kinetic energy ☒
- D. The diver loses energy during the fall to the surroundings



Q9 Conservation of energy

A ball rolls down a hill with no friction and reaches the bottom. Which statement best describes how the energy changes as the ball moves?

- A. The ball's potential energy decreases while its kinetic energy increases** ✓
- B. The ball's kinetic energy decreases as it moves downward
- C. The total energy of the ball increases as it rolls
- D. Both potential and kinetic energy increase as the ball moves

Q10 Definition of power

A factory manager is comparing two machines that perform the same task. Machine A takes more time to complete the task than Machine B. Based on the definition of power, which factor should the manager consider to determine which machine is more powerful?

- A. The total work done by each machine
- B. The mass of each machine
- C. The rate at which each machine does work** ✓
- D. The amount of energy used by each machine

Q11 Energy transformation

When a flashlight is turned on, what energy change occurs?

- A. Light energy changes to chemical energy
- B. Chemical energy changes to light energy** ✓
- C. Chemical energy changes to sound energy
- D. Light energy changes to sound energy

Q12 Forms of energy

What form of energy does a glowing bulb emit?

- A. Chemical energy
- B. Light energy** ✓
- C. Gravitational energy
- D. Sound energy

Q13 Forms of energy

Which of the following is an example of chemical energy?

- A. Energy from moving objects
- B. Energy from a stretched rubber band
- C. Energy stored in food** ✓
- D. Energy from a spinning wheel

Q14 Kinetic energy

Which of the following best describes kinetic energy?

- A. The energy contained in chemical bonds
- B. The energy an object stores in its position
- C. The energy an object has due to its motion** ✓
- D. The energy related to temperature changes

Q15 Kinetic energy

Which of the following is an example of kinetic energy?

- A. A parked bicycle
- B. A flying bird in the sky** ✓
- C. A book on a shelf
- D. An apple hanging from a tree

Q16 Kinetic energy

If two objects have the same velocity, which one will have more kinetic energy?

- A. The one with brighter color
- B. The one with greater mass** ✓
- C. The one with a different shape
- D. The one with larger size

Q17 Kinetic energy

When a moving car comes to a stop, what happens to its kinetic energy?

- A. It becomes double
- B. It becomes negative
- C. It becomes zero** ✓
- D. It remains the same

Q18 Kinetic energy

A vehicle of mass M travels at velocity V . If its kinetic energy increases by a factor of 9, how much does its velocity change?

- A. The velocity is quadrupled
- B. The velocity is doubled
- C. The velocity is increased nine times
- D. The velocity is tripled** ✓



Q19 Kinetic energy

A 3 kg stone is thrown vertically upwards with a speed of 8 m/s. What is its kinetic energy at the moment it leaves the thrower's hand?

- A. 48 J
- B. 24 J
- C. 72 J
- D. 96 J

**Q20 Kinetic energy**

Which physical quantity must be known to calculate the kinetic energy of a moving object?

- A. Mass and velocity
- B. Mass only
- C. Velocity only
- D. Mass and time

**Q21 Kinetic energy**

A stone of mass 0.5 kg is moving with a speed of 8 m/s. Its kinetic energy is _____.

- A. 128 J
- B. 32 J
- C. 64 J
- D. 16 J

**Q22 Kinetic energy**

When an object of mass m is moving with a velocity v , its kinetic energy is K , what will be its kinetic energy if its velocity is doubled?

- A. $2K$
- B. $4K$
- C. $3K$
- D. K

**Q23 Kinetic energy**

If a 4 kg object is moving at 3 m/s and another 2 kg object is moving at 6 m/s, which one has more kinetic energy?

- A. The 2 kg object moving at 6 m/s
- B. Neither object has kinetic energy
- C. Both objects have equal kinetic energy
- D. The 4 kg object moving at 3 m/s

**Q24 Kinetic energy**

Object A (3 kg) moves at 4 m/s, and object B (6 kg) moves at 2 m/s. Which object has greater kinetic energy?

- A. Object B
- B. Both have equal kinetic energy
- C. Cannot be determined
- D. Object A

**Q25 Kinetic energy**

A toy car of mass 0.5 kg moves with speed 2 m/s, Its kinetic energy is:

- A. 0.5 J
- B. 1 J
- C. 2 J
- D. 2.5 J

**Q26 Kinetic energy**

A student claims that a stationary object has kinetic energy because it has mass. Evaluate this statement.

- A. The statement is incorrect because kinetic energy requires motion
- B. The statement is correct because all objects with mass have kinetic energy
- C. The statement is correct only for objects on Earth
- D. The statement is incorrect because only energy in motion counts as potential energy

**Q27 Kinetic energy**

A bullet and a ball have the same kinetic energy, but the bullet has much less mass than the ball. Which statement about their speeds is correct?

- A. Both move at the same speed
- B. The bullet moves much faster than the ball
- C. Both bullet and ball stay at rest
- D. The ball moves much faster than the bullet

**Q28 Kinetic energy calculation**

A car with a mass of 1000 kg is moving at a speed of 25 m/s. If the driver applies the brakes and brings the car to a stop, how much kinetic energy is lost during this process?

- A. 312500 J
- B. 12500 J
- C. 25000 J
- D. 625000 J



Q29 Kinetic energy calculation

An athlete of mass 60 kg runs at 5 m/s. What is the kinetic energy gained compared to standing still?

- A. 1500 J
- B. 375 J
- C. 300 J
- D. 750 J

**Q30 Positive and negative work**

A football player kicks a ball forward. Later, a goalkeeper catches the ball and brings it to rest.

Which of the following statements are correct?

1. The player does positive work on the ball.
2. The goalkeeper does negative work on the ball.
3. During the kick, force and displacement are in the same direction.
4. During the catch, force and displacement are in opposite directions.

- A. 1 and 2 only
- B. 2 and 3 only
- C. 1, 2 and 4 only
- D. 1, 2, 3 and 4

**Q31 Positive and negative work**

When lifting an object upwards, the work done by the force of gravity is considered negative because _____.

- A. The object is displaced upward, opposite to the downward force of gravity
- B. The force of gravity is constant
- C. The net force on the object is zero
- D. Force of gravity only does positive work on falling objects

**Q32 Positive and negative work**

A force of 20 N acts opposite to the displacement of 5 m. What is the work done by the force?

- A. -100 J
- B. +25 J
- C. +100 J
- D. 0 J

**Q33 Positive negative and zero work**

A cyclist applies brakes to stop a moving bicycle. The work done by the braking force on the bicycle is _____.

- A. Negative only
- B. Both positive and negative
- C. Positive only
- D. Zero

**Q34 Positive negative and zero work**

Which of the following situations correctly illustrates the scientific definition of work in physics?

- A. A person lifts a box from the floor onto a table
- B. A person holds a book stationary above their head
- C. A person walks with a backpack at constant speed
- D. A person pushes against a wall but the wall does not move

**Q35 Positive negative and zero work**

An object is moving eastward. Which force will definitely do negative work on it?

- A. A force acting downward
- B. A force acting westward
- C. A force acting eastward
- D. A force acting upward

**Q36 Potential energy**

An object of mass m is raised vertically through a height h near the Earth's surface. What is its gravitational potential energy?

- A. mg/h
- B. mh/g
- C. mgh
- D. hg/m

**Q37 Potential energy**

A water tank of mass 500 kg is placed on the roof of a building 20 m above the ground. The acceleration due to gravity is $g = 10\text{m/s}^2$. If the tank is moved to the roof of another building that is twice as high as the first building, while its mass remains unchanged, what will be its new gravitational potential energy?

- A. 200,000 J
- B. 400,000 J
- C. 50,000 J
- D. 100,000 J



Q38 Potential energy

Which of the following physical quantities affect gravitational potential energy?

- A. Speed and distance
- B. Volume and shape
- C. Temperature and colour
- D. Mass and height** ✓

Q39 Potential energy

A roller coaster car is at the highest point of its track and is about to descend. If the mass of the car and its passengers is doubled while keeping the height and gravity constant, how does the gravitational potential energy at the top compare to the original scenario?

- A. The gravitational potential energy is quadrupled
- B. The gravitational potential energy is unchanged
- C. The gravitational potential energy is doubled** ✓
- D. The gravitational potential energy is halved

Q40 Potential energy

A ball is placed at the edge of a table and then at the center. The table's height remains unchanged. How does the ball's gravitational potential energy compare in both positions?

- A. The potential energy is higher at the edge than at the center
- B. The potential energy keeps changing as the ball moves
- C. The potential energy is the same in both positions** ✓
- D. The potential energy is lower at the edge than at the center

Q41 Potential energy

Which of the following does NOT possess potential energy (with respect to the ground)?

- A. Water stored in a dam
- B. A freely falling body at ground level** ✓
- C. A stone on the roof
- D. A compressed spring

Q42 Potential energy

A climber is carrying a backpack up a mountain with varying slopes. At which point during the climb is the potential energy of the backpack at its maximum, assuming no energy is lost and the mass remains constant?

- A. At the steepest slope of the climb
- B. At the highest elevation reached during the climb** ✓
- C. At the starting position at the mountain base
- D. At the halfway point up the mountain

Q43 Potential energy

If you lift a book and place it on a shelf, what happens to its energy?

- A. Its potential energy increases** ✓
- B. It loses all energy
- C. Its thermal energy increases
- D. It gains kinetic energy

Q44 Potential energy

An object is placed at a certain height above the ground. Which form of energy does it possess due to its position?

- A. Chemical energy
- B. Potential energy** ✓
- C. Kinetic energy
- D. Thermal energy

Q45 Potential energy

An object of mass 12.5 kg is lifted to a height of 8 m. (Take $g = 10 \text{ m/s}^2$.) Its potential energy is _____.

- A. 1000 J** ✓
- B. 100 J
- C. 800 J
- D. 1250 J



Q46 Power

A worker performs a task. Which of the following statements about power are correct?

1. If work remains constant and time increases, power decreases.
2. If time remains constant and work increases, power increases.
3. Power is directly proportional to work done.
4. Power is inversely proportional to time taken.

A. 1, 2, 3 and 4



B. 1, 2 and 3 only

C. 2 and 4 only

D. 1, 3 and 4 only

Q47 Power

Which statement about power is correct?

A. Power depends only on force.

B. Power and work have the same SI unit.

C. Power measures how quickly work is done.



D. Power is independent of time.

Q48 Power and time taken

For the same amount of work, the time taken by Machine A is one-half that of Machine B. What is the ratio of the power of Machine A to that of Machine B?

A. 1 : 1

B. 2 : 1



C. 1 : 2

D. 4 : 1

Q49 Power and time taken

Student A takes 20 seconds, while student B takes 40 seconds to complete the same amount of work. Which of the following statements is correct in connection to A and B?

A. Both students have the same power

B. Student A has double the power of Student B



C. Student B has done more work

D. Student B has double the power of Student A

Q50 Power and time taken

If the power of an engine is doubled while the time remains constant, the work done:

A. remains the same

B. becomes half

C. becomes double



D. becomes four times

Q51 Power calculation

A motor develops a power of 85 W for 30 s. What is the work done by the motor?

A. 2550 J



B. 250 J

C. 2500 J

D. 255 J

Q52 Power calculation

A machine completes a task requiring 3000 J of work in half a minute. The average power delivered by the machine is ____.

A. 300 W

B. 10 W

C. 30 W

D. 100 W

**Q53 Power calculation**

Machine M does 600 J of work in 20 s. Machine N does 900 J of work in 15 s. Which statement is correct?

A. Machine M develops greater power.

B. Both machines develop the same power.

C. Machine N develops 1.5 times the power of Machine M.

D. Machine N develops twice the power of Machine M.

**Q54 Power calculation**

A machine develops a power of 10 W. What does this imply?

A. It does 10 J of work every minute

B. It applies a force of 10 N

C. It does 10 J of work every second



D. It stores 10 J of energy



Q55 Power numerical

A motor performs 1875 J of work in 3 seconds. What is its power output?

- A. 5625 W
- B. 210 W
- C. 2810 W
- D. 625 W

**Q56 Work done by a force**

A force of 300 N acts on an object. If displacement becomes three times larger while force remains constant, work done ____.

- A. remains same
- B. becomes one-third
- C. becomes nine times
- D. becomes three times

**Q57 Work done by a force**

A force of 45 N causes an object to move 3 m in the direction of the force. Calculate the work done.

- A. 145 J
- B. 125 J
- C. 135 J
- D. 155 J

**Q58 Work done by a force**

A force of 7 N acts on an object, displacing it through 8 m in the direction of the force. What is the work done?

- A. 15 J
- B. 56 J
- C. 1 J
- D. 27 J

**Q59 Work done by a force**

A constant force acts on an object and causes it to move in the same direction as the force. How is the work done by the force calculated?

- A. Work is calculated by multiplying force and displacement
- B. Work is calculated by adding force and displacement
- C. Work is calculated by dividing force by displacement
- D. Work is calculated by multiplying force and time

**Q60 Work done by a force**

A constant force acts on an object and does 250 J of work while moving it through a distance of 25 m in the direction of the force. What is the magnitude of the force?

- A. 15 N
- B. 10 N
- C. 20 N
- D. 25 N

**Q61 Work done by force**

A student applies a constant force on a box at an angle to the horizontal, and the box moves in a straight horizontal line on a rough surface. Which statement correctly describes the work done by the applied force on the box?

- A. The total applied force, including both horizontal and vertical components, multiplied by the distance moved
- B. Only the vertical component of the applied force, multiplied by the distance moved vertically
- C. Only the horizontal component of the applied force, multiplied by the distance moved in the same direction, gives the work done
- D. The sum of the horizontal and vertical components of the force, multiplied by the total distance traveled

**Q62 Work done by force**

If the displacement of an object doubles while the constant force remains unchanged, the area under the force–displacement graph ____.

- A. becomes twice the original area
- B. remains unchanged
- C. becomes half of the original area
- D. becomes four times the original area

**Q63 Work done numericals**

A trolley is pulled along a straight track by a constant force of 40 N. If the work done on the trolley is 240 J, what distance does the trolley travel?

- A. 2 m
- B. 6 m
- C. 12 m
- D. 4 m



Q64 Work done numericals

If a force of 1 N displaces an object by 1 m along the line of force, the work done is:

A. 1 J



B. 0.1 J

C. 0.5 J

D. 10 J

Q65 Work-energy theorem

The kinetic energy of a body increases from 40 J to 140 J. What is the net work done on the body?

A. 100 J



B. 200 J

C. 50 J

D. 150 J

Q66 Work-energy theorem

According to the work-energy theorem, if the net work done on an object is zero, then its kinetic energy _____.

A. Decreases continuously

B. Increases continuously

C. Remains unchanged



D. Becomes zero

Q67 Work-energy theorem

The work done to increase the kinetic energy of a 4 kg object from 50 J to 98 J is:

A. 148 J

B. 24.5 J

C. 52 J

D. 48 J

**Q68 Work-energy theorem**

An object moving with kinetic energy 800 J experiences a net work of -600 J. What happens to the object?

A. It continues with same speed

B. It stops moving

C. It moves with half speed



D. It doubles its speed



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Q1 Classes of levers

Consider the following statements about a seesaw used in a playground.

1. The central support acts as the fulcrum.
2. The weight of a child on one side may act as the load.
3. The force applied by a child on the opposite side may act as the effort.
4. A seesaw is an example of a first-class lever.

Which of the above statements are correct?

A. 1, 2, 3 and 4



B. 1, 2 and 4 only

C. 1, 2 and 3 only

D. 1 and 2 only

Q2 Functions of simple machines

Consider the following statements about simple machines.

1. Help lift heavy loads.
2. Can increase the distance through which effort acts.
3. May change the direction of force.
4. Violate the law of conservation of energy.

Which of the above statements are correct?

A. 1 and 4 only

B. 1, 2, 3 and 4

C. 1, 2 and 3 only



D. 2 and 3 only

Q3 Ideal and real machines

Which of the following is NOT true about simple machines?

A. They reduce total work done in all cases



B. They can change the direction of force

C. They can reduce the effort required

D. They make tasks more convenient

Q4 Inclined plane

A group of students is designing a wheelchair ramp for their school entrance. According to the concept of a simple machine, which modification would make it easier to push a wheelchair to the same height?

A. Adding steps instead of a ramp to reach the same height

B. Making the ramp steeper by decreasing its length for the same height

C. Increasing the length of the ramp while keeping its height constant



D. Adding friction material to the ramp surface to slow down movement

Q5 Inclined plane

A box is raised to the same height either by lifting it vertically or by pushing it up an ideal inclined plane. Which quantity is the same in both cases?

A. Effort applied

B. Potential energy gained by the box



C. Mechanical advantage of the method used

D. Distance moved by the box

Q6 Inclined plane

During an experiment, a student gradually lowers the angle of an ideal ramp while pulling a toy cart to the same height. What observation should the student expect?

A. The force required decreases.



B. The force required remains constant.

C. The force required increases.

D. The cart gains less potential energy.

Q7 Inclined plane

An ideal inclined plane is 20 m long and raises a load through a vertical height of 4 m. Compared to lifting the load straight up, the effort required to move the load up the plane is _____.

A. One-fifth of the load



B. Equal to the load

C. One-fourth of the load

D. One-half of the load



Q8 Load effort and fulcrum

While opening a bottle cap using a bottle opener, the resistance offered by the cap acts as the ____.

- A. Machine
- B. Effort
- C. Load ✓
- D. Energy source

Q9 Load effort and fulcrum

In a simple machine, the force that must be overcome is called the ____.

- A. Energy
- B. Load ✓
- C. Effort
- D. Power

Q10 Load effort and fulcrum

Every lever consists of three essential parts that help it function. Which of the following is NOT one of these parts?

- A. Load
- B. Effort
- C. Fulcrum
- D. Axle ✓

Q11 Load effort and fulcrum

Which of the following best describes a load?

- A. A machine used for lifting
- B. The object being moved or lifted ✓
- C. The energy stored in a system
- D. The force applied downward

Q12 Mechanical advantage

A machine lifts a load of 600 N using an effort of 150 N. What is the mechanical advantage of the machine?

- A. 2
- B. 3
- C. 5
- D. 4 ✓

Q13 Mechanical advantage

Which quantity indicates the factor by which a simple machine multiplies the applied force?

- A. Velocity ratio
- B. Mechanical advantage ✓
- C. Input work
- D. Efficiency

Q14 Mechanical advantage

A worker is choosing among four levers to lift a heavy concrete block. To reduce the effort required as much as possible, which lever should the worker select?

- A. Effort arm = 40 cm, Load arm = 10 cm ✓
- B. Effort arm = 30 cm, Load arm = 15 cm
- C. Effort arm = 20 cm, Load arm = 20 cm
- D. Effort arm = 50 cm, Load arm = 25 cm

Q15 Mechanical advantage

A rescue team uses a long steel rod as a lever to lift a heavy concrete slab. To minimize the force required, where should the fulcrum be positioned?

- A. Near the point where the force is applied
- B. Away from both the slab and the effort
- C. Near the slab being lifted ✓
- D. Exactly halfway between the slab and the effort

Q16 Mechanical advantage

Two machines lift the same load. Machine P requires an effort of 100 N, while Machine Q requires an effort of 50 N. Which machine has the greater mechanical advantage?

- A. Machine P
- B. Machine Q ✓
- C. Cannot be determined
- D. Both machines are equally efficient



Q17 Mechanical advantage

A worker has to raise a heavy load to a certain height. Four ideal machines are available. Their mechanical advantages are given below:

Machine P: $MA = 0.5$

Machine Q: $MA = 0.8$

Machine R: $MA = 2$

Machine S: $MA = 4$

Assume all machines are frictionless and the load must be lifted through the same vertical height.

Which of the following statements is correct?

- A. Machine S requires the least effort but the effort moves through the greatest distance.** ✓
- B. Machine S performs less work than the other machines.
- C. Machines R and S require the same effort since the load is unchanged.
- D. Machine P requires the least effort because it has the smallest MA.

Q18 Mechanical advantage

Which statement best describes the mechanical advantage of a simple machine?

- A. The energy supplied to the machine
- B. The rate at which the machine performs work
- C. The ratio of the load lifted to the effort applied** ✓
- D. The amount of work done by the machine

Q19 Mechanical advantage and friction

A machine lifts a 1500 N load using an effort of 250 N. Due to friction, the effort required later becomes 375 N while lifting the same load. Which statement is correct?

- A. Load and effort both increased by 50%
- B. Effort decreased by 50%
- C. Effort increased by 50% while load remained unchanged** ✓
- D. Load increased by 50%

Q20 Mechanical advantage of lever

A lever provides mechanical advantage greater than 1 when _____.

- A. Fulcrum is absent
- B. Effort arm is longer than load arm** ✓
- C. Load arm is longer than effort arm
- D. Both arms are equal

Q21 Parts of a lever

The force applied by a person to operate a machine is known as _____.

- A. Fulcrum
- B. Load
- C. Effort** ✓
- D. Resistance

Q22 Parts of a lever

While operating a lever, which part serves as the fixed point around which the lever rotates?

- A. Fulcrum** ✓
- B. Effort arm
- C. Load
- D. Effort

Q23 Pulleys

Which observation would provide the strongest evidence that a machine is a fixed pulley?

- A. The machine stores energy while lifting.
- B. The applied force is smaller than the load.
- C. The load becomes lighter during lifting.
- D. The effort and load move in opposite directions.** ✓

Q24 Purpose of simple machines

What is the primary purpose of a simple machine?

- A. To increase the weight of an object
- B. To reduce the total work done in a task
- C. To create energy
- D. To make work easier by changing the magnitude or direction of a force** ✓



Physics

29 Questions • Answer Key

Q1 Audible range

Why can humans NOT hear the sound produced by a bat?

- A. The sound is too loud for humans.
- B. The frequency of bat sounds is above 20,000 Hz. ✓**
- C. The sound travels only in water.
- D. The frequency of bat sounds is below 20 Hz.

Q2 Audible range and infrasound

How does the human ear respond to frequencies below 20 Hz?

- A. The human ear converts low frequencies into high frequencies
- B. The human ear cannot hear frequencies below 20 Hz ✓**
- C. The human ear can hear all frequencies below 20 Hz
- D. The human ear amplifies only high frequencies

Q3 Audible range and infrasound

A sound wave with a frequency of 15 Hz would be best categorized as which type?

- A. Hypersonic sound
- B. Ultrasonic sound
- C. Audible sound
- D. Infrasonic sound ✓**

Q4 Compressions and rarefactions

What forms the compressions and rarefactions in a sound wave traveling through air?

- A. Particles in the air permanently collide and stick together
- B. Particles in the air move in a spiral pattern as the wave passes
- C. Particles in the air bunch together and spread apart alternately ✓**
- D. Particles in the air maintain equal spacing at all times

Q5 Frequency and time period

A certain sound wave has a frequency of 400 Hz. What is the time period for this wave?

- A. 0.05 seconds
- B. 0.0025 seconds ✓**
- C. 0.25 seconds
- D. 0.025 seconds

Q6 Longitudinal waves and compressions

Which of the following features is unique to longitudinal sound waves?

- A. They move as crests and troughs through a medium.
- B. They form regions of compression and rarefaction. ✓**
- C. They vibrate only up and down in a medium.
- D. They travel as side-to-side pulses in a medium.

Q7 Longitudinal waves and compressions

When a tuning fork vibrates and produces sound, what type of waves is created in the surrounding air?

- A. A wave where energy moves but particles do not.
- B. A surface wave moving in circles.
- C. A longitudinal wave with compressions and rarefactions. ✓**
- D. A transverse wave with crests and troughs.

Q8 Medium for sound propagation

What is the role of a medium in the propagation of sound?

- A. A medium blocks sound from moving between places
- B. A medium provides particles that carry sound vibrations ✓**
- C. A medium is not needed for sound to move from one point to another
- D. A medium changes sound into light energy for travel



Q9 Medium needed for sound

Which of the following statements best explains why sound can NOT travel through a vacuum?

- A. Sound waves in a vacuum change their pitch to inaudible levels.
- B. Sound travels faster in a vacuum because there are no obstacles.
- C. Sound requires particles to transfer energy, but a vacuum has no particles. ✓
- D. Sound needs light to travel, and a vacuum lacks light.

Q10 Medium needed for sound

When a bell rings inside a jar and the air is slowly removed, what happens to the sound?

- A. The pitch of the sound increases
- B. The sound becomes louder
- C. The sound becomes fainter as air is removed ✓
- D. The bell stops vibrating immediately as air is removed

Q11 Pitch and frequency

A student beats a large drum and blows a high-pitched plastic whistle at the same time. Which property of the sound waves is the main reason why the whistle sounds so different from the drum?

- A. The frequency of the sound waves is different for each instrument ✓
- B. The speed of the sound waves through the air is different for each
- C. The type of air in the room changes when each instrument is played
- D. The loudness of the sound waves is always the same for both

Q12 Pitch and loudness

Why does a tightly stretched drum skin make a different sound than a loose one?

- A. A tightly stretched drum skin is thicker than a loose one
- B. A tightly stretched drum skin contains more air than a loose one
- C. A tightly stretched drum skin vibrates faster than a loose one ✓
- D. A tightly stretched drum skin is heavier than a loose one

Q13 Pitch and loudness

If a musical instrument produces a sound with a frequency of 200 Hz, which of the following frequencies will produce a sound of higher pitch than this instrument?

- A. 120 Hz
- B. 150 Hz
- C. 350 Hz ✓
- D. 180 Hz

Q14 Pitch and loudness

If two notes are played, one at 300 Hz and the other at 600 Hz, how do their pitches compare?

- A. The 300 Hz note is louder than the 600 Hz note
- B. Both notes have the same pitch
- C. The 300 Hz note has a higher pitch
- D. The 600 Hz note has a higher pitch ✓

Q15 Pitch and loudness

Which statement is true about two sounds with the same amplitude but different frequencies?

- A. They have the same pitch but different loudness
- B. They travel at different speeds in the same medium
- C. They have the same loudness but different pitch ✓
- D. They have the same frequency but different amplitudes

Q16 Pitch and loudness

If two sounds have the same frequency but different amplitudes, what will be different?

- A. Their speed will be different
- B. Their loudness will be different ✓
- C. Their pitch will be different
- D. Their direction will be different

Q17 Pitch and loudness

Which pair of changes will increase both the loudness and the pitch of a sound produced by a guitar string?

- A. Increasing amplitude and increasing frequency ✓
- B. Decreasing amplitude and increasing frequency
- C. Increasing amplitude and decreasing frequency
- D. Decreasing amplitude and decreasing frequency



Q18 Pitch and loudness

Which statement best explains the difference between a low pitch sound and a high pitch sound?

- A. A low pitch sound and a high pitch sound have the same frequency.
- B. A low pitch sound is always louder than a high pitch sound.
- C. A low pitch sound has a higher frequency than a high pitch sound.
- D. A low pitch sound has a lower frequency compared to a high pitch sound. ✓

Q19 Pitch and loudness

Which of the following examples best illustrates a high pitch sound in everyday life?

- A. The beat of a large drum
- B. The ticking of a large wall clock
- C. A child blowing a whistle ✓
- D. The hum of a refrigerator

Q20 Production of sound by vibration

Why does touching a vibrating tuning fork to water cause ripples?

- A. The fork heats the water and makes ripples
- B. The fork makes sound but does not move water
- C. Water forms ripples without vibration
- D. Vibrations from the fork transfer energy, moving water ✓

Q21 Production of sound by vibration

Which of the following situations best demonstrates that a vibrating object is necessary for the production of sound?

- A. Shining a flashlight onto a wall in a dark room
- B. Holding a metal rod steady and listening for a hum
- C. Plucking a stretched guitar string and hearing a tone ✓
- D. Looking at a glass bottle placed on a table without disturbing it

Q22 Sound needs a medium

Which of the following statements best explains why striking a bell in a vacuum does NOT produce sound we can hear?

- A. Light from the bell reaches our ears instead
- B. The bell does not vibrate in a vacuum
- C. The bell's material prevents sound from traveling
- D. Sound needs a medium to travel from the bell to our ears ✓

Q23 Speed of sound

Why can you hear a train approaching when you put your ear on the railway track?

- A. Sound moves through the air above the track
- B. Vibrations travel only along the surface of the rails
- C. Sound travels efficiently through solid steel rails to your ear ✓
- D. Rails vibrate more loudly than air does

Q24 Speed of sound in media

Which of the following statements best describes how sound travels through different materials?

- A. Sound travels fastest in gases and slowest in solids.
- B. Sound travels at the same speed in all materials.
- C. Sound travels fastest in liquids and slowest in gases.
- D. Sound travels faster in solids than in liquids and gases. ✓

Q25 Speed of sound in media

Which of the following statements best describes how the speed of sound changes as it moves from air into water?

- A. The speed of sound is slower in water than in air.
- B. The speed of sound decreases when moving from air to water.
- C. The speed of sound remains the same in both air and water.
- D. The speed of sound increases when moving from air to water. ✓

Q26 Wave equation numerical

If a sound wave has a wavelength of 0.5 m and travels at 250 m/s, what is its frequency?

- A. 125 Hz
- B. 500 Hz ✓
- C. 1000 Hz
- D. 250 Hz



Q27 Wave speed, frequency and wavelength

A wave has a frequency of 200 Hz and a wavelength of 1.7 m. What does their product represent?

- A. The loudness of the wave
- B. The amplitude of the wave
- C. The speed of the wave ☒
- D. The period of the wave

Q28 Wave speed, frequency and wavelength

A sound wave has a frequency of 500 Hz and travels at 340 m/s. What is its wavelength?

- A. Its wavelength is 170 meters
- B. Its wavelength is 0.34 meters
- C. Its wavelength is 1.47 meters
- D. Its wavelength is 0.68 meters ☒

Q29 Wave speed, frequency and wavelength

If the frequency of a sound wave increases while its speed in air remains constant, what happens to its wavelength?

- A. Its wavelength fluctuates randomly
- B. Its wavelength decreases ☒
- C. Its wavelength remains unchanged
- D. Its wavelength increases



Physics

16 Questions • Answer Key

Q1 Conditions for hearing echo

Which of the following conditions is necessary to hear an echo clearly?

- A. Time interval must be at least 0.1 s ✓
- B. Source of sound must be very strong
- C. The reflecting surface must be soft
- D. Listener must be moving

Q2 Echo

Which of the following best describes an echo in the context of sound propagation and reflection?

- A. An echo is a change in the pitch of a sound due to distance from the source.
- B. An echo is a continuous sound produced by a vibrating object.
- C. An echo is a louder sound produced when sound reflects from a wall.
- D. An echo is a reflected sound heard distinctly after the original sound. ✓

Q3 Echo

Which of the following changes will most likely reduce the clarity of an echo in a large room?

- A. Installing smooth ceramic tiles
- B. Painting the walls a light colour
- C. Making the room larger
- D. Adding thick curtains to the walls ✓

Q4 Echo distance and speed

A student shouts facing a tall building 176 meters away and hears the echo after 1 second. What is the speed of sound in air based on this observation?

- A. 330 m/s
- B. 400 m/s
- C. 352 m/s ✓
- D. 176 m/s

Q5 Echo formation

Which of the following best explains why an echo is heard when a sound is produced near a large, flat wall?

- A. The wall vibrates and produces a new sound identical to the original.
- B. Sound waves pass directly through the wall and reappear on the other side.
- C. Sound is absorbed by the wall and then emitted slowly.
- D. Sound waves reflect off the wall and return to the listener after a short delay. ✓

Q6 Echo time calculation

A student shouts facing a building 220 meters away. If the speed of sound is 330 m/s, how long after the shout will the echo be heard?

- A. 0.44 s
- B. 1.33 s ✓
- C. 0.67 s
- D. 2.20 s

Q7 Reverberation

Which of the following methods is commonly used to measure reverberation in a room?

- A. Counting the number of echoes heard
- B. Timing how long sound persists after the source stops ✓
- C. Measuring the speed of sound in the room
- D. Calculating the frequency of the sound wave

Q8 Reverberation in auditoriums

Which of the following actions would most effectively reduce reverberation in a large auditorium?

- A. Removing some of the seats in the auditorium
- B. Painting the walls with regular paint
- C. Adding more loudspeakers to the auditorium
- D. Installing curtains and carpets throughout the space ✓



Q9 Reverberation in auditoriums

Which of the following best describes the effect of excessive reverberation in a large auditorium during a speech?

- A. It causes spoken words to overlap and become unclear to the audience. ✓
- B. It increases the volume of the speaker's voice for everyone present.
- C. It improves the quality of music by making it sharper and more distinct.
- D. It allows the audience to hear sound for a shorter duration than intended.

Q10 Reverberation in auditoriums

A group of engineers is tasked with designing a lecture hall for maximum speech intelligibility. Which combination of features should they prioritize to minimize reverberation?

- A. Polished stone floors and glass walls
- B. High ceilings with reflective panels
- C. Soft wall coverings, acoustic ceiling tiles, and upholstered seating ✓
- D. Upholstered seating with bare walls and floors

Q11 Stethoscope and megaphone

How does a stethoscope use the principle of reflection of sound?

- A. By absorbing sound waves
- B. By filtering sound by frequency
- C. By directing sound outward
- D. Through multiple reflections within its tube to transmit heartbeat sounds ✓

Q12 Ultrasound and its uses

Which of the following statements best describes how ultrasound is utilized in medical imaging?

- A. Ultrasound waves pass through blood without interaction to form images.
- B. Ultrasound waves reflect off tissues to create internal images. ✓
- C. Ultrasound waves are absorbed by bones to visualize soft tissue.
- D. Ultrasound waves ionize tissues to produce visible images.

Q13 Uses of ultrasound

What is the key reason for ultrasound to be used in cleaning delicate electronic components?

- A. It chemically alters the material for cleaning
- B. It scratches the surface to remove debris
- C. It melts the components for better cleaning
- D. It removes dirt without causing physical damage ✓

Q14 Uses of ultrasound

How can ultrasound be used to detect flaws in a metal block?

- A. By observing visible movement inside the block
- B. By measuring the reflection of waves at internal cracks ✓
- C. By heating the block with the ultrasound
- D. By measuring the color of the metal

Q15 Uses of ultrasound

Which of the following best explains how ultrasound is used in medical imaging?

- A. Ultrasound uses low-frequency sound waves for medical imaging
- B. Ultrasound waves reflect off tissues to create real-time images on a monitor ✓
- C. Ultrasound is used to measure temperature changes in body tissues
- D. Ultrasound waves pass through tissues without any reflection for imaging

Q16 Uses of ultrasound

Why are ultrasound waves used for cleaning delicate objects such as jewelry?

- A. They heat the jewelry to remove stains
- B. They cause tiny vibrations that dislodge dirt ✓
- C. They attract dirt particles with magnetism
- D. They dissolve dirt using special chemicals



Q1 Concave mirror image formation

A student observes that moving the object from beyond the center of curvature toward the focus of a concave mirror causes the image to change. What change is observed?

- A. The image becomes smaller and moves away from the mirror
- B. The image remains the same size and position
- C. The image becomes larger and moves away from the mirror ✓
- D. The image becomes smaller and moves toward the mirror

Q2 Concave mirror image formation

A student places a small candle between the center of curvature and the principal focus of a concave mirror. What type of image will be formed by the mirror according to the ray diagram rules?

- A. Real, inverted and enlarged image is produced beyond the center of curvature ✓
- B. Virtual, erect and enlarged image is produced behind the mirror
- C. Virtual, erect and diminished image is produced between pole and focus
- D. Real, inverted and same size image is produced at the center of curvature

Q3 Convex mirror image formation

A convex mirror has a focal length of 20 cm. If an object is placed 40 cm from the mirror, what will be the nature and relative size of the image?

- A. Real, larger than the object
- B. Virtual, smaller than the object ✓
- C. Real, smaller than the object
- D. Virtual, same size as the object

Q4 Focal length and curvature

A convex mirror has a radius of curvature of 50 cm. A parallel beam of light strikes the mirror. At what distance from the pole does the reflected beam appear to diverge?

- A. 10 cm behind the mirror
- B. 25 cm behind the mirror ✓
- C. 25 cm in front of the mirror
- D. 50 cm in front of the mirror

Q5 Image formation by concave mirror

An object is placed at the center of curvature of a concave mirror. If the mirror is now partially covered with an opaque material, what change will occur in the image?

- A. The image will disappear completely
- B. The image will remain at the same position but will become less bright ✓
- C. The image will shift closer to the mirror and become smaller
- D. The image will move farther from the mirror and become inverted

Q6 Image formation by concave mirror

Which of the following best describes the image formed by a concave mirror when the object is placed just beyond the focal point but before the center of curvature?

- A. Virtual, inverted, and magnified
- B. Real, inverted, and magnified ✓
- C. Virtual, upright, and diminished
- D. Real, upright, and same size

Q7 Image formation by concave mirror

A car driver uses a rear-view mirror to observe vehicles behind. If the mirror were replaced with a concave mirror of the same size, which of the following is the most likely consequence for the image of a car far behind?

- A. The image would always be virtual, erect, and magnified
- B. The image would always be virtual, erect, and diminished
- C. The image would appear inverted and could be larger or smaller depending on the position ✓
- D. The image would always be virtual, inverted, and diminished

Q8 Image formation by concave mirror

A converging mirror has a radius of curvature of 30 cm. If an object is placed on the principal axis at 60 cm from the pole, what is the nature of the image formed?

- A. The image is real and upright on the opposite side
- B. The image is real and inverted on the same side as the object ✓
- C. The image is virtual and upright on the same side as the object
- D. The image is at the same position as the object



Q9 Image formation by convex mirror

A science fair project uses a convex mirror to monitor a hallway. If a person stands at various distances from the mirror, what remains constant about the images formed, regardless of their position?

- A. The images are always magnified and behind the mirror
- B. The images are always real and inverted
- C. The images are always enlarged and real
- D. The images are always diminished and virtual ✓

Q10 Magnification and sign convention

A dentist uses a concave mirror of focal length 20 cm to examine a patient's tooth. If the tooth is placed 5 cm from the mirror, what is the magnification produced?

- A. 1.33 ✓
- B. 0.75
- C. 0.5
- D. 1.67

Q11 Magnification and sign convention

A student observes an image that is inverted and smaller than the object when using a mirror. What type of magnification is being observed?

- A. The magnification is equal to one and positive
- B. The magnification is less than one and negative ✓
- C. The magnification is greater than one and negative
- D. The magnification is greater than one and positive

Q12 Mirror formula numericals

A student places an object 20 cm in front of a concave mirror with a focal length of 10 cm, using the sign convention for spherical mirrors. What is the correct value and sign for the image distance?

- A. +20 cm
- B. -10 cm
- C. -20 cm ✓
- D. +10 cm

Q13 Mirror formula numericals

A student places an object at 90 cm from a concave mirror and finds the image at 45 cm in front of the mirror. What will be the distance between the pole and the principal focus of this mirror?

- A. 45 cm
- B. 30 cm ✓
- C. 22.5 cm
- D. 60 cm

Q14 Mirror formula numericals

A student observes that when an object is placed at 15 cm from a mirror, the image is formed at 30 cm on the same side. What is the focal length of the mirror?

- A. -5 cm
- B. -12 cm
- C. -10 cm ✓
- D. -8 cm

Q15 Mirror formula numericals

A traffic surveillance camera uses a convex mirror with a radius of curvature of 2 m. Where will the image of a car located 3 m from the mirror appear?

- A. 0.12 m in front of the mirror
- B. 0.75 m behind the mirror ✓
- C. 3 m in front of the mirror
- D. 3 m behind the mirror

Q16 Mirror formula numericals

If an image is formed three times the size of the object and is inverted, what is the possible position of the object with respect to a concave mirror of focal length 10 cm?

- A. Object placed 13.3 cm from the mirror ✓
- B. Object placed 6.6 cm from the mirror
- C. Object placed 20 cm from the mirror
- D. Object placed 10 cm from the mirror

Q17 Mirror formula numericals

A student places a small object 20 cm from a concave mirror of focal length 10 cm. According to the mirror formula, what will be the image distance?

- A. 20 cm in front of the mirror ✓
- B. 10 cm behind the mirror
- C. 25 cm behind the mirror
- D. 15 cm in front of the mirror



Q18 Mirror formula numericals

A real, inverted image is formed at a distance of 30 cm in front of a concave mirror when an object is placed 60 cm from the mirror. Which statement best describes the focal length of the mirror?

- ☒ A. The focal length of the mirror is - 20 cm
- ☐ B. The focal length of the mirror is + 10 cm
- ☐ C. The focal length of the mirror is + 15 cm
- ☐ D. The focal length of the mirror is - 30 cm

Q19 Mirror formula numericals

A small candle is placed 18 cm from a concave mirror with a focal length of 6 cm. What will be the nature and position of the image formed?

- ☐ A. Real, 6 cm in front of the mirror
- ☐ B. Virtual, 9 cm behind the mirror
- ☒ C. Real, 9 cm in front of the mirror
- ☐ D. Virtual, 12 cm behind the mirror

Q20 Mirror magnification numerical

A student places an object 15 cm in front of a concave mirror of focal length 10 cm. If the image formed is real, what is the magnification produced by the mirror?

- ☒ A. -2
- ☐ B. -1
- ☐ C. + 1
- ☐ D. + 2

Q21 Ray diagrams for mirrors

A ray passing through the center of curvature of a concave mirror strikes the mirror. What is the path of the reflected ray?

- ☐ A. It becomes parallel to the axis
- ☐ B. It passes through the focus
- ☐ C. It diverges from the principal axis
- ☒ D. It retraces its original path

Q22 Ray diagrams for mirrors

A ray parallel to the principal axis strikes a concave mirror. After reflection, it passes through which point?

- ☐ A. The center of curvature
- ☒ B. The focus of the mirror
- ☐ C. The pole of the mirror
- ☐ D. The vertex of the mirror

Q23 Ray diagrams for mirrors

A ray passing through the principal focus of a concave mirror will, after reflection:

- ☐ A. converge at the pole
- ☒ B. emerge parallel to the principal axis
- ☐ C. reflect back through the centre of curvature
- ☐ D. diverge away from the mirror

Q24 Ray diagrams for mirrors

In a concave mirror, a ray parallel to the principal axis is incident. After reflection, the ray passes through:

- ☐ A. The pole
- ☒ B. The focus
- ☐ C. Anywhere along the mirror
- ☐ D. The center of curvature

Q25 Sign convention for mirrors

When measuring the object distance for a spherical mirror, as **per the New Cartesian Sign Convention**, which sign is assigned if the object is placed in front of the mirror?

- ☐ A. No sign is assigned
- ☐ B. Variable sign is assigned
- ☐ C. Positive sign is assigned
- ☒ D. Negative sign is assigned

Q26 Uses of concave mirror

A physics teacher asks students to create a scenario where a concave mirror is used for shaving to get a large, upright image of the face. Where must the face be positioned relative to the mirror for this result?

- ☐ A. At the centre of curvature of the mirror
- ☒ B. Between the pole and the focus of the mirror
- ☐ C. Beyond the centre of curvature of the mirror
- ☐ D. At the focus of the mirror

Q27 Uses of convex mirror

Which scenario best illustrates the use of a convex mirror based on the nature of its image?

- ☐ A. A model uses it as a makeup mirror
- ☐ B. A scientist uses it to focus sunlight for heating
- ☐ C. A student uses it to obtain a real, inverted image on paper
- ☒ D. A shopkeeper uses it to monitor a wide area inside the store



Q1 Apparent depth refraction

A student observes that a swimming pool appears shallower than its actual depth. Which concept best explains this effect?

- A. Refraction of light at the water-air boundary** ✓
- B. Scattering of light by water molecules
- C. Reflection of light from the pool floor
- D. Internal reflection of light within the water

Q2 Convex lens properties

Which of the following statements is FALSE for a converging lens?

- A. The concentration of sunlight at a point due to the converging lens generates heat.
- B. The bright spot formed on the paper by the converging lens is a virtual image of the Sun.** ✓
- C. The light from the Sun, before reaching the converging lens, consists of parallel rays.
- D. A converging lens can focus sunlight to form a sharp bright spot on paper.

Q3 Focus of convex lens

A student places a convex lens in sunlight and notices a small bright spot forms on a paper held below the lens. What property of the lens allows this to happen?

- A. The lens diverges the rays in all directions
- B. The lens focuses parallel rays to a single point** ✓
- C. The lens blocks all rays from passing through
- D. The lens only works for colored light

Q4 Image formation by convex lens

Which statement best describes the image formed by a convex lens when the object is placed between the focal point and the optical center of the lens?

- A. The image is virtual, upright and larger than the object.** ✓
- B. The image is virtual, inverted and smaller than the object.
- C. The image is real, upright and larger than the object.
- D. The image is real, inverted and smaller than the object.

Q5 Image formation by convex lens

A student notices that the image formed by a lens is virtual, upright, and larger than the object. Which lens and object position is responsible for this observation?

- A. Convex lens with object between optical centre of lens and focal point** ✓
- B. Concave lens with object at any position
- C. Concave lens with object beyond twice the focal length
- D. Convex lens with object at twice the focal length

Q6 Image formation by convex lens

When an object is placed at $2F_1$ of a convex lens, where is the image formed?

- A. At F_2
- B. At $2F_2$** ✓
- C. At infinity
- D. Between F_2 and $2F_2$

Q7 Image formation by convex lens

A student observes that the image formed by a lens is twice the size of the object and is real. Where is the object placed relative to the lens?

- A. At F
- B. Between $2F$ and infinity
- C. Between F and $2F$** ✓
- D. At $2F$

Q8 Image formation by lens

A student places a candle at a distance greater than twice the focal length from a convex lens. She observes the image formed on a screen. Which of the following best describes the image's nature, position, and size?

- A. The image is real, inverted, formed between the focal point and twice the focal length, and smaller than the object.** ✓
- B. The image is virtual, erect, formed on the same side as the object, and larger than the object.
- C. The image is real, erect, formed beyond twice the focal length, and equal in size to the object.
- D. The image is virtual, inverted, formed at the focal point, and the same size as the object.



Q9 Image formation by lens

A student moves a lighted candle from infinity towards the focus of a convex lens. How does the size of the image change?

- A. The image disappears
- B. The image increases in size ✓
- C. The image decreases in size
- D. The image remains the same size throughout

Q10 Image formation by lens

A student places a candle beyond the center of curvature of a convex lens. What type of image is most likely to be formed on the other side of the lens?

- A. A virtual and inverted image smaller than the object
- B. A virtual and erect image larger than the object
- C. A real and inverted image of the same size as the object
- D. A real and inverted image smaller than the object ✓

Q11 Image formation by lens

During an experiment, a student places a candle beyond twice the focal length of a convex lens and records the image position and nature. Which of the following scenarios could result from this setup?

- A. A virtual, erect, and larger image appears on the same side as the object
- B. A real, inverted, and same-sized image forms at twice the focal length
- C. An erect, real, and larger image forms beyond twice the focal length
- D. An inverted, real, and diminished image forms between focus and twice the focal length ✓

Q12 Image formation by lens

A person wants to project a magnified real image of a small object onto a screen using a convex lens. Where should the object be placed relative to the lens?

- A. At the principal focus of the lens
- B. At twice the focal length from the lens
- C. Between the focus and twice the focal length from the lens ✓
- D. Between the lens and its principal focus

Q13 Image formation by lens

A real, inverted and diminished image of an object is formed by a convex lens. At which position is the object placed?

- A. Beyond $2F$ ✓
- B. At $2F$
- C. Between the principal focus (F) and $2F$
- D. At the principal focus (F)

Q14 Image formation by lens

A convex lens is used to form an image of an object. When the object is placed at a distance greater than twice of the focal length ($2f$) of the lens, what is the nature of the image formed?

- A. Virtual, upright and magnified
- B. Real, inverted and diminished ✓
- C. Real, inverted, and magnified
- D. Real, inverted and the same size

Q15 Image formation by lens

For any object position, what can be said about the size of the image formed by a concave lens?

- A. It is always the same size as the object
- B. It is always magnified compared to the object
- C. It is sometimes enlarged and sometimes diminished
- D. It is always diminished compared to the object ✓

Q16 Laws of refraction

A student observes that the incident ray, the refracted ray, and the normal at the point of incidence all lie in one plane. Which law of refraction does this illustrate?

- A. Law of dispersion
- B. Second law of refraction
- C. Law of superposition
- D. First law of refraction ✓

Q17 Lens formula and power

A convex lens forms a real, inverted image three times larger than the object. If the object is placed 30 cm from the lens, what is the closest approximate value of the power of the lens?

- A. +3.2 D
- B. +4.44 D ✓
- C. +1 D
- D. +2 D



Q18 Lens formula numerical

A convex lens forms a real image 30 cm from its optical centre. The object is placed 20 cm away from the lens. Using the sign convention, what is the correct sign and value for the focal length of the lens?

A. -60 cm

B. -12 cm

C. +60 cm

D. +12 cm

**Q19 Lens formula numerical**

A 3 cm tall object is placed 9 cm in front of a concave lens with focal length 6 cm. What is the approximate height of the image formed?

A. 4 cm and upright

B. 1 cm and inverted

C. 1.2 cm and upright



D. 3 cm and inverted

Q20 Lens formula numerical

A convex lens forms a real, inverted image of an object placed at a distance of 30 cm from the lens. The image is found to be formed at a distance of 60 cm on the other side of the lens. What is the focal length of the lens?

A. 12 cm

B. 18 cm

C. 15 cm

D. 20 cm

**Q21 Lens formula numerical**

An object is placed 15 cm from a concave lens of focal length 10 cm. What is the nature and position of the image formed by the lens?

A. The image is real, inverted and 20 cm from the lens on the opposite side to the object

B. The image is virtual, upright and 6 cm from the lens on the same side as the object



C. The image is real, upright and 8 cm from the lens on the same side as the object

D. The image is virtual, inverted and 12 cm from the lens on the opposite side to the object

Q22 Lens formula numerical

A convex lens forms a virtual image 15 cm on the same side as the object when the object is placed 10 cm from the lens. What is the focal length of the lens?

A. -10 cm

B. +10 cm

C. +30 cm



D. -30 cm

Q23 Lens formula numerical

A photographer uses a concave lens of focal length 12 cm. The object is placed 18 cm from the lens. Using the sign convention, calculate the image distance (v)?

A. -36 cm

B. +7.2 cm

C. -7.2 cm



D. +36 cm

Q24 Lens magnification numerical

A student places an object 18 cm from a converging lens of focal length 12 cm. The image formed is real. What is the magnification produced by the lens?

A. +1.5

B. +2

C. -1.5

D. -2

**Q25 Lens magnification numerical**

A student places a candle 25 cm from a convex lens of focal length 15 cm and obtains a real image. What is the magnification of the image formed?

A. 1.67

B. -2.5

C. 0.4

D. -1.5

**Q26 Lens magnification numerical**

A lens forms an image three times larger than the object. If the image is erect, what is the magnification?

A. -0.33

B. -3

C. +3



D. +0.33



Q27 Magnification by lens

If a lens produces an image twice as tall as the object, what is the magnification produced by the lens?

- A. 0.5
- B. 2
- C. 1
- D. -2

**Q28 Power of lens combination**

Two lenses, one converging with focal length 12 cm and one diverging with focal length -18 cm, are placed in contact. What is the combined focal length of this lens system?

- A. 16 cm
- B. 8 cm
- C. 7.2 cm
- D. 36 cm

**Q29 Ray diagrams for lenses**

If a ray of light passes through the optical center of a thin spherical lens, what is the path of the emergent ray?

- A. It reflects back along its original path
- B. It continues in the same direction without deviation
- C. It is absorbed by the lens material
- D. It bends towards the principal axis

**Q30 Refraction and apparent position**

When a person standing underwater looks upward at a tree located on the bank, the tree appears to be at a position different from its original location. Which of the following principles is responsible for this apparent shift in the position?

- A. Light rays from the tree bend due to refraction at the water-air interface.
- B. Light rays from the tree are reflected at the water surface.
- C. Water disperses the light from the tree into different colors.
- D. The tree image is formed due to diffraction at the water surface.

**Q31 Refraction everyday examples**

A pencil appears bent when partially submerged in water. Which scenario best explains how understanding refraction can help design better aquarium displays?

- A. Positioning lighting to account for refraction can make fish appear in their true locations to viewers
- B. Using mirrors to enhance the brightness of the aquarium
- C. Changing water temperature to reduce light bending
- D. Using colored backgrounds to make objects stand out

**Q32 Refraction everyday examples**

Which of the following best explains why a pencil partially immersed in water appears bent at the surface?

- A. Light changes direction as it moves from air to water
- B. Light reflects off the pencil and back to your eyes
- C. Water makes the pencil look thicker
- D. The pencil absorbs light and emits it at a different angle

**Q33 Refractive index**

When a ray of light passes from air into water, how does the refractive index of water with respect to refractive index of air relate to the speed of light in these two media?

- A. The refractive index of water with respect to refractive index of air is the ratio of the speed of light in air to that in water
- B. The refractive index of water with respect to refractive index of air is the difference of the speeds in air and water
- C. The refractive index of water with respect to refractive index of air is the ratio of the speed of light in water to that in air
- D. The refractive index of water with respect to refractive index of air is the sum of the speeds in air and water

**Q34 Refractive index**

If the refractive index of medium 2 with respect to medium 1 is n_{21} , which formula correctly represents n_{21} ?

- A. n_{21} = Speed of light in medium 2 divided by speed of light in medium 1.
- B. n_{21} = Speed of light in medium 2 minus speed of light in medium 1.
- C. n_{21} = Speed of light in medium 1 divided by speed of light in medium 2.
- D. n_{21} = Speed of light in medium 1 minus speed of light in medium 2.



Q35 Refractive index and bending

A student observes a pencil half-immersed in water (refractive index 1.33) and notices the apparent bending is less than when the pencil is in a liquid with refractive index 1.5. What does this suggest about the relationship between refractive index and light bending?

- A. Bending is same for all liquids
- B. Greater refractive index increases bending ✓
- C. Greater refractive index reduces bending
- D. Refractive index has no effect on bending

Q36 Refractive index calculation

The speed of a light ray changes from 3×10^8 m/s in air to 2×10^8 m/s in a transparent solid. What is the refractive index of the solid with respect to air? (Take the refractive index of air as 1.)

- A. 1.5 ✓
- B. 1.7
- C. 1.2
- D. 1.4

Q37 Refractive index calculation

A ray of light enters a rectangular glass slab from air at an angle of 40 degrees to the normal. If the refractive index of glass with respect to air is 1.5 and the velocity of light in air is 3×10^8 m/s, what is the velocity of light inside the glass slab?

- A. 2.5×10^8 m/s
- B. 2.25×10^8 m/s
- C. 1.5×10^8 m/s
- D. 2×10^8 m/s ✓

Q38 Refractive index calculation

A diamond has an absolute refractive index of 2.42. If the speed of light in vacuum is 3×10^8 m/s, which value best estimates the speed of light in diamond?

- A. 1.24×10^8 m/s ✓
- B. 1.5×10^8 m/s
- C. 2×10^8 m/s
- D. 1×10^8 m/s

Q39 Refractive index calculation

A student measures the absolute refractive index of water as 1.33. What does this mean about the speed of light in water compared to air?

- A. Light travels faster in water by a factor of 1.33 compared to air
- B. Light speed is the same in water and air
- C. Light can not travel through water at all.
- D. Light travels slower in water by a factor of 1.33 compared to air ✓

Q40 Sign convention for lenses

How is the object distance measured in the sign convention for spherical lenses?

- A. It is measured from the focal point towards the position of the object.
- B. It is measured from the optical center towards the position of the image.
- C. It is measured from the optical center towards the position of the object. ✓
- D. It is measured from the focal point towards the position of the image.



Physics

25 Questions • Answer Key

Q1 Atmospheric refraction

During sunrise or sunset, why does the Sun's disc appear flattened when observed from Earth?

- A. Because of absorption of sunlight by air
- B. Due to gravitational lensing by Earth
- C. Due to atmospheric refraction bending light unevenly across the Sun's disc ✓
- D. Because of scattering of sunlight in the atmosphere

Q2 Dispersion and recombination

A teacher uses two prisms placed in opposite orientations and passes a beam of white light through both. What is the expected outcome on a screen placed after the second prism?

- A. A black region appears where the beam ends
- B. A single white patch appears on the screen ✓
- C. A spectrum with reversed color order forms
- D. A new set of colors emerge beyond the original ones

Q3 Dispersion of light

What happens when white light passes through a glass prism?

- A. It becomes invisible
- B. It splits into a band of seven colours ✓
- C. It recombines into white light
- D. It changes into a single colour

Q4 Dispersion of light

Which of the following statements related to dispersion are true?

- (1) Red light bends the most when passing through a glass prism.
- (2) The angle of deviation is the same for all colours.
- (3) Dispersion is one of the phenomenon responsible for the formation of a rainbow.
- (4) The speed of light decreases as the light goes from air into the prism.

- A. Both statements 1 and 3 only
- B. Both statements 1 and 2 only
- C. Both statements 3 and 4 only ✓
- D. Both statements 2 and 4 only

Q5 Dispersion of light

A beam of white light passes through a glass prism and splits into different colors. Which physical phenomenon is primarily responsible for the separation of colors after refraction through the prism?

- A. Dispersion of light ✓
- B. Absorption of light
- C. Scattering of light
- D. Reflection of light

Q6 Dispersion of white light

Why do the seven colors of sunlight emerge separately after passing through a prism?

- A. Prism shape blocks some colors
- B. Colors are absorbed at different rates
- C. All colors move at the same speed in glass
- D. Different colors travel at different speeds in glass ✓

Q7 Dispersion of white light

Why does white light split into different colours when passing through a prism but not when passing through a glass slab?

- A. Because a prism is thinner than a slab
- B. Because a prism has non-parallel sides ✓
- C. Because a prism is transparent
- D. Because a prism is made of a different material

Q8 Dispersion of white light

Why does the emergent beam from a prism show distinct colors instead of a single white band?

- A. Each color bends by a different amount ✓
- B. Some colors are absorbed
- C. All colors bend equally
- D. All colors emerge parallel



Q9 Dispersion of white light

A student wants to design an experiment to demonstrate the dispersion of white light using a glass prism. Which of the following procedures would best achieve this goal?

- A. Rotate a glass prism randomly in front of a white light source and record any color changes
- B. Pass white light through a convex lens and look for color changes on a distant wall
- C. Place a triangular glass prism in the path of a narrow white light beam and observe the emerging spectrum on a white screen ✓
- D. Use a concave mirror to reflect the white light onto a wall

Q10 Electromagnetic spectrum

A solar panel in India is exposed to sunlight under clear sky conditions. Which electromagnetic spectrum segment delivers the Sun's greatest energy to a solar panel in India for electricity generation?

- A. Visible light ✓
- B. Ultraviolet light
- C. Gamma rays
- D. Infrared radiation

Q11 Electromagnetic spectrum

A scientist is investigating why certain EM waves from the Sun do not reach the Earth's surface. Which property of gamma rays primarily explains their absence at ground level?

- A. They are absorbed by upper atmosphere ✓
- B. They have long wavelength
- C. They are scattered by clouds
- D. They are reflected by Earth's surface

Q12 Electromagnetic spectrum uses

A water purification system uses electromagnetic energy to kill bacteria. Which region of the spectrum is being utilised for this function?

- A. Visible part of the spectrum
- B. Gamma part of the spectrum
- C. Infrared part of the spectrum
- D. Ultraviolet part of the spectrum ✓

Q13 Mirage

A car driver notices that the road ahead appears to be wet during a hot sunny day, but upon reaching the spot, the road is dry. Which physical phenomenon best explains this observation?

- A. Total internal reflection of light within water droplets
- B. Dispersion of sunlight by air molecules
- C. Refraction of light due to varying air temperatures above the road ✓
- D. Scattering of sunlight by dust particles

Q14 Prism and angle of deviation

What is the angle between the incident and emergent rays called in the context of a prism?

- A. The angle of refraction
- B. The angle of incidence
- C. The angle of emergence
- D. The angle of deviation ✓

Q15 Recombination of white light

What would happen to the spread of colors in the spectrum if a second identical prism is placed after the first in an inverted position?

- A. The colors spread further apart
- B. The spectrum shifts to one side
- C. The spread of colors recombines to form white light ✓
- D. Only red and violet merge

Q16 Refraction through prism

When a ray of light passes through a triangular glass prism, the emergent ray is generally not parallel to the incident ray. Which of the following best explains this observation?

- A. The two refracting faces of the prism are inclined to each other, causing an overall deviation of the light ray. ✓
- B. The parallel faces of the prism produce equal refractions that cancel each other.
- C. The light ray undergoes complete reflection at both faces of the prism.
- D. The light ray passes through the prism uniformly without any change in direction.



Q17 Refraction through prism

What is the angle between the two lateral faces of a triangular glass prism called?

- A. The angle of the prism. ✓
- B. The angle of refraction.
- C. The angle of deviation.
- D. The angle of incidence.

Q18 Refraction through prism

The refracted ray inside the prism bends _____.

- A. Toward the base of the prism ✓
- B. Perpendicular to the base
- C. Away from the base
- D. Along the base

Q19 Scattering and blue sky

A scientist wants to demonstrate why the sky appears blue during the day and reddish at sunset using a glass tank of water, a flashlight, and a small amount of milk. Which setup best demonstrates light scattering similar to that observed in the atmosphere?

- A. Mixing a small amount of milk into the water and shining the flashlight through the tank from the side to observe scattered light. ✓
- B. Adding a large amount of milk to the water and shining the flashlight through the mixture from above.
- C. Shining the flashlight from above onto clear water and observing the illuminated region.
- D. Shining the flashlight through clear water and observing the transmitted light from the opposite side.

Q20 Scattering of light

Why does the sky appear blue to human observers during daytime?

- A. Red light is scattered more than blue light due to its longer wavelength
- B. Blue light is scattered more than red light due to its shorter wavelength ✓
- C. All wavelengths are scattered equally in the atmosphere
- D. Blue light is absorbed and re-emitted by atmospheric particles

Q21 Scattering of light

Which phenomenon best explains why the sky appears blue during daytime?

- A. Sun emits predominantly blue light during the day
- B. Reflection of sunlight by clouds causes blue color
- C. Shorter wavelengths of sunlight are scattered more than longer wavelengths ✓
- D. Ozone in the atmosphere absorbs all other colors except blue

Q22 Scattering of light

A science museum is designing a demonstration to explain why the sky appears blue during the day but takes on reddish hues during sunrise and sunset. Which explanation best accounts for these observations based on the scattering of light in the atmosphere?

- A. The Sun emits more blue light during the day, while emitting more red light at sunset.
- B. Atmospheric absorption removes red light during the day, while removing blue light at sunset.
- C. Dust particles scatter all wavelengths equally, while increased dust at sunset makes red light more visible.
- D. Shorter wavelengths scatter more strongly, while longer atmospheric paths at sunset favour red wavelengths. ✓

Q23 Scattering of light

How does the size of atmospheric particles affect the scattering of sunlight?

- A. Smaller particles scatter shorter wavelengths more efficiently ✓
- B. Medium particles scatter only green light efficiently
- C. Irregular particles scatter only yellow light more
- D. Larger particles scatter only red light effectively

Q24 Twinkling of stars

What is the primary reason stars appear to twinkle in the night sky as seen from Earth?

- A. The light from stars is refracted by varying atmospheric layers ✓
- B. Stars are closer to the Earth than planets
- C. The Earth rotates causing starlight to flicker
- D. Stars emit light at varying intensities



Q25 Twinkling of stars

Why do stars appear to twinkle when observed from the Earth?

A. Due to absorption of light by atmospheric gases

B. Due to refraction caused by varying air layers in the atmosphere



C. Due to reflection of light from clouds

D. Due to scattering of light by dust particles in the air



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Physics

10 Questions • Answer Key

Q1 Accommodation of the eye

When a ciliary muscles contracts, the eye lens becomes _____.

- A. Thicker and the focal length increases
- B. Thinner and the focal length increases
- C. Thicker and the focal length decreases ✓
- D. Thinner and the focal length decreases

Q2 Accommodation of the eye

A student is experiencing difficulty seeing objects clearly both at a distance and up close. After an examination, it is found that the eye muscles are not able to adjust the focal length of the lens properly. Which part of the human eye is most likely responsible for this issue?

- A. Retina
- B. Iris
- C. Cornea
- D. Ciliary muscles ✓

Q3 Defects of vision

Which defect occurs when the eye lens loses its ability to focus on near objects due to decreased flexibility?

- A. Myopia results from reduced lens flexibility
- B. Astigmatism results from reduced lens flexibility
- C. Presbyopia results from reduced lens flexibility ✓
- D. Hypermetropia results from reduced lens flexibility

Q4 Defects of vision

Which defect of vision is caused by the eye's lens focusing images in front of the retina, making distant objects appear blurry, and can be corrected using a concave lens?

- A. Myopia ✓
- B. Presbyopia
- C. Astigmatism
- D. Hypermetropia

Q5 Human eye structure

Which application uses refraction to focus light onto a specific point for clear vision?

- A. A shadow formed behind an object
- B. The human eye lens adjusting its shape ✓
- C. A plane mirror reflecting images
- D. A glass prism splitting sunlight

Q6 Myopia and its correction

Which of the following defects of vision is corrected using a concave lens?

- A. Hypermetropia
- B. Astigmatism
- C. Myopia ✓
- D. Presbyopia

Q7 Power of accommodation

What is the ability of the eye lens to adjust its focal length called?

- A. Myopia
- B. Refraction
- C. Power of Accommodation ✓
- D. Persistence of vision

Q8 Power of accommodation

Which of the following best describes the power of accommodation of the human eye?

- A. The ability of the pupil to change size with light intensity
- B. The adjustment of eyelid position for better vision
- C. The movement of the eyeball to follow moving objects
- D. The ability of the eye lens to change its focal length to focus on objects at different distances ✓



Q9 Presbyopia

With ageing, the power of accommodation of the human eye decreases, causing difficulty in viewing nearby objects clearly. This defect is known as:

- A. Myopia
- B. Astigmatism
- C. Hypermetropia
- D. Presbyopia

**Q10 Structure of the human eye**

Which part of the human eye controls the amount of light entering the eye?

- A. Retina
- B. Optic Nerve
- C. Cornea
- D. Iris



Physics

35 Questions • Answer Key

Q1 Charge and current

An electric kettle has a resistance of 10 ohms and is connected to a 220 V supply. For 5 minutes of operation, how much charge flows through it?

- A. 1100 C
- B. 13200 C
- C. 2200 C
- D. 6600 C

**Q2 Circuit symbols**

A science project requires a variable resistor to adjust the current in a circuit. Which symbol should be used in the schematic diagram to represent this component?

- A. A zigzag line with an arrow across it
- B. Parallel long and short lines
- C. A simple zigzag line
- D. A straight line with a gap and bridge

**Q3 Circuit symbols**

Which combination of symbols would you use to indicate a wire joint in a schematic circuit diagram?

- A. A dot at the intersection of two lines
- B. A rectangle
- C. Lines crossing without a dot
- D. Two parallel lines

**Q4 Circuit symbols**

Which component is best represented by a symbol with multiple alternating long and short lines in a circuit diagram?

- A. A battery or a combination of cells
- B. Electric bulb
- C. A resistor of resistance R
- D. An electric cell

**Q5 Conductors and insulators**

Which material would be the best choice for electrical transmission lines?

- A. Rubber
- B. Glass
- C. Tungsten
- D. Aluminium

**Q6 Conductors and insulators**

Why is copper commonly used for electrical wiring in homes?

- A. It has low electrical resistance
- B. It is magnetic
- C. It is a poor conductor
- D. It has a low melting point

**Q7 Electric charge and current**

If a bulb filament draws 0.5 A of current for 10 minutes, what is the total charge passed through the circuit?

- A. 30 coulombs
- B. 60 coulombs
- C. 300 coulombs
- D. 0.05 coulombs

**Q8 Electric current direction**

What is the conventional direction of electric current in a metallic circuit?

- A. From the positive terminal to the negative terminal
- B. From the negative terminal to the positive terminal
- C. In the direction of electron movement
- D. Randomly between any two points



Q9 Factors affecting resistance

A student sets up two circuits: Circuit X uses a thin, long copper wire, and Circuit Y uses a thick, short copper wire, both connected to identical batteries. Which circuit will have a higher resistance, and why?

- A. Circuit X because the resistance increases with length and decreases with cross-sectional area ☒
- B. Circuit X because the resistance decreases with length and increases with cross-sectional area
- C. Circuit Y because the resistance decreases with length and increases with cross-sectional area
- D. Circuit Y because the resistance increases with length and decreases with cross-sectional area

Q10 Factors affecting resistance

A copper wire and an iron wire have the same length and thickness. Which wire will have lower resistance and why, when both are kept at the same temperature?

- A. The iron wire, because iron is a better conductor
- B. Both wires, because thickness is the only factor
- C. The copper wire, because copper is a better conductor ☒
- D. Both wires, because material does not affect resistance

Q11 Factors affecting resistance

Two uniform wires made of the same material, having the same length, and maintained at the same temperature are compared. Which factor will cause one wire to have greater electrical resistance than the other?

- A. Higher voltage
- B. Smaller cross-sectional area ☒
- C. Higher cross-sectional area
- D. Larger electric current

Q12 Factors affecting resistance

When the length of a wire is doubled while keeping material and area of cross-section constant, what happens to its resistance?

- A. The resistance remains unchanged
- B. The resistance becomes twice as much ☒
- C. The resistance becomes four times as much
- D. The resistance becomes half

Q13 Factors affecting resistance

A student uses two wires of the same material and length but different thickness in the same circuit. Which statement best explains why the thicker wire causes a higher ammeter reading?

- A. The thicker wire has more resistivity, resulting in higher current
- B. The thicker wire has a larger area, resulting in higher resistance and lower current
- C. The thicker wire has a larger area, resulting in lower resistance and higher current ☒
- D. The thicker wire has a different material, resulting in higher current

Q14 Ohm's law

What will happen to the resistance of a wire if both the current and voltage are increased by the same factor?

- A. The resistance will increase.
- B. The resistance will remain unchanged. ☒
- C. The resistance will decrease.
- D. The resistance will depend on the factor increase.

Q15 Ohm's law

Which of the following graphs best represents Ohm's Law for a resistor at constant temperature?

- A. A straight line graph not passing through the origin when current is plotted against voltage
- B. A curved line graph passing through the origin when current is plotted against voltage
- C. A horizontal line graph when current is plotted against voltage
- D. A straight line graph passing through the origin when current is plotted against voltage ☒

Q16 Ohm's law

In a laboratory, a student wants to verify Ohm's Law for a new material. Which experimental approach will most accurately determine if the material obeys Ohm's Law?

- A. Measure current for several applied voltages and plot voltage versus current ☒
- B. Calculate voltage for a fixed current
- C. Measure resistance at one voltage and compare to tabulated value
- D. Observe the heat produced at a single applied voltage



Q17 Ohm's law

A household has two appliances: a heater and a fan. The heater has a high resistance while the fan has a low resistance. If both are connected to the same voltage supply, which appliance will draw more current and why?

- A. Current does not depend on resistance in this case.
- B. The heater will draw more current because it has higher resistance.
- C. The fan will draw more current because it has lower resistance. ✓
- D. Both will draw the same current because the voltage is the same.

Q18 Parallel combination of resistors

A circuit consists of three resistors of 4 ohms, 6 ohms, and 12 ohms connected in parallel. Which statement is correct about the total resistance?

- A. The total resistance is equal to one of the individual resistances
- B. The total resistance equals the sum of all resistances
- C. The total resistance is less than the smallest individual resistance ✓
- D. The total resistance is equal to the largest individual resistance

Q19 Parallel combination of resistors

If two resistors of 4 Ω and 6 Ω are connected in parallel, the equivalent resistance will be:

- A. Less than 4 Ω ✓
- B. Greater than 6 Ω
- C. Between 4 Ω and 6 Ω
- D. Equal to 10 Ω

Q20 Potential difference and cell

In an electric circuit, what produces the potential difference needed for charge flow?

- A. The resistance of the wire to current
- B. The gravitational pull on electrons
- C. Connecting wires alone between two points
- D. A battery consisting of one or more electric cells ✓

Q21 Potential difference and volt

The potential difference between two points in a circuit is 1 volt if:

- A. 1 coulomb of charge flows through a resistance of 1 ohm
- B. 1 joule of energy is consumed in 1 second
- C. 1 joule of work is done in moving 1 coulomb of charge ✓
- D. 1 ampere current flows for 1 second

Q22 Potential difference and volt

In terms of potential, why does water not flow in a perfectly horizontal tube?

- A. Because the tube is made of plastic
- B. Because there is no tank connected
- C. Because gravity does not act on horizontal water
- D. Because there is no pressure difference between the two ends ✓

Q23 Potential difference and volt

What role does the chemical energy in a cell play in an electric circuit?

- A. It directly moves electrons along the wire
- B. It creates and maintains the potential difference ✓
- C. It changes the resistance of the circuit
- D. It measures the flow of current

Q24 Resistivity and factors

The resistivity of a material is defined as the resistance offered by a conductor of that material having:

- A. Half the length and double the cross-sectional area
- B. Unit length and unit cross-sectional area ✓
- C. Double the length and unit cross-sectional area
- D. Unit length and half the cross-sectional area

Q25 Resistivity of materials

A student wants to compare the resistivity of two different materials using wires of identical length and cross-sectional area. Which measurement must be made for both wires to determine their resistivity?

- A. Measuring the voltage across each wire
- B. Measuring the mass of each wire
- C. Measuring the resistance of each wire ✓
- D. Measuring the brightness of a bulb in the circuit



Q26 Resistivity of materials

If a copper wire and an iron wire of the same length and area are compared, which is the one with higher resistance?

- A. Iron wire ✓
- B. Cannot be determined
- C. Both equal
- D. Copper wire

Q27 Resistivity of materials

Which of the following materials has the highest resistivity?

- A. Silver
- B. Tungsten
- C. Manganin ✓
- D. Iron

Q28 Series and parallel circuits

A student constructs a circuit with a battery of 12 V and two resistors of 6 ohms and 4 ohms connected in series. What is the total current flowing through the circuit according to Ohm's Law?

- A. 0.6 A
- B. 2.0 A
- C. 1.2 A ✓
- D. 1.0 A

Q29 Series and parallel circuits

A technician needs to design a circuit where removing one device does not interrupt the operation of others. Which resistor arrangement should the technician choose?

- A. The technician should use a series combination of resistors.
- B. The technician should connect resistors in a random arrangement.
- C. The technician should use a series-parallel mixed combination of resistors.
- D. The technician should use a parallel combination of resistors. ✓

Q30 Series and parallel circuits

In a circuit, two resistors R_1 and R_2 are connected in parallel. If $R_1 = 4\ \Omega$ and $R_2 = 12\ \Omega$, and the total voltage across the parallel combination is 6V, what is the total current flowing in the circuit?

- A. 10 A
- B. 1.5 A
- C. 8 A
- D. 2 A ✓

Q31 Series and parallel circuits

Which of the following properties is unique to the parallel combination of resistors compared to the series combination?

- A. Total resistance equals sum of resistors
- B. Each resistor receives the same voltage ✓
- C. Current through each resistor is the same
- D. All resistors must be identical

Q32 Series and parallel circuits

Two identical bulbs are connected in parallel to a battery. If one bulb burns out, what happens to the brightness of the other bulb?

- A. Both bulbs turn off.
- B. The brightness of the other bulb increases.
- C. The brightness of the other bulb remains unchanged. ✓
- D. The brightness of the other bulb decreases.

Q33 Series combination of resistors

If a 9V battery is connected across three resistors of 3 ohms, 2 ohms, and 1 ohm in series, what is the current flowing through the circuit?

- A. 1.5 A ✓
- B. 9 A
- C. 3 A
- D. 6 A

Q34 Series combination of resistors

Which of the following is a practical reason for using a series combination of resistors in an electrical circuit?

- A. To increase total resistance and limit current ✓
- B. To increase the current in the circuit
- C. To maintain the same voltage across each resistor
- D. To decrease voltage across each resistor



Q35 Circuit symbols

What does the given symbol represent in an electric circuit diagram?



A. Wires crossing without joining

B. A wire joint



C. Variable resistance

D. Plug key or switch



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Physics

25 Questions • Answer Key

Q1 Domestic circuits and safety

Suppose a household replaces all 5 A sockets with 15 A sockets and connects multiple high-power appliances to each. What potential risk does this introduce, and why?

- A. It increases the risk of overloading and possible short-circuit due to excessive current ✓
- B. It ensures that all appliances will work at lower voltage
- C. It decreases the risk of electrical hazards in the house
- D. It prevents the fuse from operating under any circumstances

Q2 Domestic wiring and parallel connection

Why are all appliances in a domestic circuit connected in parallel?

- A. To save electricity in the household
- B. To reduce the number of switches needed
- C. To ensure each appliance gets equal potential difference ✓
- D. To prevent short-circuiting in wires

Q3 Electric energy consumed

An electric heater is rated 2000 W and is used for 2 hours. How much energy is consumed in joules?

- A. 720,000 joules
- B. 3,600,000 joules
- C. 7,200,000 joules
- D. 14,400,000 joules ✓

Q4 Electric fuse

What is the function of the cartridge (such as porcelain) encasing the fuse wire?

- A. To safely contain the melted fuse wire and prevent hazards ✓
- B. To act as a heat sink for the fuse
- C. To improve the fuse's electrical conduction
- D. To increase the current flow through the fuse

Q5 Electric fuse

Electric fuses are used in household circuits primarily to _____.

- A. Reduce voltage in the circuit
- B. Interrupt the circuit if excessive current flows ✓
- C. Supply extra electricity when needed
- D. Store electrical energy for later use

Q6 Electric power calculation

A wire of resistance 10 ohms is connected to a 12 V battery. If another identical wire is connected in parallel to the first, what is the total power consumed by both wires together?

- A. 14.4 W
- B. 120 W
- C. 28.8 W ✓
- D. 1.44 W

Q7 Electric power calculation

A student wants to reduce the power consumed by a device without changing the current. Which action will achieve this?

- A. Increase the resistance in the circuit
- B. Decrease the resistance in the circuit ✓
- C. increase the temperature in the circuit
- D. Increase the voltage applied

Q8 Electric power calculation

If the power consumed by a bulb is 60 W and the voltage across it is 120 V, what is the resistance of the bulb?

- A. 2 Ω
- B. 240 Ω ✓
- C. 60 Ω
- D. 0.5 Ω



Q9 Electric power numerical

If a bulb is rated at 60 W and operates at 120 V, what is the current flowing through the bulb?

A. 0.5 A



B. 2.0 A

C. 1.2 A

D. 0.25 A

Q10 Electric power numerical

A heater is rated at 220 V and 1000 W. If it is connected to a 110 V supply, what will be the power consumed by the heater?

A. 250 W



B. 500 W

C. 200 W

D. 1000 W

Q11 Electrical energy and kilowatt-hour

A device uses 1 kilowatt (kW) of power for 1 hour. How much energy does it consume?

A. 1 watt hour (Wh)

B. 1 joule (J)

C. 1 kilowatt (kW)

D. 1 kilowatt hour (kWh)

**Q12 Electrical energy in kilowatt-hour**

A heater is rated at 1000 W. If it is used for 2 hours, how much energy does it consume in kilowatt hours?

A. 1 kWh

B. 0.5 kWh

C. 2 kWh



D. 3 kWh

Q13 Electrical energy in kilowatt-hour

Which expression correctly represents the commercial unit of electrical energy in terms of joules?

A. 1 kilowatt hour = 360 joules

B. 1 kilowatt hour = 1.6×10^6 joules

C. 1 kilowatt hour = 1000 joules

D. 1 kilowatt hour = 3.6×10^6 joules

**Q14 Electrical safety and fuse**

A family wants to minimize the risk of electrical fires in their home. Which of the following practices involving electricity is/are most effective in achieving this goal?

A. Using only low-power electrical appliances in all rooms.

B. Increasing the number of power outlets in each room.

C. Relying on extension cords for all appliances in the home.

D. Using circuit breakers and regularly checking wiring for faults.

**Q15 Filament bulb and heating element**

What is the main purpose of filling electric bulbs with nitrogen and argon gases?

A. To make the bulb transparent

B. To cool the filament rapidly

C. To prolong the life of the filament



D. To increase the brightness of the bulb

Q16 Filament of electric bulb

Why is tungsten used as the filament material in electric bulbs?

A. It is the cheapest metal available for manufacturing filaments.

B. It produces more heat than other metals at lower temperatures.

C. It has a high melting point and can withstand high temperatures without melting.



D. It reacts with nitrogen and argon to create a brighter light.

Q17 Heating effect of current

Why does a metal filament bulb glow when electric current passes through it?

A. A chemical reaction in the filament produces light

B. The filament offers resistance, converting electrical energy to heat and light



C. The filament conducts current with zero resistance

D. The filament is magnetized by the current



Q18 Heating element materials

Why are alloys preferred for the heating elements in devices like toasters?

- A. They are insulators
- B. They have higher resistivity and do not oxidise readily at high temperatures ✓
- C. They are good electrical conductors with low resistivity
- D. They have a low melting point

Q19 Heating element materials

A manufacturer wants to design heating elements that generate more heat when a current passes through. Which material property should be maximized for this purpose?

- A. A material with zero resistivity should be used for maximum heat generation.
- B. Resistivity should be minimized to increase heat generation for a given current.
- C. Conductivity should be maximized to increase heat generation for a given current.
- D. Resistivity should be maximized to increase heat generation for a given current. ✓

Q20 Joule's law of heating

If a resistor is connected to a voltage source and the resistance is halved while the voltage remains constant, what happens to the heat produced in a fixed time?

- A. The heat produced decreases to half its previous value
- B. The heat produced increases to twice its previous value ✓
- C. The heat produced increases to four times its previous value
- D. The heat produced remains unchanged

Q21 Joule's law of heating

A student wants to design a device that maximizes heat production for a given battery and time. Which configuration should the student choose?

- A. Use a resistor with the highest possible resistance value
- B. Short-circuit the battery with zero resistance
- C. Add more batteries without changing resistance
- D. Use a resistor with very low resistance value ✓

Q22 Joule's law of heating

If the resistance of a wire is doubled and same current flows through it for same time, heat produced will:

- A. Become half
- B. Become four times
- C. Become double ✓
- D. Remain same

Q23 Joule's law of heating

If a resistor is connected across a battery and used for a longer time period, which of the following will increase, assuming current and resistance remain constant?

- A. The resistance of the resistor
- B. The charge per unit time
- C. The total heat produced in the resistor ✓
- D. The potential difference across the resistor

Q24 Joule's law of heating

If the resistance in a circuit is doubled and the current remains constant, what happens to the amount of heat produced in the resistor over the same time period?

- A. It doubles ✓
- B. It quadruples
- C. It remains unchanged
- D. It halves

Q25 Power rating numerical

A heater is rated at 1000 W, 250 V. If it is connected to a 250 V supply, what will be the current drawn by the heater and what is the resistance of the heater?

- A. 5.0 A, 50 Ω
- B. 3.5 A, 71.4 Ω
- C. 4 A, 62.5 Ω ✓
- D. 2.5 A, 100 Ω



Q1 Electric motor

A device uses the principle of magnetic fields around a current-carrying conductor to convert electrical energy to mechanical energy. Which device operates on this principle?

- A. Solar cell
- B. Transformer
- C. Galvanometer
- D. Electric motor

**Q2 Electromagnetic induction**

What happens when a conductor moves through a magnetic field?

- A. A potential difference is induced across its ends.
- B. Light is produced in the conductor.
- C. The conductor heats up.
- D. The strength of the magnetic field increases.

**Q3 Electromagnetic induction**

Which arrangement will result in the greatest induced current in a wire loop?

- A. Moving the loop quickly into a strong magnetic field
- B. Keeping the loop stationary in a magnetic field
- C. Moving the loop slowly into a weak magnetic field
- D. Moving the loop parallel to the field lines

**Q4 Electromagnetic induction**

Two identical coils are placed near each other. If the current in the first coil is switched off suddenly, what will happen in the second coil?

- A. A current is momentarily induced in the second coil in a direction that tries to keep the magnetic field constant.
- B. A current is induced in the second coil that helps decrease the original magnetic field.
- C. A steady current is induced in the second coil as long as the first coil remains off.
- D. No current is induced in the second coil because the coils are not connected.

**Q5 Electromagnetic induction**

Which setup is most likely to produce a larger induced current in a coil?

- A. Using more turns of wire in the coil
- B. Using a smaller magnet
- C. Using fewer turns of wire in the coil
- D. Moving the magnet more slowly

**Q6 Electromagnetic induction**

A coil of wire is moved rapidly into a region with a strong magnetic field. Which change will most likely increase the magnitude of the induced current in the coil?

- A. Increasing the speed at which the coil enters the magnetic field
- B. Rotating the coil at the same speed within the field
- C. Holding the coil stationary in the field
- D. Using a thicker wire for the coil

**Q7 Electromagnetic induction and generator**

In a generator, what would be the result if the coil is rotated at double the original speed in the same magnetic field?

- A. The induced potential difference will be twice as large
- B. The magnetic field strength will double
- C. The direction of current will reverse
- D. The resistance of the coil will halve

**Q8 Field around straight conductor**

What happens to the magnetic field around a straight current-carrying conductor if the direction of the current is reversed?

- A. The magnetic field around the conductor becomes zero.
- B. The magnetic field strength doubles around the conductor.
- C. The magnetic field direction reverses around the conductor.
- D. The magnetic field around the conductor disappears.



Q9 Field around straight conductor

If the direction of current in a straight conductor is reversed, what will be the effect on the direction of the surrounding magnetic field lines?

A. The magnetic field lines will reverse direction ✓

B. The magnetic field lines will become stronger

C. The magnetic field lines will remain unchanged

D. The magnetic field lines will become weaker

Q10 Field around straight conductor

A student wants to increase the magnetic field strength around a straight conductor carrying current. Which combination of changes will most effectively achieve this?

A. Increasing the current and bringing the observation point closer to the conductor. ✓

B. Keeping the current constant and changing the observation point to any location.

C. Decreasing the current and moving the observation point farther from the conductor.

D. Increasing the current while moving the observation point farther away.

Q11 Field around straight conductor

Why are magnetic field lines due to current in a straight conductor denser near the wire and farther apart as distance increases?

A. Because of interference from external magnets only

B. Because the magnetic field becomes uniform farther away

C. Because magnetic field strength decreases with increasing distance from the wire ✓

D. Because the current in the wire decreases with distance

Q12 Field around straight conductor

A student places a compass near a straight, current-carrying conductor and observes the needle deflect. What does this observation indicate about the region around the conductor?

A. An electric field is generated around the conductor

B. There is a magnetic field present around the conductor ✓

C. The region becomes gravitationally active

D. Heat is produced around the conductor

Q13 Field around straight conductor

An experiment uses a compass near a straight current-carrying wire. What does the compass needle indicate?

A. The compass needle shows no movement

B. The compass needle aligns tangentially to the magnetic field circle around the wire ✓

C. The compass needle points radially away from the wire

D. The compass needle aligns parallel to the wire

Q14 Fleming's left hand rule

A technician reverses the direction of current in a conductor placed in a magnetic field. According to Fleming's Left Hand Rule, what will happen to the direction of force on the conductor?

A. The force direction will remain unchanged

B. The force will disappear

C. The force will always increase

D. The force direction will reverse ✓

Q15 Fleming's left hand rule

In Fleming's Left Hand Rule, which finger represents the direction of the magnetic field?

A. The thumb

B. The middle finger

C. The index finger ✓

D. The ring finger

Q16 Fleming's left hand rule

An electron enters a uniform magnetic field at right angles to it. If the magnetic field is directed into the page and the electron enters toward the right, what is the direction of the force acting on the electron?

A. upward

B. out of the page

C. into the page

D. downward ✓



Q17 Fleming's left hand rule

A student uses Fleming's Left Hand Rule to determine the direction of force on a conductor. If the forefinger points north, and the middle finger points east, in which direction will the force act?

- A. Westwards
- B. Downwards
- C. Southwards
- D. Upwards

**Q18 Fleming's right hand rule**

In an experiment, a metal rod moves northward across a horizontal magnetic field directed east. According to Fleming's Right Hand Rule, what is the direction of the induced current in the rod?

- A. The induced current flows westward
- B. The induced current flows eastward
- C. The induced current flows vertically upward
- D. The induced current flows vertically downward

**Q19 Fleming's right hand rule**

If the direction of the magnetic field is north to south and the conductor moves upward, using Fleming's Right Hand Rule, what is the direction of the induced current?

- A. Towards West
- B. Away from the observer
- C. Towards East
- D. Towards the observer

**Q20 Force on current-carrying conductor**

If the current in a conductor is doubled while it remains perpendicular to the same magnetic field, how does the force on the conductor change?

- A. The force remains unchanged
- B. The force doubles
- C. The force reduces four times
- D. The force is halved

**Q21 Force on current-carrying conductor**

A rectangular coil is placed in a uniform magnetic field. If the direction of the current is reversed, what is the effect on the force acting on each segment of the coil?

- A. The force acts perpendicular to the plane of the coil
- B. The direction of the force on each segment reverses
- C. The magnitude of the force doubles
- D. The magnitude of the force becomes zero

**Q22 Magnetic field lines**

What does a higher degree of closeness of magnetic field lines indicate?

- A. Weaker magnetic field at that region
- B. Stronger magnetic field at that region
- C. Presence of electric field
- D. The field lines are about to cross

**Q23 Magnetic field lines**

Which property of magnetic field lines explains the absence of magnetic monopoles in classical electromagnetism?

- A. They are always circular
- B. They are denser near poles
- C. They form continuous closed curves
- D. They never intersect

**Q24 Magnetic field of a solenoid**

Why are field lines inside a solenoid described as parallel straight lines?

- A. Because parallel lines suggest the field varies greatly
- B. Because the magnetic field is the same at all points inside, indicating uniformity
- C. Because the current changes direction rapidly
- D. Because the solenoid is very short in length

**Q25 Magnetic field of a solenoid**

A student wants to make a bar magnet using a current-carrying solenoid. Which arrangement of the magnetic field lines will indicate that the solenoid is acting as a bar magnet?

- A. Field lines form straight parallel lines outside the solenoid only
- B. Field lines spiral around the solenoid from end to end
- C. Field lines emerge from one end and enter the other, forming closed loops outside
- D. Field lines curve randomly inside the solenoid



Q26 Magnetic field of a solenoid

Why does one end of a solenoid behave as a north pole and the other as a south pole?

- A. The insulation creates the poles
- B. The solenoid is naturally magnetic
- C. The current creates a similar magnetic effect to a bar magnet ✓
- D. There is no current in the solenoid

Q27 Magnetic field of straight conductor

A student wants to design a device where the magnetic field due to a straight conductor is maximized at a certain point. Which modification will be most effective in increasing the field strength at that point?

- A. Increase the thickness of the wire
- B. Place the conductor horizontally
- C. Increase the current through the conductor ✓
- D. Use a non-magnetic wire material

Q28 Magnetic field of straight conductor

A student observes that the compass needle deflection decreases as it moves farther from a current-carrying straight conductor. What is the most likely reason for this observation?

- A. The shape of the wire affects field strength only at close distances
- B. The Earth's magnetic field becomes stronger with distance
- C. The electric current in the conductor decreases with distance
- D. The magnetic field strength decreases as the distance from the conductor increases ✓

Q29 Magnetic field of straight conductor

A technician wants to decrease the magnetic effect around a current-carrying wire without changing the wire's material or environment. Which method should be used?

- A. Make the wire thinner without changing the current
- B. Increase the length of the wire used
- C. Reduce the amount of current flowing through the wire ✓
- D. Change the wire's path to a straight line

Q30 Magnetic field of straight conductor

How does the magnetic field produced by a current-carrying wire change with distance from the wire?

- A. It remains constant at all distances
- B. It decreases as distance increases ✓
- C. It fluctuates randomly with distance
- D. It increases as distance increases

Q31 Right hand thumb rule

Which statement best describes the application of the Right Hand Thumb Rule to a straight current-carrying conductor?

- A. Thumb points in current direction, fingers curl in magnetic field direction ✓
- B. Left hand is used for current, right for magnetic field
- C. Fingers point in current direction, thumb curls in magnetic field direction
- D. Thumb points in magnetic field direction, fingers curl in current direction

Q32 Right hand thumb rule

The right hand thumb rule is also known as _____.

- A. Maxwell's corkscrew rule ✓
- B. Fleming's rule
- C. Ohm's rule
- D. Faraday's rule

Q33 Right hand thumb rule

A student wants to use the Right Hand Thumb Rule to determine the direction of the magnetic field around a current-carrying straight conductor. Which of the following steps is essential in applying the rule correctly?

- A. Align the thumb with the magnetic field
- B. Use the left hand for orientation
- C. Point the thumb in the direction of current ✓
- D. Wrap fingers in the direction of the conductor



Q34 Right hand thumb rule

During an experiment, a student applies the Right Hand Thumb Rule to a vertical wire with current flowing upward. What is the direction of the magnetic field at a point directly east of the wire?

- A. The magnetic field points towards the south at that point
- B. The magnetic field points towards the west at that point
- C. The magnetic field points towards the north at that point ☒
- D. The magnetic field points towards the east at that point

Q35 Right hand thumb rule

Which rule is used to determine the direction of the magnetic field at the centre of a circular current-carrying loop?

- A. Ohm's law
- B. Joule's law of heating
- C. Right-hand thumb rule ☒
- D. Fleming's left hand rule

Q36 Solenoid and electromagnet

Why can a solenoid be used to magnetise a piece of soft iron placed inside it?

- A. Because the solenoid creates a weak and scattered magnetic field inside it
- B. Because the solenoid produces a strong and uniform magnetic field inside it ☒
- C. Because the solenoid produces a non-uniform field only outside it
- D. Because the solenoid blocks magnetic fields from entering soft iron



Q1 Coagulation of colloids

Which of the following is an example of coagulation in everyday life?

- A. Extracting salt from sea water
- B. Separating pigments using chromatography
- C. Filtering sand from a mixture of water and sand
- D. Adding vinegar in milk to form paneer ✓

Q2 Colloids and Tyndall effect

Which of the following is a correct property of a colloidal solution?

- A. The particles scatter a beam of light. ✓
- B. The solute can be separated by filtration.
- C. The solute particles are invisible under a microscope.
- D. The solute settles down after some time.

Q3 Colloids and Tyndall effect

Which of the following is a characteristic of a colloidal solution?

- A. The solute particles settle down on standing.
- B. The solute particles scatter a beam of light but do not settle down. ✓
- C. The solute particles do not scatter a beam of light.
- D. The solute particles can be seen with the naked eye.

Q4 Colloids and Tyndall effect

A colloidal solution is a type of:

- A. Pure substance
- B. True solution
- C. Homogeneous mixture
- D. Heterogeneous mixture ✓

Q5 Colloids and Tyndall effect

Which of the following is NOT an example of a colloid?

- A. Ice cream
- B. Blood
- C. Milk
- D. Sugar solution ✓

Q6 Concentration of solution

A solution contains 20 grams of salt dissolved in 80 grams of water. What is the concentration of the solution in terms of mass by mass percentage?

- A. 20% ✓
- B. 30%
- C. 25%
- D. 45%

Q7 Concentration of solution

If 25 g of salt is dissolved in 175 g of water, what is the concentration of the solution in mass percentage?

- A. 15%
- B. 18%
- C. 12.5% ✓
- D. 10%

Q8 Elements and compounds

If you are given a transparent liquid that can conduct electricity and contains only one type of atom, what can you conclude?

- A. It is a solution
- B. It is a heterogeneous mixture
- C. It is a compound
- D. It is an element ✓

Q9 Homogeneous and heterogeneous mixtures

Which of the following mixtures best demonstrates a heterogeneous mixture at the macroscopic level?

- A. Salt and water
- B. Sugar and water
- C. Sand and Water ✓
- D. Nitrogen and Oxygen



Q10 Homogeneous and heterogeneous mixtures

A student mixes oil and water in a beaker and notices two separate layers. Which explanation best fits this observation?

- A. Oil and water form a heterogeneous mixture because their components are not uniformly distributed** ✓
- B. Oil and water chemically react to form a new compound
- C. Oil dissolves completely in water to form a uniform solution
- D. Oil and water form a homogeneous mixture with a single phase

Q11 Homogeneous and heterogeneous mixtures

A chemistry teacher prepares a mixture by dissolving copper sulfate in water until the solution is clear blue. Why is this considered a homogeneous mixture?

- A. Copper sulfate crystals float on the surface of water
- B. The mixture forms two distinct layers after stirring
- C. Copper sulfate can be separated by filtration easily
- D. The mixture appears as a single phase with no visible separation** ✓

Q12 Homogeneous and heterogeneous mixtures

Which of the following is an example of a homogeneous mixture?

- A. Sand and water
- B. Sugar dissolved in water** ✓
- C. Oil and water
- D. Iron filings and sulfur

Q13 Homogeneous and heterogeneous mixtures

Which of the following is/are example(s) of a heterogeneous mixture?

- a) Colloidal solution
- b) Suspension
- c) Solution

- A. only (b)
- B. (a) and (b)** ✓
- C. only (a)
- D. only (c)

Q14 Homogeneous and heterogeneous mixtures

Which of the following combinations forms a homogeneous mixture when combined in water?

- A. Salt and water** ✓
- B. Sugar and sand
- C. Oil and water
- D. Iron filings and sulfur

Q15 Homogeneous and heterogeneous mixtures

Which of the following mixtures is NOT homogeneous?

- A. Air
- B. Vinegar
- C. Salt water
- D. Oil and water** ✓

Q16 Homogeneous and heterogeneous mixtures

Which of the following is a heterogenous mixture?

- A. Sand and Iron fillings** ✓
- B. Vinegar
- C. Air
- D. Salt solution

Q17 Homogeneous and heterogeneous mixtures

Which of the following is NOT a heterogeneous mixture?

- A. Alcohol and water** ✓
- B. Lemonade (with pulp)
- C. Iron filings and sulphur
- D. Soil

Q18 Homogeneous and heterogeneous mixtures

Which of the following most accurately represents a heterogeneous mixture?

- A. Sodium chloride and water
- B. Sugar and water solution
- C. Acetic acid and water solution
- D. Sand and water solution** ✓



Q19 Homogeneous and heterogeneous mixtures

Which of the following statements is true for homogeneous mixtures?

- A. The particles of a solution are smaller and cannot be seen with the naked eye. ✓
- B. The components of the mixture can be separated by filtration.
- C. They show the Tyndall effect.
- D. The solute particles settle down when it is left undisturbed.

Q20 Physical and chemical change

Which statement correctly shows that a chemical change is different from a physical change?

- A. Chemical change changes only appearance, while physical change forms new substances.
- B. Chemical change affects only size and shape, while physical change affects composition.
- C. Chemical change results in a new substance, while physical change does not. ✓
- D. Chemical change is always reversible, while physical change is never reversible.

Q21 Physical and chemical change

Which statement is correct regarding physical and chemical changes?

- A. Chemical changes alter composition. ✓
- B. All changes in solutions are chemical
- C. All physical changes are irreversible
- D. Physical changes form new substances

Q22 Physical and chemical change

Which of the following is a chemical change and NOT a physical change?

- A. Melting of ice
- B. Boiling of water
- C. Rusting of iron. ✓
- D. Dissolving sugar in water

Q23 Properties of true solution

Which of the following is NOT a property of a solution?

- A. Transparent appearance
- B. No settling of solute
- C. Uniform composition
- D. Separation of components by filtration. ✓

Q24 Properties of true solution

Which of the following CANNOT be separated by ordinary filtration?

- A. Suspension
- B. Mixture of sand and water
- C. True solution. ✓
- D. Colloidal solution

Q25 Pure substances and mixtures

Which of the following is a pure substance?

- A. Only mixture
- B. Only compound
- C. Only element
- D. Both compound and element. ✓

Q26 Saturated solution and solubility

A student adds salt to water until no more salt dissolves and some salt remains undissolved at the bottom. What does this indicate?

- A. Salt is completely insoluble in water
- B. Salt has very low solubility in water
- C. The solution formed is saturated salt solution. ✓
- D. The solution formed is a colloidal solution

Q27 Saturated solution and solubility

Which of the following statements about the solubility of solids and gases in liquids is generally CORRECT?

- A. Solubility of solids in liquids increases, while that of gases in liquids decreases with an increase in temperature. ✓
- B. Solubility of both solids and gases in liquids increases with increase in temperature.
- C. Solubility of both solids and gases in liquids decreases with increase in temperature.
- D. Solubility of solids in liquids decreases, while that of gases in liquids increases with an increase in temperature.

Q28 Separation techniques

A scientist wants to obtain pure solid iodine from its mixture with sand. Which change of temperature process should they use?

- A. Sublimation. ✓
- B. Melting
- C. Condensation
- D. Freezing



Q29 Separation techniques

Which factor must be considered before using a separating funnel for two liquids?

- A. The liquids must have strong odors
- B. The liquids must have different colors
- C. Both liquids have high boiling point
- D. The liquids must be immiscible ✓

Q30 Separation techniques

Which of the following statements about centrifugation is INCORRECT?

- A. Centrifugation involves spinning a mixture at high speed to separate its components.
- B. Centrifugation is used for separating components of different densities in a mixture.
- C. Only solid mixtures with similar particle sizes can be separated by centrifugation. ✓
- D. Centrifugation can be applied in laboratory to separate the components of blood.

Q31 Separation techniques

In an industrial process, a mixture of products is obtained when a hydrocarbon undergoes halogenation. Which method can be used to separate the monosubstituted product?

- A. Combustion
- B. Filtration
- C. Distillation ✓
- D. Precipitation

Q32 Suspension and colloid

A teacher prepares three mixtures.

1. Sugar dissolved in water
2. Salt dissolved in water
3. Sand stirred in water

Which of the following is a **suspension**?

- A. The salt and water mixture
- B. Only the sand and water mixture ✓
- C. Only the sugar and water mixture
- D. Both Sugar-water mixture & Sand-water mixture

Q33 Suspension and colloid

Which statement correctly compares the particle size in a suspension with that in a solution?

- A. Suspension particles are molecular in size and solution particles are atoms
- B. Both have equal particle size
- C. Suspension particles are smaller than solution particles
- D. Suspension particles are larger than solution particles ✓

Q34 Suspension and colloid

Which of the following is a characteristic feature of a suspension?

- A. The particles are too small to settle down on standing.
- B. Suspension shows Tyndall effect but is transparent.
- C. Particles can be seen with the naked eye and settle on standing. ✓
- D. It is a homogeneous mixture with solute dissolved uniformly.

Q35 Suspension and colloid

Which of the following is a property of a colloidal solution?

- A. Particles are smaller than true solutions
- B. Particles do not settle on standing ✓
- C. Components can be separated by filtration
- D. Particles can be seen with the naked eye

Q36 Suspension and colloid

What occurs to the particles in the suspension when we shake it?

- A. It remains settled
- B. It mixes temporarily and then settles ✓
- C. It forms a new substance
- D. It dissolves permanently

Q37 Suspension and colloid

You are given three mixtures: muddy water, sugar solution, and milk. Which one is a suspension?

- A. Milk
- B. Muddy water ✓
- C. Sugar solution
- D. Muddy Sugar



Q38 Suspension and colloid

The correct decreasing order of the size of the particles in suspension, solution, and colloid is:

- A. suspension > solution > colloid
- B. suspension > colloid > solution ✓
- C. colloid > suspension > solution
- D. solution > colloid > suspension

Q39 Suspension and colloid

What are the two main components of a colloidal solution?

- A. Reactant phase and product medium
- B. Solute phase and solvent medium
- C. Metal phase and non-metal medium
- D. Dispersed phase and dispersion medium ✓

Q40 Suspension properties

Which of the following is a characteristic property of a suspension?

- A. It is a true solution
- B. Its components cannot be separated
- C. It only burns with a blue flame
- D. Its particles can be seen with the naked eye ✓

Q41 Suspension properties

Which of the following is a common example of a suspension found in daily life?

- A. Starch solution
- B. Milk
- C. Salt water
- D. Muddy water ✓

Q42 Suspension properties

Which of the following mixtures shows the Tyndall effect but the particles settle down on standing?

- A. Colloid
- B. Suspension ✓
- C. Solution
- D. Compound

Q43 Suspension properties

Which of the following is true about suspensions?

- A. They are transparent
- B. The solute particles settle down on standing ✓
- C. They do not scatter light
- D. The solute dissolves completely

Q44 Suspension properties

Which of the following is a property of a suspension?

- A. Can be separated by filtration ✓
- B. Particles do not settle down
- C. Homogeneous mixture
- D. Particles are smaller than 1 nm

Q45 True solution properties

Which of the following is a characteristic of a true solution?

- A. The solute particles can be seen with the naked eye.
- B. The solute particles settle rapidly at the bottom.
- C. The solute particles are easily separated by filtration.
- D. The solute particles are evenly distributed in the solution. ✓



Q1 Atomicity of elements

Which statement correctly explains the term atomicity with reference to molecules of elements?

- A. It is the total mass of atoms present in one molecule
- B. It is the number of shells present in an atom
- C. It is the number of electrons in an element
- D. It is the number of atoms present in one molecule ✓

Q2 Atomicity of elements

Which of the following does not exist as a diatomic molecule?

- A. Hydrogen
- B. Sulphur ✓
- C. Chlorine
- D. Nitrogen

Q3 Atomicity of elements

Which of the following elements has molecules with the highest number of atoms?

- A. Oxygen
- B. Chlorine
- C. Sulphur ✓
- D. Nitrogen

Q4 Chemical formula writing

When potassium reacts with chlorine to form potassium chloride, which formula correctly represents the resulting compound based on their combining ratios?

- A. K_2Cl_2
- B. KCl ✓
- C. KCl_2
- D. K_2Cl

Q5 Chemical formula writing

A student wants to write the chemical formula for aluminium sulfate, which contains two aluminium atoms, three sulfur atoms, and twelve oxygen atoms. Which is the correct formula?

- A. Al_2SO_4
- B. $Al_3(SO_4)_2$
- C. $Al_2(SO_4)_3$ ✓
- D. $Al(SO_4)_3$

Q6 Conservation of mass law

A glass vessel contains a chemical reaction where no gas escapes or enters. According to the Law of Conservation of Mass, which situation is most accurate?

- A. The total mass after the reaction increases.
- B. The total mass after the reaction decreases.
- C. The total mass before the reaction is less than that after the reaction.
- D. The total mass before and after the reaction remains unchanged. ✓

Q7 Conservation of mass law

When 16 g of oxygen is combined with 2 g of hydrogen, 18 g water is formed. This observation is in accordance with:

- A. law of multiple proportions
- B. Avagadro's Law
- C. law of conservation of mass ✓
- D. Gay-Lussac's law

Q8 Dalton's atomic theory

What does Dalton's atomic theory suggest about atoms of different elements?

- A. They are the same in every aspect.
- B. They have different masses and properties. ✓
- C. They have different sizes but identical masses.
- D. They have identical masses but different shapes.



Q9 Formation of ions

What is formed when a non-metal gains electrons?

A. Anion



B. Neutral

C. Cation

D. Proton

Q10 Formation of ions

Which statement best describes the result when a sodium atom in the gaseous state loses one electron?

A. The atom becomes a sodium ion with a negative charge.

B. The atom remains a neutral sodium atom.

C. The atom becomes a sodium ion with a positive charge.



D. The atom is converted into a neutron.

Q11 Formation of ions

Which of the following statements is/are correct?

Statement I: Sodium atom loses one electron to form a sodium ion.

Statement II: Sodium ion has a negative charge.

A. Only Statement I is correct.



B. Only Statement II is correct.

C. Both statements I and II are incorrect.

D. Both statements I and II are correct.

Q12 Formula unit mass

Calculate the formula unit masses of ZnO, Na₂O, if given atomic masses of Zn = 65 u, Na = 23 u, and O = 16 u.

A. ZnO = 81u and Na₂O = 39 u.

B. ZnO = 81u and Na₂O = 62 u.



C. ZnO = 48u and Na₂O = 62 u.

D. ZnO = 18u and Na₂O = 62 u.

Q13 Formula unit mass

A student is asked to calculate the formula unit mass of barium nitrate (Ba(NO₃)₂). What should be the student's first step ?

A. Find the atomic number of barium

B. Find the molecular mass of nitrate only

C. Find the elements in the formula.



D. Find the atomic mass of barium only

Q14 History of atomic theory

Who was the first scientist to use the term 'element'?

A. JJ Thomson

B. Robert Boyle



C. Antoine Lavoisier

D. John Dalton

Q15 Law of conservation of mass

In a chemical reaction, 12g of carbon reacts completely with 32g of oxygen to form carbon dioxide. If only 40g of carbon dioxide is collected, which of the following is the correct conclusion based on the Law of Conservation of Mass?

A. The reaction is incomplete because 4g of mass is unaccounted for.

B. The law of conservation of mass does not apply to gas formation.

C. Mass is always lost as energy, so the final mass decreases.

D. Carbon dioxide gas escaped during the reaction, so mass was not fully collected.

**Q16 Law of conservation of mass**

Which of the following reactions violates the Law of Conservation of Mass?

A. $2\text{H}_2 + \text{O}_2 \rightarrow 2\text{H}_2\text{O}$

B. $2\text{Mg} + \text{O}_2 \rightarrow \text{MgO}$



C. $\text{Ca} + \text{Cl}_2 \rightarrow \text{CaCl}_2$

D. $\text{H}_2 + \text{Cl}_2 \rightarrow 2\text{HCl}$

Q17 Law of conservation of mass

Why is the reaction flask corked during experiments verifying conservation of mass?

A. To allow air circulation

B. To cool reaction mixture

C. To increase reaction speed

D. To prevent loss of matter

**Q18 Law of conservation of mass**

Which observation would show a violation of the law of conservation of mass in a closed system?

A. The mass of the products is less than the mass of the reactants



B. A white precipitate forms after mixing solutions

C. The color of the solution changes after reaction

D. The temperature of the system increases



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Q19 Law of constant proportions

Match the compound to its respective mass ratio by elements from the table given below.

Compound	Mass Ratio by Elements
1. Water (H_2O)	A. 1 : 8
2. Carbon dioxide (CO_2)	B. 14 : 3
3. Ammonia (NH_3)	C. 3 : 8
4. Sulphur dioxide (SO_2)	D. 1 : 1

A. 1 → A, 2 → C, 3 → D, 4 → B

B. 1 → A, 2 → C, 3 → B, 4 → D

C. 1 → C, 2 → A, 3 → B, 4 → D

D. 1 → A, 2 → D, 3 → B, 4 → C

Q20 Law of constant proportions

In ammonia (NH_3), the combining elements are present in the ratio of:

A. 14:3

B. 7:3

C. 28:3

D. 14:6

Q21 Law of constant proportions

A sample of water obtained from two different sources is found to contain hydrogen and oxygen in the ratio 1:8 by mass. Which law is illustrated by this observation?

A. Law of multiple proportions

B. Law of conservation of mass

C. Law of constant proportions

D. Law of reciprocal proportions

Q22 Law of constant proportions

Which of the following statements is/are CORRECT?
Statement I: Atoms of different elements combine in definite proportions to form compounds.

Statement II: In a pure chemical compound, elements are always present in a definite proportion by mass.

A. Both statements I and II are correct

B. Both statements I and II are incorrect

C. Only Statement I is correct

D. Only Statement II is correct

Q23 Law of constant proportions

Which of the following observations would violate the law of constant proportions?

A. A sample of ammonia containing nitrogen and hydrogen in a 14:3 mass ratio.

B. A sample of magnesium sulphide containing magnesium and sulphur in a 4:3 mass ratio.

C. A sample of sodium chloride with sodium and chlorine in a 23:35.5 mass ratio.

D. A sample of water containing hydrogen and oxygen in a 1:8 mass ratio.

Q24 Molecular and formula unit mass

What is the formula unit mass of calcium chloride (CaCl_2)?

A. 71 u

B. 65 u

C. 111 u

D. 46 u

Q25 Molecular and formula unit mass

Among the following, what has a molecular mass of 44 u?

A. NH_3

B. H_2O

C. CO_2

D. N_2

Q26 Molecular and formula unit mass

The formula unit mass of ammonium sulphate, $(\text{NH}_4)_2\text{SO}_4$, is:

A. 114 u

B. 118 u

C. 132 u

D. 136 u

Q27 Molecular and formula unit mass

What does the formula unit mass of a substance represent?

A. Product of atomic numbers of all atoms in a molecule

B. Ratio of atomic masses of metal and nonmetal atoms

C. Difference between molecular and atomic masses

D. Sum of atomic masses of all atoms in a formula unit



Q28 Molecular mass calculation

Given that the atomic masses of C = 12 u, O = 16 u and H = 1 u, which of the following options correctly represents the molecular masses of CO₂ and H₂O?

A. CO₂ = 46 u ; H₂O = 20 u

B. CO₂ = 32 u ; H₂O = 18 u

C. CO₂ = 44 u ; H₂O = 16 u

D. CO₂ = 44 u ; H₂O = 18 u

**Q29 Molecular mass calculation**

If the molecular mass of nitrogen gas (N₂) is 28, what is the atomic mass of a single nitrogen atom?

A. 14



B. 21

C. 7

D. 28

Q30 Molecules and compounds

Which of the following best describes a molecule of a compound?

A. A molecule formed by the chemical combination of different elements in a fixed ratio



B. A group of atoms of the same element

C. A molecule formed by atoms in any variable ratio

D. A physical mixture of atoms

Q31 Molecules and compounds

Molecules of compounds are formed by:

A. Random atomic combinations

B. Different elements in fixed ratios



C. Physical mixing of atoms

D. Similar atoms only

Q32 Molecules of elements

Which of the following is a correct statement about molecules of elements?

A. They consist of two or more atoms of the same element.



B. They are always monoatomic.

C. They consist of two or more atoms of different elements.

D. They can only exist in solid form.

Q33 Symbols of elements

Which of the following statement(s) is/are true?

Statement I: The symbol 'Ag' stands for gold.

Statement II: The symbol 'Pb' represents lead.

A. Statement I is correct, Statement II is incorrect

B. Both statements are correct

C. Both statements are incorrect

D. Statement I is incorrect, Statement II is correct

**Q34 Symbols of elements**

Which of the following element symbols does NOT match its element?

A. C for Carbon

B. Sb for Seaborgium



C. O for Oxygen

D. As for Arsenic

Q35 Symbols of elements

Which rule for writing chemical symbols is correct?

A. Both letters capitalised

B. First letter capital only



C. Second letter capital only

D. Letters written in italics

Q36 Symbols of elements

The element with the symbol K is:

A. Phosphorous

B. Potassium



C. Krypton

D. Palladium

Q37 Symbols of elements

Which of the following pairs is correctly matched?

A. Ag – Argon

B. Au – Aluminum

C. Pb – Lead



D. Fe – Fluorine



Q38 Symbols of elements

Which of the following is the correct symbol for the element Aluminium?

- A. alm
- B. Alm
- C. AL
- D. Al

**Q39 Valency and chemical formula**

The importance of valency in forming chemical formulae lies in:

- A. Predicting the energy released during compound formation
- B. Identifying the molecular geometry using bonding angles only
- C. Measuring the reactivity rate of atoms in gaseous condition
- D. Determining how atoms of elements combine with each other

**Q40 Valency and chemical formula**

An element X forms a chloride with the formula XCl_3 and an oxide with the formula X_2O_3 . Based on this, what is the valency of element X?

- A. 3
- B. 1
- C. 2
- D. 4

**Q41 Valency and chemical formulae**

What is the valency of oxygen in MgO ?

- A. Two
- B. One
- C. Three
- D. Four

**Q42 Valency and chemical formulae**

Which statement correctly describes the valency exhibited by phosphorus?

- A. Phosphorus exhibits only a valency of two.
- B. Phosphorus exhibits only a valency of three.
- C. Phosphorus exhibits only a valency of five.
- D. Phosphorus can exhibit valency of three or five

**Q43 Valency and combining capacity**

What does the valency of an element indicate?

- A. The total number of electron shells present in an atom
- B. The mass of the atom measured in atomic mass units
- C. The total number of neutrons present in the nucleus
- D. The combining capacity of an atom in chemical reactions

**Q44 Writing chemical formulae**

Aluminium reacts with oxygen. Which chemical formula represents the product of this reaction?

- A. Al_3O_2
- B. Al_2O
- C. AlO_2
- D. Al_2O_3



Q1 Alpha particle scattering experiment

In Rutherford's α -particle scattering experiment, the conclusion that most of the atom is empty space was drawn because:

- A. Electrons in atoms were electrically neutral
- B. Gold atoms were chemically unstable
- C. Only a few α -particles showed deflection ✓
- D. Most α -particles were absorbed by the foil

Q2 Atomic models

According to Rutherford's model, positive charge is:

- A. Found in outer shells
- B. Spread uniformly in the atom
- C. Present with electrons
- D. Concentrated at the centre ✓

Q3 Atomic models

Thomson's model could not explain:

- A. Electron presence
- B. Rutherford's experiment results ✓
- C. Atom's neutrality
- D. Atom's mass

Q4 Atomic models

What do the raisins represent in Thomson's plum-pudding model of the atom?

- A. Electrons embedded in positively charge sphere ✓
- B. Protons and neutrons present in the atom
- C. Electrons present in various orbits of atom
- D. Neutrons spread out throughout the atom

Q5 Atomic number and electrons

An element has an atomic number of 17. Based on the arrangement of charged particles in its atom, which statement best explains the number of electrons in its neutral state?

- A. It contains 8 electrons in the innermost shell alone.
- B. It has more electrons than protons due to its atomic mass.
- C. It contains 17 electrons to match the 17 neutrons present.
- D. It has 17 electrons to balance the 17 protons present. ✓

Q6 Atomic number and mass number

Consider two elements, X with atomic number 7 and Y with atomic number 8. Which of the following is correct about their number of protons?

- A. Both have no protons.
- B. Both have same number of protons.
- C. X has one more proton than Y.
- D. Y has one more proton than X. ✓

Q7 Atomic number and mass number

The mass number of an atom represents the total count of which particles present within its nucleus?

- A. electrons and neutrons
- B. protons and electrons
- C. protons only
- D. protons and neutrons ✓

Q8 Atomic number and mass number

Which of the following correctly defines the mass number of an atom?

- A. Number of protons only
- B. Sum of protons and neutrons ✓
- C. Number of electrons plus neutrons
- D. Number of electrons only



Q9 Atomic number and mass number

Imagine a scientist is analyzing an unknown atom and finds it has a mass number of 24 and an atomic number of 12. If the atom gains two neutrons due to a nuclear reaction, what will be its new mass number?

A. 12

B. 24

C. 26



D. 14

Q10 Atomic number and mass number

What does the atomic number of an element represent?

A. Number of neutrons only

B. Number of protons



C. Number of isotopes

D. Number of electrons and neutrons

Q11 Atomic number and mass number

Which of the following elements has a mass number of 40 and atomic number of 20?

A. Calcium



B. Sodium

C. Neon

D. Potassium

Q12 Atomic number and mass number

An atom of element X has a mass number of 37 and contains 20 neutrons. What is the atomic number of X, and which element does it represent?

A. 19, Potassium

B. 17, Chlorine



C. 20, Calcium

D. 18, Argon

Q13 Average atomic mass

Chlorine occurs in nature in two isotopic forms, with masses 35 u and 37 u, then average atomic mass of chlorine atom estimated would have been:

A. 35.5 u



B. 35.2 u

C. 34.5 u

D. 35 u

Q14 Bohr model

According to Bohr's model of an atom, which of the following statements is INCORRECT about discrete orbitals of electrons?

A. while revolving in discrete orbits, the electrons do not radiate energy

B. discrete orbits of electrons are certain special orbits that are allowed inside the atom

C. discrete orbits are also called as energy levels

D. while revolving in discrete orbits, the electrons radiate energy exponentially

**Q15 Bohr model and shells**

The path along which an electron revolves around the nucleus is called:

A. Proton

B. Molecule

C. Neutron

D. Orbit

**Q16 Bohr model and shells**

Which of the following statements are correct according to Bohr's model of the atom?

1. Electrons revolve around the nucleus in fixed circular paths called energy levels or shells.
2. The energy of electrons changes continuously while revolving in a particular orbit.
3. Energy is absorbed or emitted only when an electron jumps from one energy level to another.

A. Only 1 and 2 are correct

B. Only 1 and 3 are correct



C. All statements are correct

D. Only 2 and 3 are correct

Q17 Bohr model and shells

According to Bohr's model, electrons revolve around the nucleus in:

A. Fixed circular orbits



B. Random circular paths

C. Elliptical energy clouds

D. Spiral trajectories



Q18 Bohr model and shells

Which of the following phenomena is explained by Bohr's model?

- A. Diffraction of proton
- B. Diffraction of neutron
- C. Rutherford scattering
- D. Hydrogen line spectrum ✓

Q19 Bohr model and shells

According to Bohr's Atomic Model, the orbit closest to the nucleus is called:

- A. K-shell ✓
- B. L-shell
- C. N-shell
- D. M-shell

Q20 Discovery of subatomic particles

The electron was discovered by:

- A. Rutherford
- B. Dalton
- C. J. J. Thomson ✓
- D. Neils Bohr

Q21 Electronic configuration

According to the Bohr-Bury rules, what is the maximum number of electrons that can be accommodated in the L shell of an atom?

- A. Two electrons only
- B. Four electrons only
- C. Eight electrons only ✓
- D. Sixteen electrons only

Q22 Electronic configuration

The maximum number of electrons present in a shell is given by the formula:
(here, 'n' is the orbit number)

- A. $2n^2$ ✓
- B. $2n-2$
- C. $2n$
- D. $2n^3$

Q23 Electronic configuration

Which of the following statements is/are CORRECT?
Statement I: The maximum number of electrons in any shell is given by $2n^2$.
Statement II: The third shell ($n=3$) can hold up to 12 electrons.

- A. Only statement II is correct.
- B. Only statement I is correct. ✓
- C. Both statements I and II are incorrect.
- D. Both statements I and II are correct.

Q24 Electronic configuration

Which of the following electronic configurations is NOT possible for any neutral atom?

- A. 2, 8, 2
- B. 2, 10, 9 ✓
- C. 2, 8, 3
- D. 2, 8, 8

Q25 Electronic configuration

Which arrangement correctly shows the distribution of electrons in the orbits of the element sodium (atomic number 11)?

- A. 1,8,2
- B. 2,8,1 ✓
- C. 2,9
- D. 3,9

Q26 Formation of ions

An element X forms an ion X^{2+} . If the neutral atom of X has 20 electrons, how many electrons are present in the ion?

- A. 20
- B. 24
- C. 22
- D. 18 ✓

Q27 Isotopes and atomic mass

The average atomic mass of chlorine atom, based on the given isotopic ratio and masses, is ____.

- A. 37 u
- B. 36 u
- C. 34.5 u
- D. 35.5 u ✓



Q28 Isotopes and atomic mass

An atom of element Y has an atomic mass of 20 u. If another atom of Y has two more neutrons but the same number of protons, what will be its atomic mass?

- A. 20 u
- B. 24 u
- C. 18 u
- D. 22 u

**Q29 Isotopes and atomic mass**

If two atoms of the same element have different mass numbers but the same number of protons, which subatomic particle is responsible for this difference?

- A. Proton
- B. Electron
- C. Positron
- D. Neutron

**Q30 Isotopes and isobars**

Which property of isotopes remains unchanged?

- A. Atomic mass
- B. Nuclear stability
- C. Physical properties
- D. Chemical properties

**Q31 Isotopes and isobars**

Which of the following statements best explains why elements with the same atomic number exhibit identical chemical properties, even if their mass numbers are different?

- A. Because they are found in the same physical state
- B. Because they contain the same number of neutrons
- C. Because they have the same number of protons and electrons
- D. Because they have similar atomic mass

**Q32 Isotopes and isobars**

Which of the following properties do isobars have in common?

- A. Number of protons
- B. Mass number
- C. Atomic number
- D. Physical nature

**Q33 Isotopes and isobars**

Which of the following statements is true about isotopes?

- A. Isotopes have the same number of neutrons
- B. Isotopes have different atomic numbers but same mass number
- C. Isotopes have the same number of protons but different number of neutrons
- D. Isotopes are different elements with same atomic number

**Q34 Isotopes and isobars**

Which of the following statements is CORRECT?

- A. Atomic number is equal to number of nucleons.
- B. The two isotopes of carbon have same mass number.
- C. For an element, mass number is double of atomic number.

The three isotopes of hydrogen namely protium, deuterium and tritium have same number of protons.

**Q35 Isotopes and isobars**

Two isotopes of chlorine are present in nature: chlorine-35 and chlorine-37. Which statement best explains their chemical behavior?

- A. They react differently with sodium
- B. They cannot bond with hydrogen
- C. They have different valencies
- D. They form identical compounds

**Q36 Isotopes and isobars**

Which of the following best represents the characteristic properties of isotopes?

- A. The chemical properties of isotopes are different but their physical properties are similar.
- B. Both the chemical and physical properties of isotopes are different.
- C. Both the chemical and physical properties of isotopes are similar.
- D. The chemical properties of isotopes are similar, but their physical properties are different.



Q37 Mass number

Which property is used to differentiate atoms of various elements based on the total mass of their protons and neutrons in the nucleus?

- A. Valency
- B. Atomic mass
- C. Atomic number
- D. Isotopic ratio

Q38 Mass number

Which statement about mass number is correct?

- A. It is always less than atomic number
- B. It is unrelated to atomic number
- C. It is always equal to atomic number
- D. It is always greater than atomic number

Q39 Mass number

If an atom has an atomic number of 15 and a mass number of 31 according to Bohr's model, what is the number of neutrons present?

- A. The number of neutrons is 30.
- B. The number of neutrons is 16.
- C. The number of neutrons is 31.
- D. The number of neutrons is 15.

Q40 Rutherford model

Which statement best describes the nucleus according to Rutherford's model?

- A. The nucleus is hollow and neutral.
- B. The nucleus is large, light, and negatively charged.
- C. The nucleus is small, dense, and positively charged.
- D. The nucleus is spread out and uncharged.

Q41 Rutherford model

According to the Rutherford's model, what is the main characteristic of an atom's nucleus?

- A. It is small, dense, and positively charged
- B. It contains only electrons
- C. It is spread throughout the atom
- D. It is large and negatively charged

Q42 Subatomic particles

Which of the following statements about neutrons is correct?

- A. Neutrons have no charge and are found in the nucleus of an atom
- B. Neutrons are negatively charged and found in the outermost shell
- C. Neutrons are positively charged particles found in the nucleus
- D. Neutrons revolve around the nucleus like electrons

Q43 Subatomic particles

Where are protons located within an atom?

- A. In the atomic shell
- B. In the nucleus of an atom
- C. Outside the atom
- D. In the electron cloud

Q44 Subatomic particles

Which of the following correctly describes a proton?

- A. Neutral particle
- B. Negatively charged particle
- C. Positively charged particle
- D. Particle with no mass

Q45 Subatomic particles and charge

What role do electrons play in the overall charge of an atom?

- A. They balance the positive charge of protons to make atoms neutral
- B. They are present inside the nucleus with neutrons
- C. They make the atom positively charged
- D. They add significant mass to the atom

Q46 Subatomic particles and charge

Which of the following elements do not possess neutrons inside their nucleus?

- A. helium
- B. argon
- C. neon
- D. hydrogen



Q47 Thomson model

J.J. Thomson's experimental model proposes the:

- A. Discovery of neutrons
- B. Discovery of electrons ☒
- C. Discovery of nucleus
- D. Discovery of protons

Q48 Thomson model

Which of the following best describes Thomson's model of an atom?

- A. An atom consists of a positively charged sphere with electrons embedded in it. ☒
- B. Electrons revolve around the nucleus in fixed orbits.
- C. Electrons are randomly placed outside the atom.
- D. An atom is a dense positively charged nucleus with electrons outside.

Q49 Isotopes and isobars

Which of the following pairs of atoms are isobars?

- A. $^{40}_{20}\text{Ca}$ and $^{40}_{18}\text{Ar}$ ☒
- B. $^{35}_{17}\text{Cl}$ and $^{37}_{17}\text{Cl}$
- C. $^{14}_6\text{C}$ and $^{12}_6\text{C}$
- D. $^{23}_{11}\text{Na}$ and $^{24}_{12}\text{Mg}$



Q1 Ionic and covalent bonding

What type of bond is formed between a metal and a non-metal?

A. Ionic bond



B. Hydrogen bond

C. Metallic bond

D. Covalent bond

Q2 Ionic and covalent bonding

Which of the following statements is/are CORRECT?

Statement I: Covalent bonds involve the sharing of electron pairs between atoms.

Statement II: Covalent bonding usually occurs between metals and non-metals.

A. Both statements I and II are incorrect

B. Only statement II is correct

C. Both statements I and II are correct

D. Only statement I is correct

**Q3 Ionic bond formation**

When a non-metal gains electrons, it forms:

A. Cation

B. Anion



C. Proton

D. Neutral

Q4 Ionic bond formation

If a metal and a non-metal is mixed to form a compound, which type of charged species is most likely present, and how are they classified?

A. Ions; classified as cations and anions



B. Atoms; classified as protons and neutrons

C. Molecules; classified as acids and bases

D. Elements; classified as metals and non-metals

Q5 Ionic bond formation

Which of the following pairs of elements is most likely to form an ionic bond?

A. Magnesium and chlorine



B. Copper and iron

C. Nitrogen and oxygen

D. Hydrogen and carbon

Q6 Octet rule

Atoms of the elements would react so as to achieve an _____ of the configuration in the outermost shell.

A. triplet

B. heptet

C. octet



D. duplet

Q7 Properties of covalent compounds

Why do covalent compounds generally have low melting points?

A. Because their intermolecular forces are weak



B. Because their bonds within molecules are weak

C. Because they are composed of metals

D. Because their molecules are large

Q8 Properties of covalent compounds

Which statement explains why covalent compounds generally have low melting points?

A. Strong ionic attractions

B. Metallic bonding

C. Free electrons

D. Weak intermolecular forces

**Q9 Properties of covalent compounds**

Which of the following is NOT a property typically associated with most covalent compounds of carbon?

A. They have low melting points

B. They have low boiling points

C. Carbon forms covalent bonds with other carbon atoms

D. They are good conductors of electricity



Q10 Properties of ionic compounds

Which of the following best explains why ionic compounds are hard but brittle?

- A. They are liquids at room temperature
- B. They have a metallic lattice
- C. Strong attractions make them hard; shifting layers break them apart ☒
- D. Weak attractions make them soft and flexible

Q11 Properties of ionic compounds

Which of the following best explains why sodium chloride is solid at room temperature?

- A. It is held together by weak van der Waals forces.
- B. It forms molecules held by covalent bonds.
- C. It has metallic bonding between atoms.
- D. It has a strong electrostatic attraction between ions. ☒

Q12 Properties of ionic compounds

Which property is most commonly observed in ionic compounds like sodium chloride?

- A. Low melting and boiling points
- B. High electrical conductivity in solid state
- C. High melting and boiling points ☒
- D. Poor electrical conductivity in molten state



Q1 Balancing chemical equations

A student writes the skeletal equation for the reaction of zinc with nitric acid.



After balancing the equation with the **smallest whole number coefficients**, what will be the **sum of all coefficients** in the balanced equation?

A. 7

B. 6

C. 8

D. 5

**Q2 Balancing chemical equations**

During balancing of the following equation, a student first balances hydrogen instead of oxygen.



What is the main difficulty this approach may cause?

A. Oxygen atoms remain highly unequal



B. Coefficients become impossible values

C. Law of conservation becomes invalid

D. Chemical formulas must be modified

Q3 Balancing chemical equations

A student tries to balance the equation $\text{Fe} + \text{H}_2\text{O} \rightarrow \text{Fe}_3\text{O}_4 + \text{H}_2$ and writes the following step:



Which statement best explains why this step is **INCORRECT**?

A. It changes the composition of water



B. It balances oxygen atoms directly

C. It maintains mass conservation law

D. It increases oxygen atoms correctly

Q4 Combination reactions

Which observation confirms that a reaction is a combination reaction?

A. Only one new substance is produced



B. Colour of reactants changes

C. Gas is evolved during reaction

D. Temperature decreases suddenly

Q5 Combination reactions

What is formed when carbon burns in oxygen?

A. Hydrogen gas with heat and light released

B. Methane gas with heat and light released

C. Carbon dioxide with heat and light released



D. Carbon monoxide with heat and light released

Q6 Combination reactions

What type of chemical reaction is represented by $\text{CaO(s)} + \text{H}_2\text{O(l)} \rightarrow \text{Ca(OH)}_2\text{(aq)} + \text{Heat}$?

A. Displacement reaction

B. Decomposition reaction

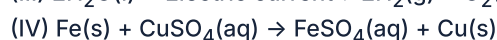
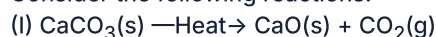
C. Combination reaction



D. Double displacement reaction

Q7 Decomposition reaction

Consider the following reactions:



Which of the above reactions correctly represent decomposition reactions?

A. Only I and II reactions

B. Only II and III reactions

C. Only III and IV reactions

D. Only I, II and III reactions

**Q8 Decomposition reaction**

Which energy source is essential to initiate most decomposition reactions successfully?

A. Presence of catalyst only

B. Heat, light or electrical energy



C. Atmospheric pressure alone

D. Mechanical stirring force



Q9 Decomposition reaction

What fundamental change distinguishes a decomposition reaction from other types of chemical reactions?

- A. One element replaces another element
- B. Two substances combine to form one
- C. One compound breaks into simpler substances ✓
- D. Ions exchange places in solution

Q10 Decomposition reaction

Refer to the two statements given below and choose the CORRECT option.

Statement A: A decomposition reaction occurs when a single compound breaks down into two or more simpler substances.

Statement B: Decomposition reactions always require the presence of oxygen.

- A. Both statements A and B are correct.
- B. Statement A is incorrect but B is correct.
- C. Statement A is correct but B is incorrect. ✓
- D. Both statements A and B are incorrect.

Q11 Decomposition reaction

Calcium carbonate is heated to produce calcium oxide and carbon dioxide; this is a type of:

- A. substitution reaction
- B. decomposition reaction ✓
- C. displacement reaction
- D. addition reaction

Q12 Decomposition reaction

A chemist keeps calcium carbonate, silver chloride, and lead nitrate exposed to sunlight. Which compound/s show/s a visible change?

- A. Only lead nitrate
- B. Only calcium carbonate
- C. Only silver chloride ✓
- D. All three compounds

Q13 Displacement reaction

Which visible change confirms displacement reaction when iron reacts with copper sulphate solution?

- A. Colourless gas evolves rapidly
- B. Solution temperature drops suddenly
- C. White precipitate forms instantly
- D. Reddish-brown copper deposits appear ✓

Q14 Displacement reaction

When zinc reacts with dilute HCl, the reaction can be classified as:

- A. Displacement reaction ✓
- B. Neutralization reaction
- C. Double decomposition reaction
- D. Combination reaction

Q15 Displacement reaction

Which equation correctly represents a displacement reaction involving metals and their salt solutions?

- A. $\text{Zn} + \text{CuSO}_4 \rightarrow \text{ZnSO}_4 + \text{Cu}$ ✓
- B. $\text{Cu} + \text{ZnSO}_4 \rightarrow \text{CuSO}_4 + \text{Zn}$
- C. $\text{Au} + \text{FeSO}_4 \rightarrow \text{AuSO}_4 + \text{Fe}$
- D. $\text{Ag} + \text{MgSO}_4 \rightarrow \text{AgSO}_4 + \text{Mg}$

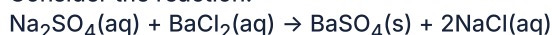
Q16 Double displacement reactions

A reaction occurs when two aqueous salt solutions are mixed, and an insoluble solid forms while the remaining ions stay dissolved in solution. Which type of reaction does this represent?

- A. Combination reaction forming single product
- B. Decomposition reaction requiring energy input
- C. Displacement reaction involving metal exchange
- D. Double displacement precipitation reaction ✓

Q17 Double displacement reactions

Consider the reaction:



Which statement best justifies classifying this reaction as a double displacement reaction?

- A. Exchange of ions produces two new compounds ✓
- B. One metal displaces another from compound
- C. Heat causes compound to break into products
- D. Reactants combine forming only one product

Q18 Double displacement reactions

If you mix aqueous solutions of sodium sulphate and barium chloride, what type of chemical reaction occurs and what is the evidence for it?

- A. Single displacement; color of substance changes
- B. Decomposition; heat release
- C. Double displacement; formation of a precipitate ✓
- D. Redox reaction; gas evolution occurs



Q19 Double displacement reactions

A chemist mixes two colorless aqueous solutions X and Y. A white precipitate Z forms instantly. Later, analysis shows Z is insoluble calcium carbonate.

Which pair of solutions was most likely used?

A. ZnSO_4 and FeCl_2

B. Na_2CO_3 and CaCl_2 ✓

C. HCl and NaOH

D. NaCl and KNO_3

Q20 Double displacement reactions

What is the main characteristic of a double displacement reaction?

A. Exchange of ions between reactants ✓

B. Combination of two elements

C. Removal of hydrogen from acid

D. Gain of oxygen by a substance

Q21 Double displacement reactions

When hydrochloric acid reacts with sodium hydroxide to form sodium chloride and water, which type of reaction is primarily demonstrated?

A. Double displacement reaction ✓

B. Displacement reaction

C. Redox reaction

D. Combination reaction

Q22 Exothermic and endothermic reactions

Which of the following statements correctly explains the relation between a combination reaction and energy?

A. Combination reactions neither release nor absorb energy

B. All combination reactions release heat

C. All combination reactions must absorb heat

D. Many combination reactions are exothermic, though some can be endothermic ✓

Q23 Lime water and carbon dioxide

When carbon dioxide gas is passed through lime water (calcium hydroxide solution), it produces a white precipitate which is of:

A. calcium oxide

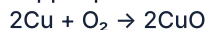
B. calcium hydrogen carbonate

C. calcium carbonate ✓

D. calcium sulphate

Q24 Oxidation and reduction

A student observes the following reaction during heating of copper powder in air.



Later, hydrogen gas is passed over the black copper oxide and reddish-brown copper is obtained.



Which substance is **oxidized in first reaction and reduced in second reaction**?

A. Copper in first reaction and Copper oxide in second reaction ✓

B. Hydrogen in first reaction and Copper oxide in second reaction

C. Copper oxide in first reaction and Copper in second reaction

D. Oxygen in first reaction and Copper oxide in second reaction

Q25 Oxidation and reduction

Consider the reaction: $\text{CuO(s)} + \text{H}_2\text{(g)} \rightarrow \text{Cu(s)} + \text{H}_2\text{O(l)}$

Which option correctly identifies the oxidation–reduction changes occurring in this reaction?

A. Hydrogen oxidised while CuO reduced ✓

B. Hydrogen reduced while CuO oxidised

C. Copper oxidised while H_2 reduced

D. Copper and hydrogen both oxidised

Q26 Oxidation and reduction

Consider the reaction:



Based on the oxygen–hydrogen definition of redox reactions, which substance undergoes reduction in this reaction?

A. Hydrogen chloride loses hydrogen

B. Chlorine gas forms by oxidation

C. Manganese dioxide loses oxygen ✓

D. Water forms after oxygen gain

Q27 Oxidation and reduction

Consider the reaction:



Which of the following correctly identifies the substance undergoing reduction in this reaction?

A. CO produced during oxidation

B. ZnO loses oxygen forming Zn ✓

C. ZnO converted into zinc metal

D. Carbon gains oxygen forming CO



Q28 Oxidation and reduction

What chemical change best indicates oxidation of a substance during a chemical reaction?

- A. Change in physical state
- B. Loss of electrons only
- C. Gain of hydrogen only
- D. Gain of oxygen or loss of hydrogen ✓

Q29 Oxidation and reduction

Which change correctly represents oxidation in a chemical reaction?

- A. Exchange of ions between compounds
- B. Removal of oxygen from a compound
- C. Formation of salt and water
- D. Addition of oxygen to a substance ✓

Q30 Oxidation and reduction

Why do oxidation and reduction reactions always occur together in chemical changes?

- A. Reaction must be balanced
- B. Energy conservation law demands it
- C. Products must be neutral
- D. One substance loses what another gains ✓

Q31 Oxidation and reduction

In the reaction $\text{MnO}_2 + 4\text{HCl} \rightarrow \text{MnCl}_2 + 2\text{H}_2\text{O} + \text{Cl}_2$, which substance is oxidized?

- A. MnO_2
- B. HCl ✓
- C. H_2O
- D. MnCl_2

Q32 Oxidation and reduction

Which observation best demonstrates that reduction has occurred in a chemical reaction?

- A. Carbon dioxide is released after heating a carbonate salt.
- B. Oxygen combines with a metal to form its oxide layer.
- C. Hydrogen gas is evolved after metal reacts with acid.
- D. Oxygen is removed from a metal oxide during heating. ✓

Q33 Precipitation reaction

Consider the following reactions:

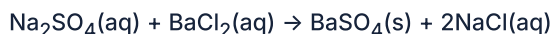
- (I) $\text{Na}_2\text{SO}_4(\text{aq}) + \text{BaCl}_2(\text{aq}) \rightarrow \text{BaSO}_4(\text{s}) + 2\text{NaCl}(\text{aq})$
- (II) $\text{AgNO}_3(\text{aq}) + \text{NaCl}(\text{aq}) \rightarrow \text{AgCl}(\text{s}) + \text{NaNO}_3(\text{aq})$
- (III) $\text{CaCO}_3(\text{s}) \xrightarrow{\text{Heat}} \text{CaO}(\text{s}) + \text{CO}_2(\text{g})$
- (IV) $\text{Fe}(\text{s}) + \text{CuSO}_4(\text{aq}) \rightarrow \text{FeSO}_4(\text{aq}) + \text{Cu}(\text{s})$

Which of the above reactions are precipitation reactions?

- A. Only III and IV
- B. Only I and II ✓
- C. Only I and III
- D. Only II and IV

Q34 Precipitation reaction

Consider the reaction:



Which feature of this reaction justifies classifying it specifically as a precipitation reaction?

- A. Sodium chloride remains dissolved in water
- B. Two ionic compounds exchange partners
- C. Reactants exist initially as aqueous solutions
- D. Insoluble barium sulphate forms in solution ✓

Q35 Rancidity

What chemical process mainly causes unpleasant smell and taste in oily food items?

- A. Oxidation of fats and oils ✓
- B. Evaporation of water
- C. Action of enzymes
- D. Fermentation of sugars

Q36 Signs of chemical reaction

In a solution, which observation suggests a chemical change has taken place?

- A. Increase in temperature only
- B. Dissolving of solid
- C. Formation of a precipitate ✓
- D. Uniform mixing of substances



Q1 Acid with metal carbonate

Which gas is released when a dilute acid reacts with a metal carbonate?

- A. Nitrogen gas is released
- B. Carbon dioxide gas is released ✓
- C. Oxygen gas is released
- D. Hydrogen gas is released

Q2 Acid with metal carbonate

Read the given statements of Assertion (A) and Reason (R) carefully and select the correct option.

(A): Carbon dioxide gas is formed when acids react with metal carbonates.

(R): Metal carbonates are basic in nature and neutralise acids to form salt, water and CO_2 .

- A. Both A and R are true, but R is not the correct explanation of A.
- B. A is false, but R is true.
- C. Both A and R are true, and R is the correct explanation of A ✓
- D. A is true, but R is false.

Q3 Acid with metal oxide

In the reaction of copper oxide with hydrochloric acid, the solution turns:

- A. Brown due to hydrogen gas
- B. Red due to oxygen evolution
- C. Blue-green due to copper(II) chloride ✓
- D. Colourless due to water formation

Q4 Acid-base indicators

Which colour change does phenolphthalein show in a basic solution?

- A. Colourless to pink gradually ✓
- B. White to green when shaken
- C. Blue to colourless instantly
- D. Yellow to red immediately

Q5 Acid-base indicators

Which of the following is commonly used as an olfactory indicator?

- A. Phenolphthalein
- B. Methyl orange
- C. Litmus
- D. Vanilla essence ✓

Q6 Acid-base indicators

Clove oil is used as an olfactory indicator. If its smell persists in solution X but fades in solution Y, what can be inferred about the nature of the two solutions?

- A. Solution X is basic and solution Y is acidic.
- B. Both solutions X and Y are basic.
- C. Both solutions X and Y are acidic.
- D. Solution X is acidic and solution Y is basic. ✓

Q7 Acid-base indicators

A student needs to test whether a laboratory sample contains a strong base. Which procedure is most appropriate for confirming this?

- A. Smell the solution for a sharp odour
- B. Add methyl orange and look for a red colour
- C. Dip blue litmus paper and check if it remains blue
- D. Add a drop of phenolphthalein and observe a pink colour ✓

Q8 Acid-base indicators

Methyl orange turns red in:

- A. Base only
- B. Both acid and base
- C. Neutral solution
- D. Acid only ✓

Q9 Acid-base indicators

What is the reason for the colour change of phenolphthalein after adding an acid to a basic solution?

- A. The solution evaporates
- B. The temperature increases
- C. The solution becomes neutral or acidic ✓
- D. The solution is diluted



Q10 Acids in aqueous solution

Which of the following correctly explains why an acid shows acidic behaviour only in aqueous solution?

- A. Hydrogen ions (H^+) are produced only when the acid dissolves in water. ✓
- B. Water prevents the ionisation of acids.
- C. An acid loses H^+ ions even in the absence of water.
- D. The acid molecules remain completely ionised in the dry state.

Q11 Baking soda uses

Why is baking soda preferred over sodium carbonate in fire extinguishers?

- A. It forms insoluble residue
- B. It produces hydrogen gas rapidly
- C. It reacts violently producing heat
- D. It releases carbon dioxide easily with acid ✓

Q12 Baking soda uses

Baking soda is commonly used in fire extinguishers because it releases a specific gas when heated. What is the gas released and how does it help extinguish fires?

- A. It releases carbon dioxide, which displaces oxygen and stops combustion ✓
- B. It releases nitrogen, which cools the burning material
- C. It releases oxygen, which smothers the fire and prevents it from spreading
- D. It releases sulfur dioxide, which reacts with the flames

Q13 Bleaching powder

Which gas released from bleaching powder is primarily responsible for its bleaching and disinfecting action?

- A. Oxygen (O_2)
- B. Hydrogen chloride (HCl)
- C. Carbon dioxide (CO_2)
- D. Chlorine (Cl_2) ✓

Q14 Bleaching powder

Which of the following is NOT a use of bleaching powder?

- A. Bleaching cotton and linen
- B. Manufacturing chloroform
- C. Removing hardness of water ✓
- D. Disinfecting drinking water

Q15 Chlor-alkali process

Which of the following is a product formed at the cathode during the electrolysis of brine?

- A. Sodium metal
- B. Hydrogen gas ✓
- C. Chlorine gas
- D. Oxygen gas

Q16 Dilution of acids

Why should acids be diluted carefully?

- A. To avoid splashing ✓
- B. To reduce concentration
- C. To increase acidity
- D. To make reaction fast

Q17 Ions in acids and bases

When sodium hydroxide is dissolved in water, which type of ions are mainly responsible for making the solution basic?

- A. Hydrogen ions (H^+)
- B. Carbonate ions (CO_3^{2-})
- C. Sodium ions (Na^+)
- D. Hydroxide ions (OH^-) ✓

Q18 Ions in acids and bases

Different acids show similar chemical properties because they all produce which of the following ions in aqueous solution?

- A. Hydroxide ions
- B. Sodium ions
- C. Hydrogen ions ✓
- D. Chlorine ions

Q19 Ions in acids and bases

Both acids and bases conduct electricity in an aqueous solution because:

- A. They produce ions in water ✓
- B. They release oxygen gas
- C. They form covalent bonds
- D. They contain free electrons



Q20 Ions in acids bases

Why do basic solutions conduct electricity when dissolved in water?

- A. Bases release free electrons
- B. Heat energy produces electric current
- C. Hydroxide ions act as charge carriers ✓
- D. Bases dissolve completely without ions

Q21 Ions in acids bases

Which common feature of hydrochloric acid and sodium hydroxide solutions explains both their ability to change the pH of water and to conduct electricity?

- A. Both have a pH less than 7.
- B. Both produce ions in aqueous solution. ✓
- C. Both have a sour taste.
- D. Both turn blue litmus red.

Q22 Neutralisation reaction

When hydrochloric acid reacts with sodium hydroxide, what is formed as a result of the neutralization reaction?

- A. Acid only
- B. Gas only
- C. Salt and water ✓
- D. Base only

Q23 Neutralisation reaction

If hydrochloric acid (HCl) reacts with sodium hydroxide (NaOH), which ions from each reactant participate in forming water?

- A. $H^+(aq)$ from HCl and $OH^-(aq)$ from NaOH ✓
- B. $H^+(aq)$ from NaOH and $OH^-(aq)$ from HCl
- C. $Cl^-(aq)$ from HCl and $Na^+(aq)$ from NaOH
- D. $Na^+(aq)$ from NaOH and $Cl^-(aq)$ from HCl

Q24 Neutralisation reaction

Read the following statements carefully and choose the CORRECT option:

Statement I: Neutralisation reactions always produce salt, water, and hydrogen gas.

Statement II: Neutralisation reaction is a type of double displacement reaction.

- A. Both statements are incorrect
- B. Only Statement II is correct ✓
- C. Both statements are correct
- D. Only Statement I is correct

Q25 Neutralisation reaction

A student accidentally spills a small amount of dilute sulfuric acid on the laboratory table. The teacher suggests adding sodium bicarbonate powder to neutralize the acid. Which product confirms that a neutralization reaction has occurred?

- A. Formation of carbon dioxide and salt ✓
- B. Formation of metal oxide
- C. Formation of hydrogen gas
- D. Formation of oxygen gas

Q26 Neutralisation reaction

If a student mixes acetic acid with sodium hydroxide and observes bubbling, what might explain this observation?

- A. The reaction is already complete
- B. Water is forming as the only product
- C. A contaminant like carbonate is present ✓
- D. The reaction is very slow

Q27 Neutralisation reaction

Consider the reaction: $HCl(aq) + NaOH(aq) \rightarrow NaCl(aq) + H_2O(l)$

This reaction is best classified as which type of chemical reactions?

- A. Combination reaction
- B. Neutralization reaction ✓
- C. Displacement reaction
- D. Decomposition reaction

Q28 Neutralisation reaction

A reaction between an acid and a base produces:

- A. Hydrogen gas and metal
- B. Salt and water ✓
- C. Only water
- D. Only salt

Q29 Neutralisation reaction

Which products are always formed during a complete neutralization chemical reaction?

- A. Acid and base
- B. Salt and water ✓
- C. Gas and salt
- D. Metal and gas



Q30 Plaster of Paris

A doctor is preparing a cast for a fractured arm. Why is Plaster of Paris preferred over cement or lime for this purpose?

- A. It produces heat when mixed with water
- B. It is heavier than cement
- C. It is more colorful
- D. It sets quickly and forms a hard, supportive mass ✓

Q31 Plaster of Paris

When Plaster of Paris ($\text{CaSO}_4 \cdot \frac{1}{2}\text{H}_2\text{O}$) is mixed with water, it becomes hard. Which process is responsible for this hardening?

- A. Rehydration to form gypsum ✓
- B. Oxidation of calcium ions
- C. Neutralization between acid and base
- D. Dehydration of calcium sulphate

Q32 Preparation of baking soda

During the preparation of baking soda in the laboratory, which gas is essential for its formation along with ammonia and water?

- A. Hydrogen
- B. Carbon dioxide ✓
- C. Nitrogen
- D. Oxygen

Q33 Properties of acids and bases

How are acids and bases similar in terms of their effect on skin?

- A. They both clean the skin without harm
- B. They both soothe the skin
- C. They both can cause irritation or burns ✓
- D. They both act as moisturizers

Q34 Reaction of acids with carbonates

A student adds hydrochloric acid to sodium hydrogen carbonate. Which observation confirms neutralization?

- A. Color turns red
- B. Precipitate forms
- C. Temperature drops
- D. Effervescence ✓

Q35 Reaction of acids with metals

Which gas is usually released when acid reacts with metals?

- A. nitrogen
- B. chlorine
- C. hydrogen ✓
- D. carbon dioxide

Q36 Reaction of metals with acids and bases

A laboratory investigation shows that magnesium reacts with bases to release a gas. Which is the most likely identity of the gas produced?

- A. Hydrogen ✓
- B. Carbon dioxide
- C. Oxygen
- D. Chlorine

Q37 Reaction of oxides with base

What is a common observable change when a non-metallic oxide is bubbled through a base?

- A. The solution turns bright red in color
- B. There is a decrease in alkalinity of the solution ✓
- C. A gas is evolved rapidly during the reaction
- D. The temperature of the solution falls sharply

Q38 Reaction of oxides with base

A student mixes a non-metallic oxide with a base and observes neutralization. What does this suggest about the properties of the substances involved?

- A. The base acts as an acid
- B. The non-metallic oxide acts as an acid ✓
- C. Both substances are neutral
- D. The non-metallic oxide acts as a base

Q39 Reaction of oxides with base

When carbon dioxide (CO_2) reacts with sodium hydroxide (NaOH), the salt formed is:

- A. sodium nitrate
- B. sodium sulphate
- C. sodium chloride
- D. sodium carbonate ✓



Q40 Reaction of oxides with base

Which of these statements best describes why non-metallic oxides react with bases?

- A. They behave as basic oxides and neutralize acids
- B. They are always basic and do not react with bases
- C. They behave as acidic oxides and neutralize bases ✓
- D. They form acids and bases together

Q41 Reactions of acids and bases

When a metal oxide reacts with an acid, it forms:

- A. carbon dioxide and hydrogen gas
- B. salt and hydrogen gas evolution
- C. salt and water as final products ✓
- D. acid and metal oxide mixture only

Q42 Reactions of acids and bases

Identify the correct statement regarding the reaction of sodium carbonate and dilute HCl.

- A. Carbon monoxide is released.
- B. Hydrogen is released.
- C. Chlorine is released.
- D. Carbon dioxide is released. ✓

Q43 Salts and their nature

Salts of a strong acid and a strong base are generally:

- A. neutral ✓
- B. basic
- C. acidic
- D. amphoteric

Q44 Washing soda uses

Sodium carbonate (washing soda) is used in which of the following industries?

a. glass
b. soap
c. paper

- A. Only b and c
- B. Only a and c
- C. Only a and b
- D. a, b and c ✓

Q45 pH in daily life

Why is maintaining a specific pH crucial for digestive enzymes in the human stomach?

- A. To ensure the correct shape and activity of enzymes like pepsin ✓
- B. To neutralise excess stomach acid
- C. To absorb water more efficiently
- D. To prevent the growth of harmful bacteria

Q46 pH in daily life

Which acid does our stomach produce and what is its pH?

- A. Citric acid; pH 6.5-7.0
- B. Hydrochloric acid (HCl); pH 1.5-3.5 ✓
- C. Lactic acid; pH 3.5-4.5
- D. Acetic acid; pH 6.0-7.0

Q47 pH in daily life

What is the approximate value of gastric juice in the human body?

- A. 7.0 - 7.4
- B. 10 - 11
- C. 0.9 -1.2 ✓
- D. 6.5 - 6.8

Q48 pH in daily life

Which pH range is best for most plants to grow in garden soil?

- A. Between pH 3 and pH 4
- B. Between pH 4 and pH 5
- C. Between pH 6 and pH 7.5 ✓
- D. Between pH 8.5 and pH 9.5

Q49 pH in daily life

Which substance would best help neutralize the burning sensation caused by a bee sting containing methanoic acid?

- A. Tamarind solution
- B. Mild baking soda solution ✓
- C. Mild vinegar solution
- D. Lemon juice



Q50 pH of salts

A salt solution has a pH of 9. Which type of salt is it most likely to be?

- A. Formed from a strong acid and weak base
- B. Formed from a strong acid and strong base
- C. Formed from a weak acid and weak base
- D. Formed from a strong base and weak acid ✓

Q51 pH scale

A higher concentration of H^+ ions in a solution corresponds to:

- A. Neutral pH
- B. Constant pH
- C. Lower pH value ✓
- D. Higher pH value

Q52 pH scale

Which of the following solutions has the lowest hydrogen ion concentration?

- A. Blood (pH = 7.4)
- B. Seawater (pH = 8.2) ✓
- C. Vinegar (pH = 3)
- D. Milk (pH = 6.6)

Q53 pH scale

A student measures the pH of four liquids: lemon juice (2), soap solution (9), water (7), and vinegar (3). Which is the most basic?

- A. Vinegar (3)
- B. Soap solution (9) ✓
- C. Lemon juice (2)
- D. Water (7)



Q1 Alloys and their composition

Which of the following is the purest form of iron?

A. Wrought iron



B. Hard steel

C. Stainless steel

D. Limonite

Q2 Corrosion and its prevention

Which of the following observations correctly represents corrosion of a metal?

A. Iron develops reddish-brown surface layer



B. Aluminium breaks under mechanical load

C. Copper wire melts when strongly heated

D. Silver dissolves completely in water

Q3 Corrosion and its prevention

What happens at the anode during anodising?

A. Nitrogen gas reacts with aluminium to form oxide

B. Carbon dioxide reacts with aluminium to form oxide

C. Oxygen gas reacts with aluminium to form oxide



D. Hydrogen gas reacts with aluminium to form oxide

Q4 Corrosion and its prevention

Industrial machines made of steel often operate in moist environments. Which routine maintenance task is most effective in minimizing corrosion and ensuring machine longevity?

A. Wiping machines with dry towels

B. Covering machines with paper sheets

C. Applying lubricating oil on exposed parts



D. Spraying water on the machines

Q5 Corrosion and its prevention

Why does galvanisation protect iron even when the zinc layer is damaged?

A. Zinc reacts faster with water

B. Zinc corrodes preferentially



C. Zinc prevents oxygen contact

D. Zinc increases iron hardness

Q6 Corrosion and its prevention

Why is corrosion considered economically harmful to metallic structures and machinery?

A. It enhances metal conductivity

B. It weakens metals and reduces durability



C. It increases metal reactivity

D. It improves surface appearance

Q7 Corrosion and its prevention

Anodising is a process used to improve the appearance and durability of aluminium articles. Which of the following statements best explains the principle behind anodising?

A. Aluminium is coated with zinc to prevent rusting.

B. Aluminium is made the cathode in electrolysis to reduce oxide layer.

C. Aluminium is made the anode and oxidised to form a thicker protective oxide layer.



D. Aluminium is dipped in alkali to increase its reactivity.

Q8 Corrosion and its prevention

Anodizing is a process of forming a thick oxide layer of which of the following metals through an electrolytic process?

A. iron

B. aluminium



C. zinc

D. copper

Q9 Corrosion and its prevention

What is the main reason silver articles turn black when exposed to air for a long period?

A. Formation of a silver sulphide coating



B. Formation of silver oxide by reaction with oxygen

C. Formation of silver chloride by reaction with chlorine in the air

D. Accumulation of dust particles on the surface



Q10 Corrosion of metals

Which of the following conditions accelerate the corrosion of metals the most?

- A. Pure water and sunlight
- B. Dry air and low temperature
- C. Moist air and presence of salts or acids ✓
- D. Vacuum and darkness

Q11 Metal reaction with oxygen

When copper is heated in air, it combines with oxygen to form a black oxide, which is:

- A. copper(III) oxide
- B. copper(I) oxide
- C. copper(IV) oxide
- D. copper(II) oxide ✓

Q12 Metal reaction with water

When magnesium metal reacts with hot water, what is the main product formed alongside hydrogen gas?

- A. Magnesium hydroxide ✓
- B. Iron hydroxide
- C. Copper hydroxide
- D. Magnesium oxide

Q13 Prevention of corrosion

Which of the following methods prevents corrosion by sacrificing another metal?

- A. Galvanisation ✓
- B. Painting
- C. Alloying
- D. Anodising

Q14 Prevention of corrosion

Which method effectively prevents corrosion by blocking contact with air and moisture?

- A. Mixing metal with water
- B. Applying paint or protective coating ✓
- C. Heating metal at high temperature
- D. Exposing metal to sunlight

Q15 Properties of metalloids

Which statement best identifies a metalloid based on its properties?

- A. It shows properties that are unrelated to metals and non-metals
- B. It shows properties identical to non-metals in all conditions
- C. It shows properties identical to metals in all conditions
- D. It shows properties intermediate between metals and non-metals ✓

Q16 Properties of metals

Which of the following physical properties is true for metals?

- A. Metals are poor conductors of heat
- B. Metals are lustrous and good conductors of electricity ✓
- C. Metals are brittle and break easily
- D. Metals are solid at room temperature

Q17 Properties of metals

Which of the following sets correctly represents physical properties commonly exhibited by most metals?

- A. Brittle, non-lustrous, poor conductor of heat
- B. Dull, malleable, non-sonorous
- C. Lustrous, malleable, good conductor of electricity ✓
- D. Soft, non-ductile, poor conductor of electricity

Q18 Properties of non-metals

Which statement best describes the electrical conductivity of non-metals in their pure form?

- A. Non-metals conduct electricity as metals do
- B. Non-metals do not conduct electricity ✓
- C. Non-metals have high electrical conductivity
- D. Non-metals conduct electricity efficiently

Q19 Properties of non-metals

A student is comparing samples of sulphur, carbon (Diamond), and bromine. Which property is least likely to be observed in all three?

- A. Brittleness
- B. High electrical conductivity ✓
- C. Dull appearance
- D. Poor heat conduction



Q20 Properties of non-metals

Consider the following statements about non-metals and select the correct option.

Statement I: A solid substance that is dull, brittle, and does not conduct electricity in the solid state is most likely a non-metal.

Statement II: All non-metals are dull, brittle solids and do not conduct electricity in the solid state.

A. Statement I is correct, but Statement II is incorrect



B. Both statements are incorrect

C. Statement I is incorrect, but Statement II is correct

D. Both statements are correct

Q21 Reaction of metals with acids

When a metal reacts with a dilute acid, hydrogen gas is released. What is the compound formed along with hydrogen gas called?

A. Salt



B. Oxide

C. Water

D. Base

Q22 Reaction of metals with non-metals

A student observes the reaction between zinc and sulfur resulting in a compound. Which property of metals is demonstrated when zinc combines with a non-metal like sulfur?

A. Zinc acts as a reducing agent



B. Zinc acts as an oxidizing agent

C. Zinc acts as a catalyst

D. Zinc acts as a solvent

Q23 Reaction of metals with oxygen

Which metal forms a protective oxide layer on its surface when heated in air, preventing further oxidation?

A. Iron

B. Aluminium



C. Sodium

D. Copper

Q24 Reaction of metals with oxygen

Which of the following statements correctly describes the behaviour of different metals when heated in air?

A. All metals burn in air with the same intensity and form metal oxides

B. Potassium and sodium react so vigorously with oxygen that they catch fire



C. Iron and copper burn with a flame producing metal oxides

D. Silver and gold burn in air and form thick oxide coatings

Q25 Reaction of metals with water

The gas evolved when calcium reacts with water is:

A. Hydrogen



B. Carbon dioxide

C. Oxygen

D. Nitrogen

Q26 Reaction of metals with water

Which equation correctly represents the reaction between calcium and cold water?

A. $\text{Ca} + \text{H}_2\text{O} \rightarrow \text{CaH}_2 + \text{O}_2$

B. $\text{Ca} + \text{H}_2\text{O} \rightarrow \text{CaOH}_2 + \text{H}_2$

C. $\text{Ca} + 2\text{H}_2\text{O} \rightarrow \text{Ca}(\text{OH})_2 + \text{H}_2$



D. $2\text{Ca} + \text{H}_2\text{O} \rightarrow 2\text{CaOH} + \text{H}_2$

Q27 Reactivity series

Read the following statements and choose the correct option.

Statement I: All metals in the reactivity series can displace hydrogen from dilute acids to form hydrogen gas.

Statement II: Metals below hydrogen in the reactivity series do not produce hydrogen gas with dilute acids.

A. Statement I is true, Statement II is true, but Statement II is not the correct explanation of Statement I.

B. Statement I is false, but Statement II is true.



C. Statement I is true, but Statement II is false.

D. Statement I is true, Statement II is true, and Statement II is the correct explanation of Statement I.



Q28 Reactivity series

Given that:

- P displaces Q from its salt solution,
- R displaces S from its salt solution,
- Q displaces R from its salt solution,
- S cannot displace any other metal;

Which metal is the most reactive among them?

A. S

B. P



C. R

D. Q

Q29 Reactivity series and displacement

When a metal is placed in the salt solution of another metal and a reaction occurs, what does it indicate about the two metals?

A. Both metals are equally reactive

B. The metal in solution is more reactive

C. No information about reactivity can be determined

D. The solid metal is more reactive than the metal in solution

**Q30 Reactivity series and displacement**

What primary factor determines whether one element can displace another from its compound?

A. Difference in solution concentration

B. Relative reactivity of the elements involved



C. Difference in atomic masses

D. Difference in physical state

Q31 Reactivity series displacement

When a zinc strip is dipped into a solution of iron(II) sulphate, what will happen?

A. No reaction occurs

B. Zinc displaces iron from the solution.



C. Iron deposits on zinc, and hydrogen gas is evolved.

D. Zinc gets coated with iron oxide.

Q32 Reactivity series displacement

A student dips an iron nail in a blue solution of copper sulphate. After 30 minutes, the blue colour fades and a reddish-brown deposit forms on the nail. The reddish-brown deposit is due to _____.

A. copper sulphate converting to Cu^+

B. copper sulphate converting to iron oxide (rust)

C. copper sulphate converting to metallic copper



D. Fe converting to copper oxide

Q33 Reactivity series of metals

A student mixes lead metal with iron(II) sulfate solution and observes no visible change. Which statement best explains this observation?

A. Lead reacts vigorously with iron(II) sulfate forming a new compound.

B. Lead is more reactive than iron and displaces it from the solution.

C. The reaction is reversible, so no net change is observed.

D. Lead is less reactive than iron and cannot displace it from its compound.

**Q34 Reactivity series of metals**

Given that metal X reacts with CuSO_4 but not with FeSO_4 , and metal Y reacts with FeSO_4 but not with ZnSO_4 , what is the correct order of decreasing reactivity for Zn, Fe, Cu, X, and Y?

A. $\text{Fe} > \text{X} > \text{Zn} > \text{Y} > \text{Cu}$

B. $\text{Cu} > \text{X} > \text{Fe} > \text{Y} > \text{Zn}$

C. $\text{Y} > \text{Zn} > \text{X} > \text{Fe} > \text{Cu}$

D. $\text{Zn} > \text{Y} > \text{Fe} > \text{X} > \text{Cu}$

**Q35 Rusting of iron**

A shiny iron nail was left in four different conditions for several days.

I. Dry air in a sealed container

II. Water containing dissolved oxygen

III. Water that had been boiled and then covered with oil

IV. Moist air

In which of the above conditions will rusting of iron most likely occur?

A. II, III and IV

B. I, II and IV

C. I and III only

D. II and IV only



Q1 Electrolytic reduction

Which of the following metals is usually extracted from its ore by electrolytic reduction?

- A. Copper
- B. Zinc
- C. Iron
- D. Aluminium**

**Q2 Electrolytic reduction**

Which of the following metals is extracted by electrolysis due to its position at the top of the activity series?

- A. Iron
- B. Sodium**
- C. Zinc
- D. Copper

**Q3 Electrolytic reduction**

Which method is commonly used to extract sodium from its compound?

- A. Distillation
- B. Thermal decomposition
- C. Electrolytic reduction**
- D. Heating with carbon

**Q4 Electrolytic refining**

What is used as an anode in the electrolytic refining of nickel?

- A. Impure nickel**
- B. Nickel acetate
- C. Nickel carbonate
- D. Nickel sulphate

**Q5 Electrolytic refining**

During the electrolytic refining of copper, which of the following correctly matches the components and their roles?

Component	Role in Refining Process
A. Pure Copper	i. Anode
B. Impure Copper	ii. Cathode
C. Acidified Copper Sulphate	iii. Electrolyte

- A. A - i, B - ii, C - iii
- B. A - ii, B - iii, C - i
- C. A - iii, B - i, C - ii
- D. A - ii, B - i, C - iii**

**Q6 Electrolytic refining**

Which of the following statements are correct for electrolytic refining?

- a. Copper, zinc, and nickel are refined electrolytically.
- b. In this method, a thin strip of pure metal is used as cathode.
- c. The insoluble impurities settled at bottom of the anode are known as anode mud.

- A. a and c only
- B. All a, b and c**
- C. b and c only
- D. a and b only

**Q7 Extraction by electrolysis**

Select the option that is true regarding the following two statements labelled Assertion (A) and Reason (R).

Assertion (A): Metals such as sodium and potassium are extracted by electrolysis.

Reason (R): These metals are highly reactive and cannot be obtained by reduction with carbon.

- A. Both A and R are true, but R is not the correct explanation of A
- B. A is false, but R is true
- C. Both A and R are true, and R is the correct explanation of A**
- D. A is true, but R is false



Q8 Occurrence of metals and ores

Metals of medium reactivity are generally found in the form of which compounds?

- A. Peroxides, hydrides, or cyanides
- B. Chlorides, silicates, or phosphates
- C. Oxides, sulphides, or carbonates ✓
- D. Nitrides, fluorides, or bromides

Q9 Occurrence of metals and ores

Why are few metals NOT found in their native state of nature?

- A. Because they are soluble in nature.
- B. Because they have high reactivity. ✓
- C. Because they are high density.
- D. Because they have low melting points.

Q10 Ores and minerals

A mineralogist discovers a new metallic ore in the earth's crust. If the ore is primarily a sulphide, the metal is most likely to belong to the:

- A. Middle of the activity series ✓
- B. Bottom of the activity series
- C. Noble gases, which do not form ores
- D. Top of the activity series

Q11 Reduction of ores

Which process is commonly used to extract iron, a metal in the middle of the activity series, from its ore?

- A. Reduction with hydrogen
- B. Reduction with carbon (coke) ✓
- C. Electrolytic reduction
- D. Thermal decomposition

Q12 Reduction of oxides

Which substance is commonly used as a reducing agent to extract metals like zinc from their oxides?

- A. Sulfur
- B. Carbon ✓
- C. Oxygen
- D. Nitrogen

Q13 Reduction of oxides to metal

Read the given statements of Assertion (A) and Reason (R) carefully and select the correct option.

(A): Copper can be obtained from copper oxide by heating it with carbon.

(R): Copper is low in the activity series and can be reduced by simple heating.

- A. Both A and R are true, and R is the correct explanation of A.
- B. A is false, but R is true.
- C. Both A and R are true, but R is not the correct explanation of A.
- D. A is true, but R is false. ✓

Q14 Refining of metals

Which of the following statements is CORRECT regarding the refining of metals?

- A. Refining involves converting the ore to oxide form.
- B. Refining is only used for highly reactive metals.
- C. Refining is used to remove impurities from the extracted metal. ✓
- D. Refining is the process of extracting metal from its ore.

Q15 Roasting and calcination

Metals low in the reactivity series, such as copper and mercury, are extracted by:

- A. roasting in air to convert sulphide ores into oxides, followed by heating ✓
- B. reduction with carbon at high temperatures
- C. displacement using more reactive metals
- D. electrolysis of their molten ores

Q16 Roasting and calcination

During the extraction of metals, the sulphide ores are converted into oxides by heating strongly in the presence of excess air. This process is known as:

- A. sulphonation
- B. calcination
- C. roasting ✓
- D. elimination



Q17 Steps of metal extraction

Which sequence best describes the steps for obtaining a pure metal from its ore?

- A. Ore is enriched, then metal is extracted, and finally purification is performed. ☒
- B. Ore is melted, then metal is extracted, and finally enrichment is performed.
- C. Ore is purified, then metal is extracted, and finally enrichment is performed.
- D. Metal is extracted, then ore is enriched, and finally purification is performed.



Q1 Allotropes of carbon

Which of the following is the carbon allotrope having a tetrahedral structure?

- A. Graphite
- B. Diamond ✓
- C. Fullerene
- D. Graphene

Q2 Allotropes of carbon

Which of the following statements correctly identifies a key property of diamond, an allotrope of carbon, that distinguishes it from graphite?

- A. Diamond has soft layers that slide over each other.
- B. Diamond exists in a layered structure like graphite.
- C. Diamond conducts electricity because of delocalised electrons.
- D. Diamond is a non-conductor of electricity due to the absence of free electrons. ✓

Q3 Allotropes of carbon

Why does diamond not conduct electricity while graphite does?

- A. Fullerenes have mobile electrons in cages
- B. Amorphous carbon contains delocalized electrons
- C. All electrons in diamond are involved in bonding ✓
- D. Diamond has layers that slide and conduct

Q4 Catenation and tetravalency

Which of the following properties of carbon leads to the formation of a large number of compounds?

- A. Malleability and Sonority
- B. Combustibility and Ductility
- C. Catenation and Tetravalency ✓
- D. Non flexibility

Q5 Catenation and tetravalency

Why does carbon form a large number of compounds?

- A. Because carbon forms only single bonds
- B. Because the carbon-carbon bond is very strong and stable ✓
- C. Because carbon cannot form rings
- D. Because carbon is highly reactive

Q6 Catenation and tetravalency

A chemist is designing a synthetic route for a new medicine and must select a carbon compound as the starting material. Which property of carbon allows it to form a wide variety of organic molecules suitable for this task?

- A. Carbon's ability to form double bonds with oxygen
- B. Carbon's ability to lose electrons easily
- C. Carbon's ability to attract electrons strongly
- D. Carbon's ability to form four strong covalent bonds ✓

Q7 Catenation and tetravalency

Carbon forms millions of stable compounds, unlike most other elements. Which combination of properties best explains this behavior?

- A. High chemical reactivity and tetravalency together
- B. Strong covalent bonding and tetravalency together ✓
- C. Presence of isotopes and nuclear stability
- D. Low atomic mass and small atomic size

Q8 Combustion of carbon allotropes

The combustion of carbon allotropes, like diamond and graphite, produces:

- A. only carbon dioxide
- B. only carbon dioxide and heat
- C. only carbon dioxide and light
- D. carbon dioxide, heat and light ✓



Q9 Dehydration of ethanol

What happens when ethanol is heated with excess concentrated sulphuric acid at 170°C?

- A. Carbon dioxide is released
- B. Methane is formed as a gas
- C. Ethene is formed by dehydration ✓
- D. Ethanoic acid is formed

Q10 Esterification

What type of reaction occurs when ethanoic acid reacts with ethanol in the presence of an acid catalyst?

- A. Esterification reaction ✓
- B. Combustion reaction
- C. Saponification reaction
- D. Neutralization reaction

Q11 Ethanoic acid properties

Refer to the two statements given below and choose the CORRECT option.

Statement A: Ethanoic acid reacts with bases to form a salt and water.

Statement B: This reaction is classified as an oxidation reaction.

- A. Both statements A and B are correct.
- B. Statement A is correct but B is incorrect. ✓
- C. Both statements A and B are incorrect.
- D. Statement A is incorrect but B is correct.

Q12 Ethanoic acid properties

Which of the following statements is true about ethanoic acid?

- A. It is used to sweeten food due to its sugar content
- B. It has a soapy feel and bitter taste
- C. It does not dissolve in water
- D. It turns blue litmus red and reacts with carbonates to produce CO₂ ✓

Q13 Ethanol properties

Which property of ethanol makes it suitable for use as a solvent in medicines?

- A. It is acidic in nature
- B. It is highly flammable
- C. Solubility ✓
- D. It forms esters

Q14 Ethanol properties

Which statement correctly describes the solubility of ethanol?

- A. Completely miscible with water ✓
- B. Insoluble in water
- C. Slightly soluble in water
- D. Soluble only in acids

Q15 Ethanol properties and uses

Which property of alcohol makes it suitable for use as an alternative fuel in vehicles?

- A. It burns cleanly, producing less smoke and harmful gases. ✓
- B. It is a gaseous fuel.
- C. It has a lower boiling point than water.
- D. It is heavier than petrol.

Q16 Ethanol properties and uses

Alcohol is added to petrol mainly because it is a:

- A. Cleaner fuel additive ✓
- B. Heavier fuel additive
- C. Denser fuel additive
- D. Stronger fuel additive

Q17 Functional groups

Which of the following compounds contains both an amine and a carboxyl functional group?

- A. Propanone
- B. Ethanal
- C. Glycine ✓
- D. Ethanol

Q18 Functional groups

Which functional group is found in esters?

- A. -NH₂
- B. -COO- ✓
- C. -OH
- D. -COOH



Q19 Homologous series

Which of the following statements about a homologous series are CORRECT?

1. All members have the same general formula.
2. Each successive member differs by a $\text{-CH}_2\text{-}$ group.
3. Physical properties remain identical for all members.

A. Only 2 and 3

B. Only 1 and 2

C. 1, 2, and 3

D. Only 1 and 3

Q20 Homologous series

What do methane, ethane and propane represent in the study of carbon compounds?

A. Chains containing mixed metal atoms

B. Chains containing aromatic carbon atoms

C. Chains containing single carbon atom

D. Chains containing increasing carbon atoms

Q21 Homologous series

Compounds that differ by a $\text{-CH}_2\text{-}$ unit belong to which type of chemical grouping?

A. Ionic compound

B. Functional group

C. Homologous series

D. Structural isomer

Q22 Homologous series

Which property is most affected if the length of the carbon chain in an alkane increases?

A. Boiling point

B. Flammability

C. Electrical conductivity

D. Color

Q23 Homologous series

Which characteristic is shared by all members of a homologous series?

A. They have the same molecular mass

B. They have identical physical properties

C. They have similar chemical properties

D. They have the same molecular formula

Q24 IUPAC nomenclature

For the compound $\text{CH}_3\text{-CH}_2\text{-CHO}$, what is its correct IUPAC name?

A. Propanone

B. Propanol

C. Propanoic acid

D. Propanal

Q25 IUPAC nomenclature

A. Butan-2-al

B. Butan-2-one

C. Butan-2-oic acid

D. Butan-2-ol

Q26 IUPAC nomenclature

The IUPAC name for the compound $\text{CH}_3\text{-C(CH}_3)_2\text{-CH}_2\text{-CH}_3$ is:

A. 2,2-Dimethylbutane

B. 2,3-Dimethylbutane

C. 3,3-Dimethylbutane

D. 1,2-Dimethylbutane

Q27 IUPAC nomenclature

The IUPAC name of the compound $\text{CH}_3\text{-CH}_2\text{-C(CH}_3)_2\text{-CH}_2\text{-CH}_3$ is:

A. 3-ethylpentane

B. 2-methylhexane

C. 3,3-dimethylpentane

D. 2,2-dimethylpentane

Q28 Organic compounds identification

Which of the following is an organic compound?

A. CaCO_3

B. NaCl

C. CO_2

D. CH_3Cl



Q29 Organic compounds identification

Which of the following substances does **NOT** contain carbon in its chemical composition?

- A. Carbohydrates
- B. Water
- C. DNA
- D. Proteins

Q30 Oxidation of ethanol

Complete oxidation of one mole of ethanol releases how many moles of CO_2 ?

- A. Four
- B. Two
- C. One
- D. Three

Q31 Oxidation of ethanol

Consider the conversion of ethanol ($\text{CH}_3\text{CH}_2\text{OH}$) to acetic acid (CH_3COOH) using acidified potassium dichromate:
Statement I: This is an example of an oxidation reaction.
Statement II: Acidified potassium dichromate is an oxidizing agent.
Statement III: Acidified potassium dichromate is a reducing agent.
Which of the following is correct?

- A. II and III are true
- B. Only I is true
- C. I and II are true
- D. I and III are true

Q32 Oxidation of ethanol

Read the following two statements carefully and choose the correct option:
Statement I: Ethanol on oxidation with alkaline potassium permanganate gives ethanoic acid.
Statement II: Oxidation of ethanol involves the removal of hydrogen atoms and addition of oxygen.
Which of the following is correct?

- A. Only statement I is correct.
- B. Both statements are correct, and Statement II explains Statement I.
- C. Both statements are correct, but Statement II does not explain Statement I.
- D. Only statement II is correct.

Q33 Oxidation of ethanol

A student heats ethanol with alkaline potassium permanganate. Which observation confirms that the oxidation process occurred?

- A. evolution of a gas with a burning smell
- B. formation of a sweet-smelling ester
- C. no change in color or smell
- D. purple color of KMnO_4 fades and a sharp-smelling liquid forms

Q34 Oxidation of ethanol

Select the option that is true regarding the following two statements labelled Assertion (A) and Reason (R).

Assertion (A): In oxidation reactions, the colour of potassium permanganate disappears initially.
Reason (R): Potassium permanganate reacts with alcohols and gets reduced, causing decolourisation.

- A. A is true, but R is false.
- B. Both A and R are true, and R is the correct explanation of A.
- C. Both A and R are true, and R is not the correct explanation of A.
- D. A is false, but R is true.

Q35 Preparation of ethanol

Molasses, a byproduct of sugar production from sugarcane, can be used as a feedstock for the production of which of the following carbon compounds through fermentation?

- A. butanone
- B. ethanol
- C. propanoic acid
- D. propanal

Q36 Properties of ethanol

Which of the following best explains why ethanol conducts electricity poorly despite being a liquid and having a polar O-H bond?

- A. It decomposes in water into CO_2 and H_2O
- B. It is a covalent compound and does not ionize in solution
- C. It dissociates completely into ions in water
- D. It is a weak base that accepts protons



Q37 Properties of ethanol

Which of the following statements about ethanol is CORRECT?

- A. Ethanol does not mix with water at all.
- B. Ethanol burns with a clear blue flame, producing carbon dioxide and water. ✓
- C. Ethanol is a colorless, odourless liquid that does not evaporate easily.
- D. Ethanol reacts with baking soda to release hydrogen gas.

Q38 Reactions of ethanol

When ethanol reacts with sodium metal, which gas is released as a result of the reaction?

- A. Nitrogen gas
- B. Oxygen gas
- C. Hydrogen gas ✓
- D. Carbon dioxide

Q39 Reactions of ethanol

Which process converts ethanol to ethene when ethanol is heated at 443 K with excess concentrated sulphuric acid?

- A. Hydrolysis of ethanol
- B. Oxidation of ethanol
- C. Reduction of ethanol
- D. Dehydration of ethanol ✓

Q40 Structural isomerism

A teacher asks students to draw the structure of butane and isobutane. What is the main difference between these two molecules?

- A. Butane contains an aromatic ring, isobutane does not
- B. Both are cyclic hydrocarbons
- C. Isobutane has fewer carbon atoms than butane
- D. Butane is a straight-chain, while isobutane is a branched-chain isomer ✓

Q41 Structural isomerism

Which pair of compounds will show different chemical properties despite having the same molecular formula?

- A. Ethane and ethene
- B. Butane and isobutane ✓
- C. Ethanol and ethanoic acid
- D. Propanol and methanol

Q42 Structural isomerism

A compound has the molecular formula C_4H_{10} . Which statement best describes its structure?

- A. It forms only one possible structure
- B. It must contain a carbon-carbon double bond
- C. It has a cyclic structure and a single isomer
- D. It can exist as two different isomers with straight or branched chains ✓

Q43 Versatility of carbon

Considering the versatility of carbon, which scenario most accurately represents its role in environmental science?

- A. Formation of carbon dioxide in respiration ✓
- B. Use of calcium carbonate in bones
- C. Formation of sodium carbonate in water
- D. Formation of magnesium oxide in rocks

Q44 Vital force theory

How did Friedrich Wöhler challenge the vital force theory of organic compound synthesis?

- A. By synthesizing carbon dioxide in the lab
- B. By preparing urea from ammonium cyanate ✓
- C. By discovering the catenation property of carbon
- D. By extracting natural substances from living systems



Q1 Addition and substitution reactions

What is the main difference between an addition and a substitution reaction in carbon compounds?

- A. Addition reactions remove atoms from molecules
- B. Addition reactions occur only in saturated compounds
- C. Addition reactions increase the number of atoms in a molecule ✓
- D. Addition reactions replace one atom with another

Q2 Addition reactions

Which of the following hydrocarbons undergo addition reactions with hydrogen?

- A. Unsaturated hydrocarbons ✓
- B. Alicyclic hydrocarbons
- C. Saturated hydrocarbons
- D. Aromatic hydrocarbons

Q3 Addition reactions

Which of the following hydrocarbons will undergo an addition reaction most readily?

- A. Methane
- B. Propane
- C. Ethene ✓
- D. Ethane

Q4 Addition reactions

Consider the following statements and select the correct option.

Statement A: Addition reactions occur when two or more reactants combine to form a single product.

Statement B: Alkenes and alkynes commonly undergo addition reactions.

- A. Statement A is incorrect but B is correct.
- B. Statement A is correct but B is incorrect.
- C. Both statements A and B are correct. ✓
- D. Both statements A and B are incorrect.

Q5 Addition reactions

Unsaturated hydrocarbons usually undergo which of the following reaction mechanisms?

- A. Neutralization
- B. Addition ✓
- C. Combustion
- D. Substitution

Q6 Bonding in hydrocarbons

The number of bonds formed in ethene is:

- A. 3
- B. 5
- C. 4
- D. 6 ✓

Q7 Bromine water test

What visible change occurs when bromine water is added to ethene?

- A. The solution turns blue after addition reaction
- B. A white precipitate forms in the water after addition reaction
- C. The bromine water remains orange after reaction
- D. The bromine water changes from orange to colorless ✓

Q8 Combustion and flame type

A student burns ethanol in air and observes a blue flame. Which statement best explains this observation?

- A. Ethanol produces a red flame when burned in air.
- B. Complete combustion produces a blue flame due to sufficient oxygen supply. ✓
- C. Impurities in ethanol cause the blue color of the flame.
- D. Incomplete combustion leads to a blue flame because of less oxygen.



Q9 Combustion and flame type

Select the correct option regarding the following two statements labelled Assertion (A) and Reason (R).

Assertion (A): Unsaturated hydrocarbons give a yellow flame with black smoke.

Reason (R): They burn completely when oxygen is insufficient.

- A. Both A and R are true, and R is not the correct explanation of A.
- B. A is false, but R is true.
- C. A is true, but R is false. ✓
- D. Both A and R are true, and R is the correct explanation of A.

Q10 Combustion and flame type

Which of the following carbon compounds is most likely to burn with a non-luminous flame?

- A. Kerosene
- B. Charcoal
- C. Ethanol ✓
- D. Camphor

Q11 Combustion and flame type

Which of the following statements correctly explains why saturated hydrocarbons burn with a blue flame, while unsaturated hydrocarbons tend to burn with a yellow, sooty flame?

- A. Unsaturated hydrocarbons contain more oxygen, which leads to incomplete combustion.
- B. Saturated hydrocarbons react with nitrogen in the air to prevent soot formation.
- C. Saturated hydrocarbons have weaker bonds, so they burn more completely.
- D. Unsaturated hydrocarbons have a higher carbon-to-hydrogen ratio, leading to incomplete combustion and soot formation. ✓

Q12 Combustion and flame type

What sort of flame is produced when unsaturated carbon compounds are burnt in air?

- A. a blue flame with lots of black smoke
- B. a yellow flame with lots of black smoke ✓
- C. a yellow flame with no smoke
- D. a clean flame

Q13 Combustion and flame type

Which scenario best illustrates complete combustion of methane in a domestic gas burner?

- A. An orange flame produces a strong gas odor in the kitchen
- B. A weak, flickering flame is present with white ash
- C. A yellow flame with black residue forms on the vessel
- D. A blue, non-luminous flame is observed with no residue left behind ✓

Q14 Combustion of carbon compounds

The combustion of carbon or its compounds gives off:

- A. Heat and light ✓
- B. Heat only
- C. Electricity
- D. Light only

Q15 Cyclic hydrocarbons

Which among the following molecular formulae of organic compounds does NOT represent a ring structure?

- A. C_6H_{10}
- B. C_6H_8
- C. C_6H_6
- D. C_6H_{14} ✓

Q16 Cyclic hydrocarbons

Which saturated hydrocarbon has the molecular formula as C_3H_6 ?

- A. cyclopropane ✓
- B. propane
- C. propene
- D. propyne

Q17 General formula of hydrocarbons

What is the general formula for alkanes with 'n' carbon atoms?

- A. C_nH_{2n+2} ✓
- B. C_nH_{2n}
- C. C_nH_{2n-2}
- D. C_nH_{2n+1}



Q18 Hydrogenation of unsaturated compounds

The commonly used catalysts for hydrogenation reactions are _____ and _____.

- A. nickel, sodium hydroxide
- B. palladium, conc. sulphuric acid
- C. palladium, nickel
- D. conc. sulphuric acid, nickel

Q19 Hydrogenation of unsaturated compounds

What happens when hydrogen (H_2) is added to an alkene in the presence of a catalyst?

- A. Alkene forms an alcohol
- B. Alkene converts into an alkane
- C. Alkene undergoes substitution
- D. Alkene breaks down

Q20 Saturated and unsaturated hydrocarbons

Why are saturated hydrocarbons less reactive than unsaturated hydrocarbons?

- A. They contain oxygen.
- B. They are aromatic.
- C. They have double bonds.
- D. Their single bonds are strong.

Q21 Saturated and unsaturated hydrocarbons

Which of the following statements best describes a saturated carbon compound?

- A. A saturated carbon compound contains at least one triple bond between carbon atoms.
- B. A saturated carbon compound contains a benzene ring in its structure.
- C. A saturated carbon compound contains at least one double bond between carbon atoms.
- D. A saturated carbon compound contains only single bonds between carbon atoms.

Q22 Saturated and unsaturated hydrocarbons

When comparing methane (CH_4) and ethene (C_2H_4), what is true regarding their covalent bonds?

- A. Methane contains one double covalent bond
- B. Ethene contains double bonds between hydrogen atoms
- C. Both contain only non-polar covalent bonds
- D. Methane contains only single covalent bonds while ethene has a double bond

Q23 Substitution reactions

Read the following two statements carefully and choose the correct option:

Statement I: When methane reacts with chlorine in the presence of sunlight, hydrogen atoms in methane are gradually replaced by chlorine atoms.

Statement II: The reaction between methane and chlorine is called an addition reaction.

- A. Both statements are incorrect.
- B. Only Statement II is correct.
- C. Both statements are correct.
- D. Only Statement I is correct.

Q24 Substitution reactions

Why do higher homologues of alkanes produce multiple products when they react with chlorine in a substitution reaction?

- A. Chlorine is unstable in nature
- B. Alkanes are aromatic
- C. Chlorine replaces hydrogen at different position
- D. Hydrogen atoms are absent

Q25 Substitution reactions

Which of the following is NOT a characteristic of substitution reactions in alkanes ?

- A. One atom replaces another
- B. Multiple products may form
- C. Occurs in presence of sunlight
- D. Double bond is broken

Q26 Test for unsaturation

Which method would be most appropriate to distinguish between saturated and unsaturated carbon compounds in a laboratory setting?

- A. Measuring melting point with a thermometer.
- B. Heating over a Bunsen burner and observing flame color.
- C. Testing with bromine water to observe color change.
- D. Mixing with copper sulfate solution.



Chemistry

22 Questions • Answer Key

Q1 Cleansing action of soap

What is the principal mechanism by which soap removes oily dirt from fabrics?

- A. Soap chemically reacts with oil to convert it into soluble alcohol
- B. Soap increases viscosity and dissolves impurities directly in water
- C. Soap molecules reduce surface tension and form micelles trapping dirt ✓
- D. Soap evaporates water content and separates dirt through sublimation

Q2 Coal and petroleum

Select the correct option regarding the following two statements labelled Assertion (A) and Reason (R).

Assertion (A): Coal and petroleum are called fossil fuels.
Reason (R): They were formed from the remains of ancient plants and animals.

- A. Both A and R are true, and R is not the correct explanation of A.
- B. Both A and R are true, and R is the correct explanation of A. ✓
- C. A is true, but R is false.
- D. A is false, but R is true.

Q3 Coal and petroleum

Imagine a region with abundant ancient plant remains, frequent earthquakes, and thick rock layers. Which fossil fuel is most likely to be found there and why?

- A. No fossil fuels, because biomass cannot decay underground
- B. Coal, because these conditions favor coal formation from ancient plants ✓
- C. Oil, because these conditions favor oil formation from sea animals
- D. Natural gas, because these conditions favor gas formation from volcanic activity

Q4 Food preservation and rancidity

Which condition will slow down rancidity in oily food items?

- A. Storage at high temperature
- B. Presence of moisture
- C. Storage in airtight containers flushed with nitrogen ✓
- D. Exposure to sunlight

Q5 Food preservatives

Which of the following is used as a preservative in pickles?

- A. 5-8% solution of cinnamic in water
- B. 5-8% solution of ethanol in water
- C. 5-8% solution of acetic anhydride in water
- D. 5-8% solution of acetic acid in water ✓

Q6 Formation of coal

Which sequence correctly represents the formation stages of coal?

- A. Peat → Bituminous → Lignite → Anthracite
- B. Anthracite → Bituminous → Lignite → Peat
- C. Peat → Lignite → Bituminous → Anthracite ✓
- D. Lignite → Peat → Anthracite → Bituminous

Q7 Formation of coal

Read the following statements carefully and choose the correct option:

Assertion (A): Coal was formed from trees and plants buried under earth millions of years ago.

Reason (R): Heat and pressure over time converted the remains of plants into coal.

- A. A is false, but R is true.
- B. A is true, but R is false.
- C. Both A and R are true, and R is the correct explanation of A. ✓
- D. Both A and R are true, and R is not the correct explanation of A.



Q8 Formation of coal

Coal is formed from the remains of trees, ferns and other plants that lived _____ of years ago.

- A. hundreds
- B. millions
- C. thousands
- D. tens

**Q9 Formation of coal**

Why do coal and petroleum take millions of years to form in nature?

- A. Their formation involves slow chemical and physical changes
- B. They are produced by repeated flooding events
- C. They form quickly through cooling of materials
- D. They result from rapid chemical reactions

**Q10 Formation of coal**

Why does coal have a higher carbon content compared to the original plant material?

- A. Minerals are added to plant remains in the soil
- B. Sunlight increases the carbon in buried plants
- C. Water and volatile substances are lost during coal formation
- D. Gas from the atmosphere is absorbed by the plants

**Q11 Formation of petroleum**

Which combination of conditions is most likely to lead to the formation of petroleum from marine sediments?

- A. High pressure, high temperature, anaerobic conditions
- B. Low temperature, low pressure, aerobic conditions
- C. Low pressure, high temperature, aerobic conditions
- D. High temperature, low pressure, aerobic conditions

**Q12 Formation of petroleum**

Which condition is most necessary for petroleum formation from dead marine organisms?

- A. Exposure to sunlight and fresh oxygen
- B. Direct contact with surface water and wind
- C. Low temperature and presence of open air
- D. High pressure and absence of air for long periods

**Q13 Micelle formation**

The cloudy appearance of soap solution is due to:

- A. Absorption of light by oil
- B. Refraction of light by ions
- C. Scattering of light by micelles
- D. Reflection of light by bubbles

**Q14 Prevention of rancidity**

Which storage condition slows rancidity most effectively in edible oils and fats?

- A. Repeated heating of food
- B. Mixing food with water
- C. Keeping under sunlight
- D. Storing in airtight containers

**Q15 Prevention of rancidity**

A packet of potato chips is filled with nitrogen gas before sealing. What is the main reason for using nitrogen in the packet?

- A. Nitrogen prevents oxidation of oils and fats
- B. Nitrogen increases the crispness of chips
- C. Nitrogen removes moisture from chips
- D. Nitrogen reacts with oil to stabilize it

**Q16 Soap and micelle formation**

In a comparison between two soap solutions, one containing oil droplets and the other without, which is more likely to have well-developed micelles?

- A. The solution without oil because soap cannot form micelles with oil.
- B. Neither solution because micelles cannot exist in aqueous solutions.
- C. Both solutions because micelles never interact with oily substances.
- D. The solution containing oil droplets because hydrophobic cores trap oil.

**Q17 Soap and micelle formation**

Why does a soap solution appear cloudy?

- A. Because soap molecules dissolve completely
- B. Because dirt is suspended in water
- C. Because hydrocarbons are soluble in water
- D. Because soap micelles are large enough to scatter light



Q18 Soap and micelle formation

How do micelles enable soaps to function effectively in cleaning oily stains from clothes?

- A. They chemically break down oily molecules into polar fragments that can evaporate easily.
- B. They surround and trap non-polar substances, making them soluble in water ☒
- C. They increase the pH of water so that oils form solid precipitates that can be washed away.
- D. They coat the fabric surface with a hydrophobic layer that prevents water from sticking.

Q19 Soap and micelle formation

What happens to soap molecules when they are added to water?

- A. Hydrocarbon tails remain in water while ionic heads project outward.
- B. Ionic heads remain in water while hydrocarbon tails project outward. ☒
- C. Both ionic heads and tails remain completely inside the water.
- D. Soap molecules dissolve randomly without forming any arrangement.

Q20 Soap and saponification

How does saponification relate to soap formation?

- A. Saponification produces sodium or potassium salts of long chain carboxylic acids, which are soaps ☒
- B. Saponification is unrelated to soap production
- C. Saponification produces only esters used in flavoring
- D. Saponification makes ethanol for cleaning

Q21 Soap in hard water

Why is soap less effective in hard water?

- A. Soap becomes acidic
- B. Soap evaporates quickly
- C. Soap forms insoluble scum ☒
- D. Soap loses polarity

Q22 Soaps and detergents

The cleaning action of detergents is most effective in:

- A. Highly acidic medium
- B. Neutral medium
- C. Alkaline medium ☒
- D. Acidic medium



Q1 Cell organelle functions

Complete the analogy.

Ribosomes : Protein Synthesis :: Mitochondria : _____.

- A. Cell Division
- B. Waste Removal
- C. Energy Production
- D. DNA Replication

**Q2 Cell organelle functions**

Which of the following cell structures is mainly responsible for providing support and maintaining the shape of eukaryotic cells?

- A. DNA
- B. Cell Sap
- C. Cytoskeleton
- D. Nucleoid

**Q3 Cell organelle functions**

Which organelle is physically continuous with the nuclear envelope?

- A. Lysosome
- B. Golgi Body
- C. Mitochondria
- D. Endoplasmic Reticulum

**Q4 Cell organelle functions**

Which structure in an animal cell acts as the control centre and contains the genetic material?

- A. Endoplasmic reticulum
- B. Vacuole
- C. Nucleus
- D. Ribosome

**Q5 Cell organelle functions**

Complete the analogy.

Mitochondria : Energy Release :: Chloroplast : _____.

- A. Food Synthesis
- B. Genetic Transfer
- C. Cell Digestion
- D. Waste Removal

**Q6 Cell organelles and functions**

Which organelle is primarily responsible for aerobic respiration in animal cells?

- A. Mitochondria
- B. Ribosome
- C. Endoplasmic reticulum
- D. Nucleus

**Q7 Cell organelles and functions**

In animal cells, the breakdown of pyruvate using oxygen during aerobic respiration occurs in the _____.

- A. Nucleus
- B. Cytoplasm
- C. Mitochondria
- D. Ribosome

**Q8 Cell organelles and functions**

Apart from the nucleus and plastids, which of the following organelle contains its own DNA?

- A. Golgi Apparatus
- B. Ribosome
- C. Lysosome
- D. Mitochondrion

**Q9 Cell terminology roots**

Which pair **CORRECTLY** matches the Greek root with its meaning?

- A. Chroma — Green
- B. Karyon — Wall
- C. Pro — True
- D. Leukos — White



Q10 Cell wall and membrane

Complete the Analogy.

Plant : Rigid Cell Wall :: Animal : _____

- A. Lignified support
- B. Cellular flexibility
- C. Photosynthetic tissues
- D. Fixed position

Q11 Chromatin and chromosomes

When a cell prepares to divide, the chromatin material organizes itself into _____.

- A. Nuclear pores
- B. Lysosomes
- C. Chromosomes
- D. Proteins

Q12 Discovery of the cell

Which material did Robert Hooke use to first discover "cells"?

- A. Onion peel
- B. Leaf surface
- C. Cork slice
- D. Human cheek

Q13 Meiosis and gamete formation

Two siblings from the same parents often look different from each other. Which process mainly causes this difference?

- A. Respiration
- B. Meiosis
- C. Mitosis
- D. Photosynthesis

Q14 Microscopy

Complete the analogy.

Light Microscope: Visible Light:: Electron Microscope: _____.

- A. Ultraviolet Light
- B. Electron Beam
- C. Laser Light
- D. X rays

Q15 Microscopy

The measure of an image's clarity is called _____, whereas _____ is the brightness difference between object parts.

- A. magnification, illumination
- B. illumination, magnification
- C. contrast, resolution
- D. resolution, contrast

Q16 Mitosis and meiosis

The reproductive cells such as sperm and eggs produced through meiosis are known as _____.

- A. Inclusions
- B. Organelles
- C. Gametes
- D. Tissues

Q17 Mitosis and meiosis

Complete the analogy.

Mitosis : 2 Daughter Cells :: Meiosis : _____

- A. 1 Daughter Cell
- B. 8 Daughter Cells
- C. 3 Daughter Cells
- D. 4 Daughter Cells

Q18 Osmosis and plasmolysis

If a researcher finds that a plant cell is neither swelling nor shrinking in a specific solution, they can conclude the solution is ____.

- A. Isotonic
- B. Hypotonic
- C. Pure water
- D. Concentrated

Q19 Osmosis and plasmolysis

Complete the analogy.

Hypotonic solution : Cell Swells :: Hypertonic solution : _____.

- A. Cell Shrinks
- B. Cell Divides
- C. Cell becomes rigid
- D. Cell stays same



Q20 Osmosis and plasmolysis

Complete the analogy.

Dye in water : Diffusion :: Roots absorbing water :

_____.

A. Evaporation

B. Osmosis

C. Photosynthesis

D. Filtration

Q21 Plant and animal cell

A botanist observes two cell types under a microscope. The first type has thick cell walls and large vacuoles, while the second type lacks cell walls and has small vacuoles. What can be inferred?

A. The first sample is plant tissue, and the second is animal tissue.

B. Both samples are plant tissues.

C. The first sample is animal tissue, and the second is plant tissue.

D. Both samples are animal tissues.

Q22 Programmed cell death

A eukaryotic cell that performs its functions and undergoes programmed cell death when no longer required is best described as a _____.

A. Tumour cell

B. Malignant cell

C. Normal cell

D. Bacterial cell

Q23 Programmed cell death

Which of the following pairs is **INCORRECT**?

A. Embryo — Uses programmed cell death for shaping

B. Malignant — Tissue invasion

C. Cancer Cell — Controlled division

D. Normal Cell — Definite lifespan

Q24 Programmed cell death

Name the process of selective cell destruction that helps in the formation of separate fingers during embryonic development.

A. Programmed cell death

B. Mitosis

C. Meiosis

D. Plasmolysis

Q25 Prokaryotic and eukaryotic cells

In a bacterial cell, the genetic material is found without a surrounding membrane in a region called the _____.

A. Cytoplasm

B. Nucleolus

C. Vacuole

D. Nucleoid

Q26 Prokaryotic and eukaryotic cells

Identify the **CORRECTLY** matched cell–structure pair.

A. Bacteria Cell – Well-defined Nucleus

B. Eukaryotic Cell – Membrane-bound Endoplasmic Reticulum

C. Animal Cell – Cell Wall

D. Prokaryotic Cell – Mitochondria

Q27 Prokaryotic and eukaryotic cells

What do scientists examine to determine whether an organism is a eukaryote or prokaryote?

A. Cell structure and presence of nucleus

B. General feeding behavior and diet

C. Ecological role within the environment

D. Method of reproduction and offspring



Q1 Collenchyma tissue

A botanist observes a plant stem that bends easily without breaking and is investigating the tissue beneath the epidermis. Which type of simple permanent tissue is most likely responsible for this flexibility?

- A. Sclerenchyma
- B. Parenchyma
- C. Collenchyma
- D. Epidermis

Q2 Meristematic tissue

Where is the intercalary meristem commonly located in plants?

- A. At the tip of roots and shoots
- B. At the base of leaves or internodes
- C. At the edge of leaves
- D. On lateral sides of the stem

Q3 Meristematic tissue

To increase the width or girth of a tree trunk, cells must divide around the stem in a ring-like manner. Which tissue performs this function?

- A. Intercalary meristem
- B. Apical meristem
- C. Lateral meristem
- D. Sclerenchyma

Q4 Meristematic tissue

In plants, growth is restricted to specific regions because of the presence of dividing tissues, which are also known as _____.

- A. Meristematic tissues
- B. Vascular tissues
- C. Supportive tissues
- D. Permanent tissues

Q5 Meristematic tissue

Which characteristic is unique to meristematic tissue in plants?

- A. Cells transport water and minerals
- B. Cells are capable of continuous division
- C. Cells have thick secondary walls
- D. Cells mainly provide mechanical support

Q6 Meristematic tissue

A student observes a plant cell under a microscope and notes it has a prominent nucleus, dense cytoplasm, and no visible vacuoles. Which of the following is the most likely function of this cell?

- A. Active cell division and growth
- B. Providing structural support
- C. Storing water and nutrients
- D. Transporting water and minerals

Q7 Meristematic tissue

If a student wants to observe cells that are actively dividing to increase the length of a plant stem or root, which specific tissue should they examine under the microscope?

- A. Intercalary meristem
- B. Permanent tissue
- C. Apical meristem
- D. Lateral meristem

Q8 Meristematic tissue

Which of the following characteristics are true for the cells of meristematic tissue?

- A. Very active, prominent nuclei, light cytoplasm and thin cellulose walls
- B. Very active, prominent nuclei, light cytoplasm and thick cellulose walls
- C. Very active, prominent nuclei, dense cytoplasm and thick cellulose walls
- D. Very active, prominent nuclei, dense cytoplasm and thin cellulose walls



Q9 Meristematic tissue

Which of the following best describes the role of apical meristems?

- A. Drive lengthwise growth at the tips of roots and shoots. ☒
- B. Increase the diameter of stems and roots.
- C. Form only in mature tissues after the plant has fully grown.
- D. Store nutrients in parenchyma

Q10 Meristematic tissue

Which of the following is correct about growth pattern in plants and animal cells?

- A. Animal cells growth is due to meristematic tissues.
- B. Both follow same growth pattern.
- C. Plants have a specific growth region containing dividing tissues. ☒
- D. Plant cell growth is more uniform in comparison to animal cells.

Q11 Need for transport system

Why do plants need a specialized transportation system for water and minerals?

- A. Because diffusion does not occur in plants
- B. Because plants have high energy needs like animals
- C. Because diffusion alone is insufficient for large distances in tall plants ☒
- D. Because plants move and need rapid transport throughout the body

Q12 Parenchyma tissue

Since parenchyma tissue mainly stores food and other materials, its cells require enough internal space. Therefore, parenchyma cells are generally _____.

- A. Tightly packed without spaces
- B. Loosely packed with intercellular spaces ☒
- C. Dead and hollow
- D. Hardened with minerals

Q13 Plant versus animal tissues

Which statement correctly describes the energy requirement of plant tissues compared to animal tissues?

- A. Plants do not perform respiration for energy
- B. Plants generally require less energy than animals ☒
- C. Plants require more energy than animals
- D. Plant tissues do not require energy at all

Q14 Root hair and absorption

How do root hair help plants in the process of absorbing water and minerals from the soil?

- A. They transport food to leaves.
- B. They synthesize food.
- C. They increase the surface area of absorption. ☒
- D. They provide mechanical support.

Q15 Sclerenchyma tissue

Dead structures are often "hard and rigid." Which simple permanent tissue is mainly made of dead cells that provide mechanical strength to plants?

- A. Epidermis
- B. Sclerenchyma ☒
- C. Parenchyma
- D. Meristematic tissue

Q16 Sclerenchyma tissue

Why do most plant supportive tissues consist of dead cells, whereas animal supportive tissues are made up of living cells?

- A. Plants do not require living cells at all
- B. Because dead cells divide faster in plants than in animals
- C. Animal tissues are dead to avoid immune reactions
- D. Dead cells in plants provide structural strength without requiring energy ☒

Q17 Simple permanent tissues

A botanist is designing a water-efficient vertical garden for a city building. Which simple permanent tissue should be mainly used to provide both support and flexibility to withstand wind?

- A. Collenchyma ☒
- B. Epidermal tissue
- C. Sclerenchyma
- D. Parenchyma



Q18 Simple permanent tissues

During a histological examination of a plant's leaf stalk, elongated cells with irregularly thickened corners and very little intercellular space are observed. Which simple permanent tissue is present and what is its primary function in this region?

- A. Chlorenchyma
- B. Sclerenchyma
- C. Collenchyma ✓
- D. Parenchyma

Q19 Simple permanent tissues

Complete the analogy.

Meristematic Tissue : Dividing capacity :: Simple Permanent Tissue : _____

- A. Active locomotion
- B. Protective epidermis
- C. Lost ability to divide ✓
- D. Rapid stimulus transmission

Q20 Simple permanent tissues

Complete the analogy.

Parenchyma: Large intercellular spaces:: Sclerenchyma: _____

- A. Large air cavities
- B. Living cells
- C. No internal space ✓
- D. Thin cellulose walls

Q21 Simple permanent tissues

Which simple permanent tissue in plants is mainly responsible for photosynthesis and storage of food?

- A. Collenchyma
- B. Phloem
- C. Parenchyma ✓
- D. Sclerenchyma

Q22 Simple permanent tissues

Which of the following characteristics are correct for the cells of parenchyma?

- A. Dead, loosely organised with large intercellular spaces
- B. Living, loosely organised with large intercellular spaces ✓
- C. Dead, loosely organised without intercellular spaces
- D. Living, loosely organised without intercellular spaces

Q23 Simple permanent tissues

A horticulturist wants to breed aquatic plants that are better able to float. Which tissue modification should they focus on enhancing?

- A. Reducing intercellular spaces in parenchyma
- B. Irregular thickening in collenchyma
- C. Aerenchyma formation ✓
- D. Increasing chlorophyll in collenchyma

Q24 Translocation in phloem

What is the primary mechanism by which sucrose moves into phloem tissue in plants?

- A. Osmosis through a semi-permeable membrane
- B. Facilitated diffusion via carrier proteins
- C. Simple diffusion along the gradient
- D. Active transport with energy from ATP ✓

Q25 Translocation in phloem

Which process would be directly affected if a plant's phloem were blocked during spring?

- A. Water transport from roots to leaves would decrease
- B. Roots would not absorb sufficient nutrients from soil
- C. Leaves would be unable to perform gas exchange
- D. Buds would fail to receive sugars needed for growth ✓

Q26 Translocation in phloem

What is the primary reason water moves into the phloem tissue after sucrose is actively loaded into it in plants?

- A. The increase in osmotic pressure draws water into the phloem ✓
- B. Water moves to phloem due to root pressure buildup
- C. Pressure equalizes between phloem and xylem tissues
- D. Increased ATP usage raises the temperature in the phloem

Q27 Transpiration pull

What is the main force that pulls water upward through the xylem in tall trees?

- A. Transpiration pull ✓
- B. Root pressure
- C. Capillary action
- D. Diffusion



Q28 Water absorption by root hairs

Water moves from the soil into the root hair cells mainly due to which of the following processes?

- A. Active transport
- B. Diffusion
- C. Transpiration
- D. Osmosis

**Q29 Water absorption by roots**

Which part of a plant mainly absorbs water and minerals from the soil?

- A. Roots
- B. Leaves
- C. Stems
- D. Flowers

**Q30 Xylem and phloem**

Complete the analogy.

Xylem : Water Transport :: Phloem : _____.

- A. Protection from Microbes
- B. Mechanical Strength
- C. Gas Exchange
- D. Food Transport

**Q31 Xylem and phloem**

Which plant tissue is dead at maturity but functional for transport of water and minerals?

- A. Phloem
- B. Xylem
- C. Parenchyma
- D. Collenchyma

**Q32 Xylem and phloem**

Transport of water in plants occurs through _____.

- A. Xylem
- B. Phloem
- C. Cambium
- D. Vacuole

**Q33 Xylem and phloem functions**

Which part of the plant vascular tissue is mainly responsible for transporting amino acids and soluble products of photosynthesis?

- A. Cortex
- B. Xylem
- C. Phloem
- D. Epidermis

**Q34 Xylem and phloem functions**

Why are xylem and phloem described as independently organised conducting tubes in plants?

- A. They transport different substances separately.
- B. They act as one type of tissue in all plants
- C. They share a single pathway for all transport needs
- D. They perform identical functions in tandem

**Q35 Xylem and phloem functions**

Among the following, which is transported in xylem?

- A. Glucose
- B. Water and minerals
- C. Proteins
- D. Amino acids



Q1 Blood as connective tissue

Blood is a connective tissue because it links different body systems. What is the liquid matrix in which blood cells are suspended?

- A. Platelets
- B. Plasma** ✓
- C. Cytoplasm
- D. Haemoglobin

Q2 Bone and cartilage

A rare genetic disorder causes the hard matrix of a certain connective tissue to become less rigid, leading to frequent bone fractures. What is the most likely explanation for this observation?

- A. A defect in type I collagen due to Mutation in COL1A1 or COL1A2 genes** ✓
- B. Loss of proteins and sugars in cartilage matrix
- C. Decrease in plasma proteins in blood matrix
- D. Reduction in calcium and phosphorus compounds in bone matrix

Q3 Connective tissue

The cells of the cartilage are known as _____.

- A. Osteocytes
- B. Chondrocytes** ✓
- C. Fibroblasts
- D. Adipocytes

Q4 Connective tissue types

A football player tears a structure that connects muscles to bones during practice. Which structure is most likely damaged?

- A. Nerve
- B. Cartilage
- C. Ligament
- D. Tendon** ✓

Q5 Epithelial tissue

Which of the following is **NOT** a function of epithelial tissues?

- A. Protection
- B. Secretion
- C. Formation of red blood cells** ✓
- D. Absorption

Q6 Epithelial tissue

A patient suffers from repeated skin infections after severe damage to the outer body covering. Which tissue has most likely been affected?

- A. Connective tissue
- B. Muscular tissue
- C. Epithelial tissue** ✓
- D. Nervous tissue

Q7 Epithelial tissue

Epithelial tissue is separated from the underlying tissue by a fibrous extracellular layer known as:

- A. Connective matrix
- B. Basement membrane** ✓
- C. Cell wall
- D. Cytoplasm

Q8 Epithelial tissue

Which epithelial tissue is found in the lining of the kidney tubules?

- A. Squamous
- B. Columnar
- C. Cuboidal** ✓
- D. Ciliated



Q9 Epithelial tissue

Epithelial tissues act as the covering or protective layers in animals. Which of the following is NOT a location where you would find epithelial tissue?

- A. Skin
- B. Kidney tubules
- C. Inside of a bone
- D. Lining of the mouth



Q10 Epithelial tissue

Read the following statements are about epithelial tissue and select the most appropriate option.

Statement A: Cells of epithelial tissue are tightly packed.
Statement B: Fibrous basement membrane separates epithelium from underlying tissue.

- A. Statement A is incorrect and Statement B is correct
- B. Both Statement A and Statement B are incorrect
- C. Statement A is correct and Statement B is incorrect
- D. Both Statement A and Statement B are correct



Q11 Epithelial tissue

Which of the following explains why epithelial tissue cells are tightly packed with very little space between them?

- A. To allow rapid cell division in the tissue
- B. To enhance secretion functions of the tissue
- C. To increase the overall strength of the tissue
- D. To form a continuous barrier and regulate permeability



Q12 Muscular tissue

The long, cylindrical cells that form muscular tissues are specifically known as _____.

- A. Neurons
- B. Cartilage discs
- C. Muscle fibres
- D. Sieve tubes



Q13 Muscular tissue

Smooth muscles are responsible for all the following actions, EXCEPT:

- A. Moving food through the digestive tract.
- B. Lifting a heavy bucket of water.
- C. Functioning automatically without conscious thought.
- D. Regular movements in the intestines.



Q14 Muscular tissue types

Under a microscope, skeletal muscles show alternate light and dark bands. The cells of this tissue are long, cylindrical, unbranched, and _____.

- A. Uninucleate
- B. Dead
- C. Spindle-shaped
- D. Multinucleate



Q15 Muscular tissue types

Muscular tissue is responsible for all movement in our body and consists of elongated cells which are also commonly referred to as _____.

- A. Muscle fibres
- B. Neurons
- C. Epithelial cells
- D. Cartilage cells



Q16 Nervous tissue

Identify the FALSE statement related to the nervous tissue.

- A. Nerve impulses are signals that are transmitted along nerve fibres.
- B. Nervous tissue includes the spinal cord.
- C. An axon is a single, long section of nervous tissue.
- D. The cells of nervous tissue are referred to as nephrons.



Q17 Nervous tissue

What are the main components of nervous tissue?

- A. Muscles
- B. Neurons
- C. Bones
- D. Glands



Q18 Nervous tissue

Which of the given statements about nervous tissue are correct?

- (i) Nervous tissues are made up of neurons.
- (ii) Neurons have one axon and many dendrites.
- (iii) Nerve impulses are signals that pass through a nerve fibre.

- A. (i) and (iii) only
- B. (ii) and (iii) only
- C. (i), (ii) & (iii)
- D. (i) and (ii) only



Q19 Skeletal and muscular system

Which of the following is **NOT** a part of the musculoskeletal system?

- A. Bones
- B. Nephrons
- C. Tendons
- D. Muscles



Q20 Skeletal system functions

A child presents with a congenital absence of the vertebral column. Which major body system would be primarily compromised?

- A. Respiratory gas exchange
- B. Cutaneous respiration
- C. External digestion
- D. Central nervous system protection



Q21 Skeletal system functions

After severe trauma, a bird develops difficulty in body support and movement. Which vertebrate system is primarily affected?

- A. Simple digestive sac
- B. Basic muscle bands
- C. External gill arches
- D. Internal skeletal framework



Q1 Basis of classification

A scientist groups forest animals first by their feeding habits and then by habitat. Which is the main advantage of this multi-criteria classification approach?

- A. It reveals functional relationships** ✓
- B. It reduces the number of groups
- C. It focuses on genetic similarity
- D. It simplifies taxonomy

Q2 Basis of classification

A student classifies animals in a diagram by both activity time (day/night) and visible characteristics. Which statement best shows what combining these criteria demonstrates about scientific classification?

- A. It eliminates overlaps
- B. It creates unique groups
- C. It always focuses on genetics
- D. It allows for multiple perspectives** ✓

Q3 Binomial nomenclature

A botanist names a new flowering plant growing in a remote region using binomial system. Which of the following is the correct format?

- A. Species capitalized, genus in lowercase
- B. Genus capitalized, species in lowercase** ✓
- C. Both words in uppercase
- D. Both words in lowercase

Q4 DNA-based classification

Researchers studying genetic similarity in hornbill species are most likely to use which characteristic for classification?

- A. Diet composition
- B. DNA sequence comparison** ✓
- C. Nesting site location
- D. Beak shape and size

Q5 DNA-based classification

After a genetic study, two bacteria previously grouped together are found to have highly divergent DNA. According to modern classification, which of the following is the most likely consequence?

- A. They are merged as one species
- B. They may be reclassified into separate domains or groups** ✓
- C. They remain in the same traditional group
- D. Their similarity is confirmed by traditional traits

Q6 DNA-based classification

A group of scientists wants to determine the evolutionary relationships and common ancestry among closely related species in a region. Which classification criterion would provide the most reliable evidence?

- A. Activity patterns track
- B. External features alone
- C. Similarity in genetic code** ✓
- D. Feeding habits profiles

Q7 DNA-based classification

Three microbes were classified together, but DNA sequencing shows two have closer genetic material. Which classification change could this finding suggest?

- A. Grouping by habitat similarities
- B. Maintaining previous grouping
- C. Ignoring genetic information
- D. Reassignment based on DNA similarities** ✓

Q8 DNA-based classification

A taxonomist examines DNA sequences of two bacteria and finds high similarity. Based on current classification principles, which relationship does this suggest between them?

- A. They likely share a common ancestry** ✓
- B. They belong to different domains
- C. They are unrelated
- D. They occupy same ecological niche



Q9 Five kingdom classification

A new microorganism is found that is unicellular, prokaryotic, and lacks a membrane-bound nucleus but can perform photosynthesis. According to the five kingdom classification, which kingdom is it placed in?

- A. Protista
- B. Fungi
- C. Monera
- D. Plantae

**Q10 Five kingdom classification**

While reviewing classification systems, a biologist notes confusion in placing amoeba in the two-kingdom system. Which key feature caused this confusion?

- A. Amoeba is unicellular, moves and is heterotrophic
- B. Amoeba lacks a cell wall and is stationary
- C. Amoeba has a true nucleus and is autotrophic
- D. Amoeba is photosynthetic and multicellular

**Q11 Five kingdom classification**

A waterborne outbreak reveals that causative agent is single-celled, nucleus-lacking organisms thriving in sewage and animal intestines. Which group do these organisms most likely belong to?

- A. Kingdom Monera
- B. Kingdom Plantae
- C. Kingdom Protista
- D. Kingdom Fungi

**Q12 Five kingdom classification**

During an algal bloom, dominant species are single-celled organisms with a nucleus that can photosynthesize and ingest food. Which organism is most likely responsible?

- A. Euglena-like protists
- B. Amoeba
- C. Bacteria
- D. Cyanobacteria

**Q13 Five kingdom classification**

A science teacher asks students to identify an organism under the microscope. The organism is single-celled, has a rigid cell wall, and produces oxygen through photosynthesis. Which organism is most likely being observed?

- A. Euglena
- B. Amoeba
- C. Paramecium
- D. Cyanobacterium

**Q14 Five kingdom classification**

A taxonomist is classifying a microscopic organism that is unicellular, has a true nucleus, and moves using cilia. Which kingdom is most appropriate for its classification?

- A. Protista
- B. Plantae
- C. Fungi
- D. Monera

**Q15 Five kingdom classification**

A scientist discovers a single-celled eukaryotic organism. Which key feature distinguishes it from Monera in the five kingdom system?

- A. Cell wall made of chitin
- B. Multicellular organization
- C. Presence of a membrane-bound nucleus
- D. Autotrophic mode of nutrition

**Q16 Five kingdom classification**

During a field study, a student finds an organism that is multicellular, lacks cell walls, and depends on others for food. According to the five kingdom classification, to which kingdom should this organism belong?

- A. Fungi
- B. Monera
- C. Plantae
- D. Animalia



Q17 Five kingdom classification

A clinical investigation identifies a unicellular, motile, eukaryotic organism that ingests bacteria for food. Which is the best position for this organism in the five kingdom system?

- A. Animalia
- B. Fungi
- C. Monera
- D. Protista



Q18 Fungi characteristics

A tribal community identifies wild mushrooms for food and medicine. Which property is most relevant to their nutritional and medicinal value?

- A. Colorful cap pattern presence
- B. Structural similarity to plants
- C. Rapid spore production capability
- D. High content of bioactive compounds



Q19 Fungi characteristics

A fungal culture in a laboratory is observed to grow best when kept in a warm and moist incubator. Which aspect of its biology is directly influenced by these conditions?

- A. High energy storage in vacuoles
- B. Increased pigment production
- C. Optimal spore germination and growth
- D. Maximum rate of cell division



Q20 Fungi characteristics

A patient has a chronic infection from a eukaryotic organism that reproduces via spores and has a chitin cell wall. Which type of organism is most likely responsible for this infection?

- A. Algae
- B. Fungus
- C. Protozoa
- D. Bacteria



Q21 Fungi characteristics

A field biologist observes a rapid increase in soil minerals after the introduction of a decomposer organism in a forest plot. Which feature of this organism most likely facilitated the increase in mineral content?

- A. Cellulose cell wall formation
- B. Absorption of nutrients by mycelium
- C. Ingestion of organic material
- D. Photosynthesis for energy production



Q22 History of classification systems

A medical laboratory detects bacteria in a patient's sample. According to the historical development of classification systems, in which kingdom would bacteria have been placed immediately after the three kingdom system was introduced?

- A. Monera
- B. Animalia
- C. Protista
- D. Plantae



Q23 Monera and bacteria

What characteristic is shared by both bacteria and cyanobacteria?

- A. Both reproduce by forming seeds
- B. Both possess well defined nucleus
- C. Both are single-celled prokaryotes
- D. Both live in the gut of ruminants



Q24 Protista characteristics

In a comparative study, some unicellular organisms from a hay infusion display flexible shapes and engulf food particles, while others have a rigid outer covering and are green in color. Which conclusion best explains the observed differences?

- A. Monera have similar cell walls
- B. All protists are prokaryotic
- C. Protists vary in structure and nutrition
- D. Chlorophyll is absent in all



Q25 Taxonomic hierarchy

A zoologist finds two organisms with the same order but different families. Which conclusion about their classification does this indicate?

- A. They share family but not class
- B. They share species but not order
- C. They share genus but not family
- D. They share all higher levels up to order

**Q26 Taxonomic hierarchy**

A clinical botanist is required to identify a plant to its family. Which of the following taxonomic ranks is immediately higher than family in the classification hierarchy?

- A. Cultivar
- B. Species
- C. Order
- D. Genus

**Q27 Taxonomic hierarchy**

In the biological taxonomic hierarchy, which taxonomic rank is determined last when classifying a newly discovered plant?

- A. Genus
- B. Family
- C. Species
- D. Order

**Q28 Taxonomic hierarchy**

A clinician differentiates two bacteria using the classification hierarchy: same order but different families. Which conclusion does this indicate?

- A. They share order and family, but not genus or species
- B. They share only the order level
- C. They share only the family level
- D. They share order and class, but not family



Q1 Animal body organisation

A student is analyzing digestive systems in different invertebrates. Which structural change allows efficient, one-way food processing and waste elimination?

A. Development of two body openings ✓

B. Presence of body segmentation

C. Acquisition of bilateral symmetry

D. Evolution of feeding tentacles

Q2 Animal phyla characteristics

A zoologist observes a fixed aquatic animal with no tissue differentiation but efficient water filtration. Which of the following is most likely to happen if this animal was placed in a terrestrial environment?

A. It would use tentacles to trap moisture

B. It would desiccate due to inability to retain water ✓

C. It would move to moist areas for survival

D. It would close its pores to prevent drying

Q3 Arthropoda characteristics

An earthworm and crab both have segmented bodies, but only one has a hard outer covering. Which benefit does this outer covering provide in terrestrial environments?

A. Provides tentacles for prey capture

B. Prevents water loss and offers protection ✓

C. Facilitates single opening for digestion

D. Allows more flexible movement

Q4 Gymnosperms characteristics

In a habitat recently affected by drought, which feature would most likely allow gymnosperms to persist when other plants fail?

A. Needle-like leaves prevent water loss ✓

B. Fruits improve seed dispersal in water

C. Aquatic fertilisation ensures survival

D. Flowers attract diverse pollinators

Q5 Plant kingdom divisions

A new land plant has vascular tissues but no flowers or seeds. Which group does it belong to, and which significant challenge does this group face?

A. Pteridophyta; absence of seeds limits reproductive success ✓

B. Bryophyta; lack of vascular tissues for transport

C. Gymnosperm; reliance on water for fertilisation

D. Angiosperm; seeds exposed to environment

Q6 Plant kingdom divisions

In a comparative study, angiosperms might be more diverse than gymnosperms in various environments as:

A. Aquatic fertilisation events increases variation

B. Angiosperms utilize flowers and fruits for reproduction ✓

C. Needle-like leaves helps enhance species diversity

D. Gymnosperms rely on efficient water transport

Q7 Plant kingdom divisions

A student observes green mats growing on rocks in a damp forest. They have rhizoid-like structures but lack true roots. Which class do these plants most likely represent?

A. Pteridophyta

B. Thallophyta

C. Bryophyta ✓

D. Gymnosperm

Q8 Plant kingdom divisions

Two vascular plants: one produces seeds in cones, the other has seeds in fruits. Which statement accurately distinguishes these groups?

A. First is pteridophyte, second is bryophyte

B. First is bryophyte, second is gymnosperm

C. First is angiosperm, second is pteridophyte

D. First is gymnosperm, second is angiosperm ✓



Q9 Plant kingdom divisions

Two specimens: one has undifferentiated body living in water, the other has true roots, stems, and leaves. Which of the following correctly matches them with their classes?

A. Pteridophyta and Gymnosperm

B. Thallophyta and Pteridophyta

C. Bryophyta and Thallophyta

D. Bryophyta and Angiosperm

Q10 Plant kingdom divisions

A researcher attempts to cultivate plants with true roots, stems, and leaves but finds that reproduction only occurs when water is present. Which feature limits these plants' distribution?

A. Absence of true roots

B. Water-dependent reproduction

C. Lack of vascular tissue

D. Seeds encased in fruits

Q11 Plant kingdom divisions

In an experiment, a group of plants fail to reproduce when water is withheld, even though they have vascular tissues. Which plant group do they most closely resemble?

A. Gymnosperm

B. Pteridophyta

C. Bryophyta

D. Angiosperm

Q12 Plant kingdom divisions

A researcher finds a plant group that does not need water for fertilisation and has seeds which are not enclosed in fruits. Which plant group is being described?

A. Gymnosperms

B. Pteridophytes

C. Bryophytes

D. Angiosperms

Q13 Porifera and Coelenterata

Two aquatic animals: one has pores for water flow, the other uses tentacles to capture prey. Which key structural difference explains their feeding strategies?

A. Segmentation in both animals

B. Presence of a hard skeleton in the tentacled animal

C. Presence of tissues in the tentacled animal

D. Bilateral symmetry in the pore-bearing animal

Q14 Pteridophyta characteristics

A plant sample, when tested, has vascular tissues (xylem and phloem) but no seeds. Which group does it belong to?

A. Thallophyta

B. Gymnosperm

C. Bryophyta

D. Pteridophyta

Q15 Thallophyta characteristics

A green, thread-like plant in freshwater pond lacks roots, stems, and leaves but photosynthesizes. Based on this information, which group does it belong to?

A. Thallophyta

B. Bryophyta

C. Pteridophyta

D. Gymnosperm

Q16 Vertebrates and chordates

A wildlife veterinarian observes that a certain animal can maintain a large body size and perform complex behaviors. Which structural attribute is most vital for these traits?

A. External tentacles for movement

B. Vertebral column for support

C. Protective rigid outer covering

D. Simple single-celled structure

Q17 Vertebrates and chordates

During rehabilitation, a patient with vertebral damage has impaired organ coordination. Which vertebrate feature underlies this complication?

A. Protective single-layered skin

B. Simple external limb appendages

C. Basic independent cell clusters

D. Complex organ system integration



Q1 Autotrophic nutrition

Since plants prepare their own food using sunlight, they do not require a digestive organ like a stomach. Instead, they possess tissues specialized for ____.

A. Photosynthesis



B. Digestion

C. Thinking

D. Running

Q2 Autotrophic nutrition

How do autotrophs fulfill their carbon and energy requirements?

A. By respiration

B. By fermentation

C. By digestion

D. By photosynthesis

**Q3 Digestive enzymes**

What is the main function of saliva in the mouth during digestion?

A. It transports food to the stomach

B. It absorbs nutrients

C. It breaks down starch into simple sugar



D. It kills all bacteria

Q4 Human digestive system

Which enzyme released by the gastric glands helps digest proteins in the stomach?

A. Lipase

B. Amylase

C. Pepsin



D. Maltase

Q5 Human digestive system

Which organ helps crush food into smaller pieces during eating?

A. Stomach

B. Tongue

C. Teeth



D. Salivary glands

Q6 Human digestive system

Why does the sight of or thought of delicious food make our mouths "water"?

A. Stomach acid increases rapidly

B. Taste buds start moving quickly

C. Salivary glands secrete saliva



D. Digestive enzymes are released

Q7 Human digestive system

Why is the small intestine able to fit into a compact space within the human body?

A. Large diameter

B. Rigid lining

C. Extensive coiling



D. Thick walls

Q8 Human digestive system

What protects the stomach lining from damage by its own acid under normal conditions?

A. Pepsin release

B. Mucus secretion



C. Acid increase

D. Saliva entry

Q9 Human digestive system

Carbohydrate digestion in humans begins in the mouth and is completed in which part of the digestive tract?

A. Small intestine



B. Stomach

C. Oesophagus

D. Large intestine

Q10 Nutrition in Amoeba

Which structure in Amoeba is primarily responsible for engulfing food particles?

A. Temporary pseudopodia



B. Cytoplasm within the cell membrane

C. Cilia covering cell surface

D. Cell wall surrounding the organism



Q11 Nutrition in Amoeba

In which of the following organisms are pseudopodia used for capturing the food?

A. Amoeba



B. Hydra

C. Paramecium

D. Euglena

Q12 Nutrition in Amoeba and Paramecium

Choose an INCORRECT statement in regard to food uptake by single celled organisms.

A. Amoeba takes in food by forming pseudopodia

B. Paramecium uses cilia to move and capture food

C. Amoeba has autotrophic mode of nutrition



D. Food is taken in through the process of endocytosis

Q13 Nutrition in Amoeba and Paramecium

How does Paramecium ingest food?

A. By moving cilia toward a specific spot



B. By changing its entire body shape

C. By extending temporary pseudopodia

D. By direct absorption across the surface

Q14 Nutrition in Paramecium

How does Paramecium ensure that food particles are directed to its intake spot?

A. Forms pseudopodia to engulf food

B. Releases enzymes to move food particles

C. Uses movement of cilia covering the cell surface



D. Utilises contractile vacuoles for food transport

Q15 Nutrition in unicellular organisms

Which of the following CORRECTLY pairs the organism with the body part it uses for food intake?

A. Paramecium - cilia



B. Euglena - tentacles

C. Hydra - pseudopodia

D. Amoeba - flagella

Q16 Nutrition in unicellular organisms

Which of the following statements about nutrition in single-celled organisms is INCORRECT?

A. Paramecium takes in food with the help of cilia at a fixed spot

B. Food is digested inside food vacuoles in Amoeba

C. Amoeba uses pseudopodia to engulf food

D. Paramecium engulfs food from all parts of its surface



Q17 Peristalsis

If peristaltic movements in the oesophagus were disrupted, what would most likely happen to the food after it is chewed and swallowed?

A. Food would not move efficiently to the stomach



B. Starch would be broken down more quickly

C. Food would be digested faster

D. Saliva would increase

Q18 Photosynthesis and stomata

What is the primary function of stomata in plant leaves during photosynthesis?

A. Allow gaseous exchange



B. Prevent entry of CO₂

C. Maintain constant leaf temperature

D. Absorption of Oxygen

Q19 Photosynthesis process

What does the splitting of water molecules during photosynthesis produce?

A. Nitrogen and carbon

B. Nitrogen and oxygen

C. Hydrogen and oxygen



D. Oxygen and carbon

Q20 Photosynthesis process

Marine organisms like phytoplankton use dissolved CO₂ in ocean water for the process of _____.

A. Combustion

B. Respiration

C. Photosynthesis



D. Decomposition



Q21 Photosynthesis process

In plants, carbohydrates produced during photosynthesis are stored in which form?

- A. Cellulose
- B. Protein
- C. Starch
- D. Glycogen

**Q22 Photosynthesis process**

A desert plant absorbs carbon dioxide at night and uses it during the day for photosynthesis. Which property of photosynthesis does this illustrate?

- A. Water is unnecessary for photosynthesis in desert plants
- B. Carbon dioxide is not required for photosynthesis in desert plants
- C. Photosynthesis can involve intermediate compounds stored for later use
- D. Photosynthesis occurs only at night in desert plants

**Q23 Photosynthesis process**

Which pigment is responsible for absorbing light during photosynthesis?

- A. Keratin
- B. Carotene
- C. Chlorophyll
- D. Anthocyanin

**Q24 Photosynthesis process**

Which of the following processes in plants are responsible for fulfilling the energy and carbon requirements?

- A. Respiration
- B. Transpiration
- C. Translocation
- D. Photosynthesis

**Q25 Photosynthesis process**

In a desert plant, carbon dioxide is taken in at night and stored as an intermediate, which is later used during the day for carbohydrate synthesis. What advantage does this adaptation provide to the plant in its environment?

- A. It allows carbohydrate synthesis only at night
- B. It increases the rate of photosynthesis during the day
- C. It eliminates the need for chlorophyll
- D. It reduces water loss by stomatal opening to cooler night hours



Q1 ATP and energy release

Which molecule is immediately synthesized using energy released during cellular respiration in animal cells?

- A. Adenosine Diphosphate (ADP)
- B. Nicotinamide adenine Dinucleotide (NAD)
- C. Adenosine triphosphate (ATP) ✓
- D. Guanosine Diphosphate (GDP)

Q2 Aerobic and anaerobic respiration

Select the correct option regarding the following two statements labelled Assertion (A) and Reason (R).

Assertion (A): Carbon dioxide is a reactant in aerobic respiration.

Reason (R): Carbon dioxide is released during the oxidation of glucose.

- A. Both A and R are true, and R is the correct explanation of A
- B. Both A and R are true but R is not the correct explanation of A
- C. A is false, but R is true ✓
- D. A is true, but R is false

Q3 Aerobic and anaerobic respiration

The amount of energy released during aerobic respiration in animals is ____ that released during anaerobic respiration.

- A. Equal to
- B. Slower than
- C. Greater than ✓
- D. Lesser than

Q4 Aerobic respiration

Which gas is essential for aerobic respiration in animals?

- A. Carbon dioxide
- B. Oxygen ✓
- C. Nitrogen
- D. Hydrogen

Q5 Aerobic respiration

What is the process in which organisms take in oxygen and use it to break down food for cellular activities called?

- A. Photosynthesis
- B. Respiration ✓
- C. Transpiration
- D. Fermentation

Q6 Aerobic vs anaerobic respiration

Which process in animals takes place in the absence of oxygen and releases a smaller amount of energy?

- A. Anaerobic respiration ✓
- B. Aerobic respiration
- C. Transpiration
- D. Photosynthesis

Q7 Aerobic vs anaerobic respiration

During aerobic respiration in animals, the breakdown of a three-carbon pyruvate molecule produces carbon dioxide and ____.

- A. Glucose
- B. Ethanol
- C. Lactic acid
- D. Water ✓

Q8 Anaerobic respiration

In animals, anaerobic respiration primarily results in the formation of ____.

- A. Water
- B. Glucose
- C. Carbon dioxide
- D. Lactic acid ✓



Q9 Anaerobic respiration

Which of the following facts about cellular respiration is **INCORRECT**?

- A. The first step of glucose breakdown takes place in the cytoplasm.
- B. Anaerobic respiration in yeast produces water as a major end product. ✓
- C. Anaerobic respiration occurs in the absence of oxygen.
- D. Anaerobic respiration in yeast produces ethanol and carbon dioxide.

Q10 Anaerobic respiration

Which product is formed during anaerobic respiration in human muscles?

A. Lactic acid ✓

B. Carbon dioxide

C. Ethanol

D. Water

Q11 Anaerobic respiration

What are the end products formed during anaerobic respiration in yeast cells?

A. Glucose and oxygen

B. Water and oxygen

C. Lactic acid and water

D. Ethanol and carbon dioxide ✓

Q12 Anaerobic respiration and lactic acid

A patient with severe lung disease has reduced oxygen intake. Which cellular pathway is likely to be upregulated in their muscle cells during exertion, and what product accumulates as a result?

A. Aerobic breakdown of pyruvate to carbon dioxide and water

B. Anaerobic conversion of pyruvate to lactic acid, leading to lactic acid accumulation ✓

C. Direct conversion of glucose to ATP without any by-products

D. Anaerobic conversion of pyruvate to ethanol and carbon dioxide

Q13 Anaerobic respiration and lactic acid

Which product is commonly formed during anaerobic respiration in animals?

A. Lactic acid ✓

B. Oxygen

C. Alcohol

D. Glucose

Q14 Breathing mechanism

Which of the following does **NOT** occur during inhalation in human beings?

A. Air enters the lungs

B. The diaphragm flattens downward

C. Blood releases oxygen ✓

D. The chest cavity expands

Q15 Criteria for being alive

A botanist observes a dormant seed with no visible growth or movement. How can the botanist determine whether the seed is alive?

A. Wait only for visible growth before deciding

B. Test whether the seed can move independently

C. Conclude it is not alive if it shows no movement

D. Monitor its internal metabolic activity ✓

Q16 Criteria for being alive

Which of the following statements best describes why visible movement alone cannot define whether a plant is alive?

A. Only animals can be alive without visible movement.

B. Visible movement is always present in living organisms.

C. Plants may be alive even without visible growth or movement. ✓

D. All living things must show visible movement to be alive.

Q17 Effects of smoking

Tobacco consumption mainly affects which organ system first?

A. Respiratory system including lungs and airways ✓

B. Excretory system including kidneys and bladder

C. Digestive system including stomach and intestines

D. Skeletal system including bones and joints



Q18 Effects of smoking

Which of the following statements, correctly explains how smoking affects the respiratory system in humans?

- A. Tar in tobacco strengthens the walls of alveoli
- B. Nicotine increases oxygen-carrying capacity of blood to various tissues
- C. Smoking increases the surface area of alveoli for better gas exchange in the tissues
- D. Carbon monoxide in smoke combines with haemoglobin, reducing oxygen transport to tissues ✓

Q19 Effects of smoking

A long-term smoker develops a chronic cough and frequent respiratory infections. Which physiological change in the respiratory tract primarily contributes to this increased susceptibility?

- A. Narrowing of bronchi
- B. Thickening of bronchial walls
- C. Destruction of cilia in the upper respiratory tract ✓
- D. Increased mucus production

Q20 Effects of smoking on lungs

A patient develops frequent coughing and respiratory infections after starting to smoke. Which physiological change best explains this?

- A. Bronchial constriction throughout the lungs
- B. Loss of cilia function in the upper respiratory tract ✓
- C. Excess saliva secretion in the oral cavity
- D. Rapid increase in blood pressure and heart rate

Q21 Gaseous exchange and respiratory organs

A field ecologist studies fish in a high-altitude lake with low oxygen. Which structural adaptation in the gills would most likely be observed?

- A. Greater surface area for gas exchange ✓
- B. Reduced blood flow in gills
- C. Fewer capillaries in gill tissue
- D. Thicker gill membranes

Q22 Gaseous exchange in lungs

What happens when blood passes through the alveolar capillaries in the lungs?

- A. Both gases remain unchanged in the circulating blood
- B. Oxygen and carbon dioxide both enter the bloodstream from alveoli
- C. Oxygen enters blood and carbon dioxide moves into alveoli ✓
- D. Carbon dioxide enters blood and oxygen moves into alveoli

Q23 Glycolysis and pyruvate

Which of the following formations is the three carbon molecule formed during the breakdown of glucose?

- A. Formation of fructose-6-phosphate
- B. Formation of glucose-6-phosphate
- C. Formation of pyruvate molecule ✓
- D. Formation of acetyl-co-A molecule

Q24 Human respiratory system

What are the tiny balloon-like structures located at the end of the smallest tubes in the human lungs called?

- A. Bronchi
- B. Alveoli ✓
- C. Villi
- D. Bronchioles

Q25 Human respiratory system

Which of the following structures in throat is responsible for the prevention of collapse of air-passage in human beings?

- A. Pharynx
- B. Larynx
- C. Oesophagus
- D. Rings of cartilage ✓

Q26 Life processes overview

A mutation disrupts the transportation system in a plant, causing accumulation of oxygen and waste products in leaf cells. Which two life processes are most directly hindered as a result?

- A. Growth and excretion
- B. Respiration and excretion ✓
- C. Nutrition and growth
- D. Nutrition and respiration



Q27 Need for life processes

Why do multicellular organisms need specialized systems for the intake of energy and exchange of materials, unlike unicellular organisms?

- A. They are much heavier than single-celled organisms
- B. They are completely unable to move from one place to another
- C. Single-celled organisms do not require cellular energy to survive
- D. Most internal cells lack direct contact with the external environment ✓

Q28 Need for life processes

Which of the following correctly explains why life processes such as nutrition, respiration, transport and excretion are essential for living organisms?

- A. They are independent processes that do not affect each other.
- B. They maintain homeostasis and provide energy. ✓
- C. They are required only for growth and reproduction.
- D. They occur only in plants to sustain photosynthesis.

Q29 Need for specialised systems

Why do single-celled organisms not require specialized organs for taking in food and exchanging gases?

- A. Because they have a transportation system
- B. Because they have complex body designs
- C. Because their entire surface is in contact with the environment ✓
- D. Because they do not need food or oxygen

Q30 Respiration in plants

The process in plants that involves the breakdown of glucose to release energy is called:

- A. Respiration ✓
- B. Transpiration
- C. Excretion
- D. Photosynthesis

Q31 Human respiratory system

Match **Column A** with **Column B**.

	Column A		Column B
(a)	Alveoli	(i)	Prevents food entry into the trachea
(b)	Haemoglobin	(ii)	Gas exchange
(c)	Diaphragm	(iii)	Oxygen transport
(d)	Epiglottis	(iv)	Helps in inhalation

- A. a-iv, b-iii, c-ii, d-i
- B. a-ii, b-iii, c-iv, d-i ✓
- C. a-iii, b-ii, c-iv, d-i
- D. a-ii, b-iv, c-iii, d-i



Q1 Arteries veins and capillaries

A doctor observes a blood vessel with thick, elastic walls under a microscope. What is this vessel most likely to be?

A. An artery



B. A vein

C. A capillary

D. A lymph vessel

Q2 Arteries veins and capillaries

A researcher needs to deliver a drug directly to the cells of an organ for rapid effect. Which blood vessel should the delivery target for optimal diffusion to surrounding cells?

A. Veins because they collect blood

B. Veins due to presence of valves

C. Capillaries because of their one-cell thick walls



D. Arteries due to thick elastic walls

Q3 Arteries veins and capillaries

Which type of blood vessel is best suited for rapid exchange of gases and nutrients with body tissues?

A. Capillaries



B. Veins

C. Lymph vessels

D. Arteries

Q4 Arteries veins and capillaries

What prevents blood from flowing backward inside the low-pressure veins of the human circulatory system?

A. Thick elastic walls

B. Microscopic capillaries

C. One-way valves



D. High pumping force

Q5 Arteries veins and capillaries

Select the correct option regarding the following two statements labelled Assertion (A) and Reason (R).

Assertion (A): The walls of veins are thinner than those of arteries.

Reason (R): Veins carry blood under high pressure.

A. A is false, but R is true

B. Both A and R are true, but R is not the correct explanation of A

C. A is true, but R is false



D. Both A and R are true, and R is the correct explanation of A

Q6 Blood and haemoglobin

A patient has reduced oxygen saturation despite normal lung volume. Which condition best explains this?

A. Increased breathing rate

B. Decreased number of alveoli

C. Increased capillary density

D. Reduced haemoglobin concentration

**Q7 Blood and haemoglobin**

In human beings, the respiratory pigment that carries oxygen is _____.

A. myosin

B. haemoglobin



C. chlorophyll

D. insulin

Q8 Blood components and functions

Complete the analogy.

Platelets : Clotting :: White Blood Cells : _____.

A. Oxygen Transport

B. Fighting Inflammation



C. Connecting Joints

D. Storing Minerals



Q9 Blood components and lymph

After a severe injury, a patient's blood pressure decreases and they start to develop extensive bruising. Which dual failure in physiological systems best explains these clinical observations?

- A. Enhanced lymph flow and increased platelet aggregation
- B. Reduced plasma protein synthesis and increased red blood cell count
- C. Reduced platelet function and impaired lymphatic drainage ✓
- D. Decreased oxygen transport and increased tissue fluid

Q10 Blood components and lymph

Which statement CORRECTLY compares the protein content of lymph and blood plasma?

- A. Lymph contains less protein than plasma ✓
- B. Lymph contains equal protein to plasma
- C. Lymph contains no protein
- D. Lymph contains more protein than plasma

Q11 Blood pressure

Which statement CORRECTLY describes systolic and diastolic pressure in the human circulatory system?

- A. Systole is contraction, diastole is relaxation ✓
- B. Systole is relaxation, diastole is contraction
- C. Systole and diastole are both relaxations
- D. Systole and diastole are both contractions

Q12 Blood pressure

Select the correct option regarding the following two statements labelled Assertion (A) and Reason (R).

Assertion (A): Blood pressure increases temporarily during exercise.

Reason (R): Exercise increases heart rate and the volume of blood pumped by the heart per minute.

- A. A is false, but R is true
- B. Both A and R are true, but R is not the correct explanation of A
- C. A is true, but R is false
- D. Both A and R are true, and R is the correct explanation of A ✓

Q13 Blood pressure

Which of the following best describes systolic pressure?

- A. Blood pressure in artery during ventricular contraction ✓
- B. Blood pressure in veins during contraction
- C. Blood pressure in artery during ventricular relaxation
- D. Blood pressure in veins during relaxation

Q14 Blood transport of gases

Which gas is most abundant in the blood pumped by the heart to the body?

- A. Helium
- B. Hydrogen
- C. Oxygen ✓
- D. Carbon dioxide

Q15 Excretion and urine formation

What is the main purpose of making urine in animals?

- A. Digest and absorb food
- B. Produce hormones
- C. Store energy for future use
- D. Remove harmful metabolic wastes ✓

Q16 Excretion and urine formation

Which organ directly filters nitrogenous waste from human blood?

- A. Heart
- B. Lungs
- C. Liver
- D. Kidneys ✓

Q17 Excretion and urine formation

Which of these structures carries urine from the kidneys to the bladder?

- A. Urethra
- B. Intestines
- C. Ureters ✓
- D. Trachea



Q18 Excretion and urine formation

Match the excretory product in **Column A** with the organ that removes it in **Column B**.

Column A (Excretory Product)	Column B (Organ)
(a) Urea	(i) Liver
(b) Carbon dioxide	(ii) Lungs
(c) Excess salts	(iii) Skin
(d) Bile salts	(iv) Kidney

A. a-iv, b-ii, c-iii, d-i



B. a-iii, b-iv, c-ii, d-i

C. a-ii, b-i, c-iv, d-iii

D. a-iv, b-iii, c-i, d-ii

Q19 Excretion and urine formation

What determines how much water is re-absorbed during urine formation?

A. Oxygen

B. Glucose

C. Excess water



D. Protein

Q20 Haemoglobin and oxygen transport

Which respiratory pigment in human beings has the highest affinity for oxygen?

A. Chlorophyll

B. Keratin

C. Hemocyanin

D. Haemoglobin

**Q21 Haemoglobin and oxygen transport**

Oxygen is transported in human blood mainly by binding with the pigment _____.

A. Chlorophyll

B. Haemoglobin



C. Myoglobin

D. Plasma

Q22 Haemoglobin and oxygen transport

The absence of a nucleus in mature RBCs provides more room for _____, which carries oxygen to the body.

A. Lysosomes

B. Chlorophyll

C. DNA

D. Hemoglobin

**Q23 Heart chambers and circulation**

A researcher observes an animal with three-chambered heart and some mixing of oxygenated and deoxygenated blood. What energy adaptation does this animal likely exhibit according to the context?

A. It has a highly efficient oxygen supply

B. It maintains body temperature using constant energy

C. It possesses double circulation with no mixing

D. It does not maintain its body temperature using constant energy

**Q24 Heart structure and double circulation**

In mammals, what is the primary advantage of having a four-chambered heart in relation to the transportation of blood in the lungs?

A. Allows blood to flow only once through the heart

B. Prevents mixing of oxygenated and deoxygenated blood



C. It ensures only oxygenated blood enters the lung tissue

D. Reduces blood pressure in the lungs

Q25 Heart structure and double circulation

In double circulation, which vessel delivers oxygenated blood to the heart?

A. Pulmonary vein



B. Pulmonary artery

C. Aorta

D. Vena cava

Q26 Human excretory system

What are the names of the closely spaced filtration units in each kidney?

A. Tubules

B. Neurons

C. Glomerulus

D. Nephrons



Q27 Human excretory system

Which structure connects the kidneys to the urinary bladder?

- A. Bladder
- B. Ureter
- C. Urethra
- D. Pelvis

**Q28 Human heart structure**

Why do the ventricles of the heart have thicker muscular walls compared to the atria?

- A. They store more blood before each contraction
- B. They require more nerves for neural control
- C. They separate oxygenated and de-oxygenated blood
- D. They pump blood to organs throughout the body

**Q29 Human heart structure**

Which structure prevents the backward flow of blood during contractions of the heart?

- A. Septa
- B. Valves
- C. Arteries
- D. Muscles

**Q30 Human heart structure**

Which chamber of the human heart pumps blood directly to the lungs for oxygenation?

- A. Left atrium
- B. Right ventricle
- C. Left ventricle
- D. Right atrium

**Q34 Arteries veins and capillaries**

Match 'Column A' with 'Column B' in context of the muscular layers in blood vessels.

	Column A		Column B
(a)	Thick tunica media	(i)	Vein
(b)	Smallest vessel diameter	(ii)	Artery
(c)	Large lumen	(iii)	Capillary
(d)	Endothelium	(iv)	All blood vessels

- A. a-ii, b-iii, c-i, d-iv
- B. a-ii, b-iv, c-i, d-iii
- C. a-iii, b-ii, c-i, d-iv
- D. a-i, b-ii, c-iv, d-iii

**Q31 Human heart structure**

What is the main purpose of having different chambers in the human heart?

- A. To pump blood exclusively toward the lungs for gaseous exchange
- B. To maintain the steady blood pressure throughout the systemic veins
- C. To provide storage for excess blood during periods of rest
- D. To prevent mixing of oxygen-rich and carbon dioxide-rich blood

**Q32 Lymph**

In a scenario where excess extracellular fluid is not drained back into the blood, which system's malfunction is most likely responsible?

- A. Digestive system
- B. Circulatory system
- C. Lymphatic system
- D. Nervous system

**Q33 Lymph and its function**

A patient has difficulty transporting absorbed fats from the intestine. Which fluid's impaired function could cause this problem?

- A. Platelets
- B. Lymph
- C. Blood cells
- D. Plasma



Q1 Brain and its functions

Which organ sends messages to muscles to carry out voluntary actions like writing or moving a chair?

- A. Lungs
- B. Brain
- C. Heart
- D. Stomach



Q2 Brain and its parts

Which part of the human brain is mainly involved in maintaining body balance?

- A. Pons
- B. Cerebrum
- C. Medulla
- D. Cerebellum



Q3 Brain and its parts

What is a unique function of the forebrain compared to other brain regions?

- A. It regulates heartbeat
- B. It releases hormones
- C. It controls balance
- D. It receives sensory impulses



Q4 Brain and its parts

Which part of the human brain is responsible for most thinking activities?

- A. Fore-brain
- B. Cerebellum
- C. Mid-brain
- D. Hind-brain



Q5 Coordination in plants and animals

Which statement correctly compares information conduction in plants and animals?

- A. Both use same tissue
- B. Plants use nerves
- C. Animals lack conduction
- D. Plants lack specialized tissue



Q6 Coordination in plants and animals

What does the fact that movement in a plant occurs away from the point of touch suggest about plant coordination?

- A. Signal transmission
- B. Photosynthesis
- C. Growth stimulation
- D. Water absorption



Q7 Hormones and endocrine glands

Which hormone controls the blood sugar level in the body?

- A. Adrenaline
- B. Thyroid hormone
- C. Growth hormone
- D. Insulin



Q8 Hormones and endocrine glands

_____ is necessary for the thyroid gland to make thyroxine hormone.

- A. Calcium
- B. Iodine
- C. Vitamin D
- D. Iron



Q9 Hormones and endocrine glands

Which of the following is secreted directly into the blood and carried to different parts of the body?

- A. Adrenaline
- B. Saliva
- C. Pancreatic juice
- D. Bile juice



Q10 Nastic movement in Mimosa

Which mechanism allows the sensitive plant to move its leaves immediately after being touched?

- A. Use of animal-like proteins
- B. Electrical impulses in muscle tissue
- C. Specialized nervous tissue
- D. Changing the amount of water in certain cells



Q11 Nastic movement in plants

Which tissue is absent in the touch response of a sensitive plant?

- A. Epithelial tissue
- B. Ground tissue
- C. Vascular tissue
- D. Nervous tissue

**Q12 Nastic movement in plants**

What happens when the leaves of the touch-me-not (Mimosa) plant are touched?

- A. They change color
- B. They fold up and droop
- C. They grow larger
- D. They produce flowers

**Q13 Nerve impulse**

The specialised signal that travels along a nerve fibre to communicate with other cells is specifically known as a(n) _____.

- A. Hormone
- B. Nerve impulse
- C. Axon
- D. Stimulus

**Q14 Nervous system organisation**

Which of the following structures connect the brain to the muscles?

- A. Bones
- B. Blood
- C. Glands
- D. Nerves

**Q15 Nervous system structure**

Which type of nerves arise from the brain in humans?

- A. Cranial nerves
- B. Autonomic nerves
- C. Spinal nerves
- D. Motor nerves

**Q16 Neuron structure**

In a neuron, what are the short, branched fibres that receive impulses from other neurons called?

- A. Cartilage discs
- B. Muscle fibres
- C. Axons
- D. Dendrites

**Q17 Neuron structure**

Which part of a neuron carries nerve impulses away from the cell body?

- A. Cilia
- B. Root hair
- C. Flagellum
- D. Axon

**Q18 Neuron structure**

After the dendrite receives information, what is the next structure the impulse moves to?

- A. Axon end
- B. Cell body
- C. Dendrite
- D. Axon

**Q19 Neuron structure**

Which is the first part of a neuron to receive information?

- A. Axon terminal
- B. Axon
- C. Cell body
- D. Dendrite

**Q20 Neuron structure**

Why is the structure of neurons important for their role in the nervous system?

- A. Allows signal transmission
- B. Repairs tissues
- C. To store nutrients
- D. To produce enzymes



Q21 Neuron structure

Which part of a neuron receives information from the environment?

- A. Nucleus
- B. Dendrite ✓
- C. Axon
- D. Synapse

Q22 Reflex action and reflex arc

Why is consciously thinking before withdrawing the hand from a hot object considered inefficient?

- A. The brain cannot receive incoming sensory signals sent directly from the skin.
- B. Muscles cannot respond to signals sent by the brain during dangerous events.
- C. Nerve impulses travel only from the body muscles directly back to the brain.
- D. Thinking involves time taking complex interactions of many nerve impulses. ✓

Q23 Reflex action and reflex arc

Where are reflex arcs primarily formed in the human body?

- A. Heart
- B. Lungs
- C. Brain
- D. Spinal cord ✓

Q24 Synapse function

What is the main function of the synapse between two neurons?

- A. Signal storage
- B. Energy supply
- C. Impulse transfer ✓
- D. Communication

Q25 Tropic movements in plants

Which type of plant movement is caused by growth in response to a stimulus?

- A. Rapid contraction
- B. Directional growth ✓
- C. Random growth
- D. Circular growth

Q26 Tropic movements in plants

What movement in plants causes a tendril to circle and cling to an object?

- A. Turgor movement
- B. Locomotory movement
- C. Nastic movement
- D. Tropic movement ✓

Q27 Tropic movements in plants

Which environmental factor causes a plant shoot to bend toward a window?

- A. Gravity
- B. Temperature
- C. Water
- D. Light ✓

Q28 Tropic movements in plants

In geotropism, what does gravity act as?

- A. Internal factor
- B. Biotic factor
- C. Reversible signal
- D. Directional stimulus ✓

Q29 Tropic movements in plants

In what way does geotropism support effective rooting in plants?

- A. It directs photosynthetic tissues into the soil.
- B. It directs roots to grow downward, anchoring the plant and helping them access moisture and nutrients. ✓
- C. It prevents roots from branching.
- D. It makes roots grow toward sunlight.

Q30 Tropic movements in plants

Which of the following environmental stimulus causes roots to grow away from itself?

- A. Light ✓
- B. Water
- C. Gravity
- D. Air



Q31 Tropic movements in plants

What is the term for the growth of plant roots downward in response to gravity?

- A. Phototropism
- B. Geotropism ☒
- C. Chemotropism
- D. Hydrotropism

Q32 Turgor and plant movement

What causes plant cells to change shape during movement?

- A. Water content ☒
- B. Temperature
- C. Special proteins
- D. Light energy

Q33 Turgor and plant movement

Which factor does **NOT** contribute to immediate plant movement after a stimulus?

- A. Water flow
- B. Signal transfer
- C. Shape change
- D. Muscle contraction ☒

Q34 Voluntary and involuntary actions

Salivation when seeing food is an example of which type of action?

- A. Involuntary ☒
- B. Self-propagated
- C. Voluntary
- D. Planned



Q1 Asexual reproduction

Amoeba, yeast, and hydra can reproduce even when only one parent organism is present. Which conclusion does this suggest about asexual reproduction?

- A. It requires seeds for reproduction.
- B. Two parents are always necessary.
- C. It produces only multicellular organisms.
- D. It occurs without fusion of gametes. ✓

Q2 Contraception methods

A couple is considering permanent surgical contraception to avoid future pregnancies. Which of these is a limitation of this approach in the context of sexually transmitted diseases?

- A. Does not prevent infections ✓
- B. Increases hormonal side effects
- C. Causes uterine irritation
- D. Is reversible by oral pills

Q3 External fertilisation

A pond contains a large cluster of jelly-like eggs laid by a female frog. What is the most likely mode of fertilisation in frogs?

- A. In-vitro fertilisation by scientists
- B. Asexual budding of the jelly-like eggs
- C. Internal fertilisation inside pond plants
- D. External fertilisation in water ✓

Q4 Female reproductive system

Match the following.

Column I	Column II
1. Ovary	a. Site of foetal development
2. Fallopian tube	b. Release of eggs and hormones
3. Uterus	c. Site where fertilisation occurs

- A. 1-a, 2-c, 3-b
- B. 1-c, 2-b, 3-a
- C. 1-b, 2-c, 3-a ✓
- D. 1-b, 2-a, 3-c

Q5 Female reproductive system

All of the following are parts of the human female reproductive system, **EXCEPT** _____.

- A. Vagina
- B. Oviducts
- C. Uterus
- D. Vas deferens ✓

Q6 Human embryonic development

A pregnant woman in her ninth week visits a clinic for a check-up. The doctor explains that the developing baby is now called a foetus and will continue organ development. Which trimester is she currently in?

- A. Second trimester
- B. Third trimester
- C. First trimester ✓
- D. Later stage

Q7 Human gametes

In humans, which reproductive cell possesses a tail that helps it swim toward the egg?

- A. Embryo
- B. Sperm ✓
- C. Zygote
- D. Egg

Q8 Human gametes

The _____ of a sperm cell contains the genetic material required for fertilisation.

- A. Head ✓
- B. Tail
- C. Fluid
- D. Membrane



Q9 Human reproductive system

All of the following structures belong to the male reproductive system, **EXCEPT** _____.

- A. Vas deferens
- B. Fallopian tube ✓
- C. Penis
- D. Scrotum

Q10 Human reproductive system

Complete the analogy.

Sperm Production : Testes :: Egg Production : _____.

- A. Uterus
- B. Fallopian tubes
- C. Ovaries ✓
- D. Vagina

Q11 Menstrual cycle

A woman experiences heavy and prolonged menstrual bleeding. Her doctor suspects a problem related to the endometrium. Which physiological process is most directly affected to cause this symptom?

- A. Decreased ovarian hormone production
- B. Excessive shedding of endometrial tissue ✓
- C. Reduced blood vessel formation
- D. Delayed release of the ovum

Q12 Menstrual cycle

Which organ produces hormones that regulate the menstrual cycle?

- A. Ovaries ✓
- B. Pancreas
- C. Thyroid
- D. Testes

Q13 Menstrual cycle and ovulation

In humans, a mature egg is typically released from one of the ovaries every month in a process called _____.

- A. Spermatogenesis
- B. Puberty
- C. Menopause
- D. Ovulation ✓

Q14 Menstrual cycle and ovulation

While males produce millions of sperm, females usually produce only _____ mature egg(s) every month in humans.

- A. Zero
- B. Thousands
- C. One ✓
- D. A few hundred

Q15 Menstrual cycle and ovulation

A 13-year-old girl starts menstruating but has irregular cycles for the first year. Which underlying factor most likely contributes to this pattern according to reproductive maturity?

- A. Constant egg release
- B. Immature hormonal regulation ✓
- C. Fully matured ovaries
- D. Fully developed uterus

Q16 Pollination and fertilisation

Complete the analogy.

Pollination : Transfer of Pollen :: Fertilisation : _____.

- A. Growth of stem
- B. Ripening of fruit
- C. Absorption of water
- D. Fusion of gametes ✓

Q17 Pollination and fertilisation

Which of the following is **NOT** a characteristic feature of insect-pollinated flowers?

- A. Brightly coloured petals that attract insects
- B. Production of light, small pollen grains in very large numbers ✓
- C. Production of nectar and fragrance to attract pollinators
- D. Sticky stigma adapted to receive pollen from insects



Q18 Reproductive health and IVF

A couple is unable to conceive naturally due to blocked oviducts in the female. Which medical technique can help them achieve pregnancy?

- A. Hormone therapy
- B. Ultrasound imaging
- C. In-vitro Fertilisation**
- D. Artificial insemination

Q19 Reproductive health and IVF

A woman undergoes IVF, and the fertilised egg is implanted in her uterus. Which of these marks the clinical beginning of her pregnancy in this scenario?

- A. Manual fertilisation in the lab
- B. Implantation of the fertilised egg**
- C. Natural ovulation of the egg
- D. Initial division of the zygote

Q20 Tissue culture and totipotency

The capability of a single mature plant cell to develop into a complete plant, as proposed by Haberlandt, is called _____.

- A. Permeability
- B. Totipotency**
- C. Turgidity
- D. Contact inhibition

Q21 Tissue culture and totipotency

Cell culture refers to the process of growing cells _____.

- A. outside the body**
- B. without nutrients
- C. only in soil
- D. inside the body

Q22 Vegetative propagation

Which of the following statements about vegetative propagation is **INCORRECT**?

- A. Only one parent is involved in the process.
- B. New plants arise from stems, roots, or leaves.
- C. New plants develop from seed-bearing structures.**
- D. The offspring are genetically identical to the parent.

Q23 Vegetative propagation

Farmers use cutting, grafting, and tissue culture to grow many plants with the same useful traits. These methods are preferred as:

- A. They depend on pollinating insects.
- B. They produce genetically identical plants.**
- C. They always create new varieties.
- D. They stop flowering in plants.



Q1 Adaptation and natural selection

An ornithologist observes that birds in mountainous regions have more robust chest muscles and larger wings compared to those in forests. Which structural adaptation is being demonstrated?

- A. Improving camouflage
- B. Enhancing nest building
- C. Facilitating sustained flight in thin air ✓
- D. Increasing egg production

Q2 Adaptation and natural selection

A zoologist compares the claws of arboreal and terrestrial mammals. Which of these defines the structural difference primarily indicating their adaptation?

- A. The dual role of providing camouflage in their habitat
- B. Suitability for climbing versus walking on flat ground ✓
- C. Equal sharpness developed primarily for defensive needs
- D. A uniform increase in claw length across all arboreal species

Q3 Adaptation and natural selection

Which statement best describes the primary evolutionary significance of fat storage in a camel's hump?

- A. It alters anatomical characteristics to change taxonomic classification.
- B. It provides a direct substitute for milk production to feed offspring.
- C. It provides a structural reserve supporting survival in extreme environments. ✓
- D. It lowers body mass to facilitate rapid escape from desert predators.

Q4 Chromosomes in humans

A scientist wants to ensure that a human zygote formed in a laboratory dish has the correct number of chromosomes. Number of chromosomes this zygote should have are:

- A. 69
- B. 23
- C. 46 ✓
- D. 92

Q5 DNA as hereditary material

DNA, which is also called _____ acid, is the hereditary material that carries genetic information in cells.

- A. Denatured
- B. Di-ribonucleic
- C. Decarbonated
- D. Deoxyribonucleic ✓

Q6 Evolution and speciation

A researcher is studying how small differences among individuals over generations contribute to the emergence of new life forms. Which process does this scenario illustrate?

- A. Evolution of biodiversity ✓
- B. Genetic drift
- C. Ecological succession
- D. Taxonomic classification



Q1 Cancer and tumours

When the regulatory mechanisms controlling cell growth fail, cells begin to divide uncontrollably, leading to the formation of _____.

- A. Vacuoles
- B. Cell inclusions
- C. Organ systems
- D. Tumours

**Q2 Lifestyle diseases and tobacco**

Smoking increases the risk of which disease related to blood vessels?

- A. Goitre
- B. Cardiovascular disease
- C. Anaemia
- D. Diabetes

**Q3 Tobacco-related diseases**

Which disease involves the uncontrolled growth of abnormal cells in the lungs due to smoking?

- A. Asthma
- B. Lung cancer
- C. Emphysema
- D. Bronchitis

**Q4 Tobacco-related diseases**

Which form of cancer has a high occurrence in India due to the use of gutkha?

- A. Prostate cancer
- B. Skin cancer
- C. Oral cancer
- D. Bone cancer

**Q5 Tobacco-related diseases**

A patient who frequently chews tobacco products develops difficulty in swallowing and persistent mouth sores. Which health condition is most likely indicated?

- A. Hepatitis
- B. Oral cancer
- C. Diabetes
- D. Asthma

**Q6 Tobacco-related diseases**

Which of the following organs is most commonly affected by smoking tobacco products?

- A. Pancreas
- B. Intestine
- C. Brain
- D. Lungs



Q1 Biological magnification

Why do non-biodegradable substances show biological magnification?

- A. They provide energy to organisms
- B. They are not taken up by organisms
- C. They persist in organisms ✓
- D. They are broken down quickly by organisms

Q2 Biological magnification

If a non-biodegradable chemical enters the food chain at a concentration of 0.02 ppm in water, what will happen over time?

- A. It will disappear completely from the ecosystem
- B. It will show maximum accumulation at the highest trophic level ✓
- C. Its concentration will decrease at higher trophic levels
- D. It will remain only within the producers

Q3 Biological magnification

In a grassland food chain, the maximum accumulation of a chemical pesticide would be found in:

- A. Frog
- B. Hawk ✓
- C. Grass
- D. Grasshopper

Q4 Biological magnification

Which action taken by us can directly reduce biological magnification?

- A. Washing the food grains thoroughly before use
- B. Eating meat rather than food grains
- C. Burning crop residues after harvesting
- D. Reducing the use of chemical pesticides on crops ✓

Q5 Biological magnification

In a food chain: Grass → Grasshopper → Frog → Snake → Eagle, the accumulation of DDT will be highest in _____.

- A. Frog
- B. Eagle ✓
- C. Grass
- D. Grasshopper

Q6 Biological magnification

Which type of pollutants is mainly responsible for biological magnification?

- A. Decomposable pollutants
- B. Thermal pollutants
- C. Non-biodegradable pollutants ✓
- D. Noise pollutants

Q7 Biological magnification

Which sequence correctly represents the increase in concentration of a pesticide in a food chain?

- A. Grass → Frog → Grasshopper → Snake → Hawk
- B. Hawk → Snake → Frog → Grasshopper → Grass
- C. Grass → Grasshopper → Frog → Snake → Hawk ✓
- D. Grasshopper → Grass → Frog → Hawk → Snake

Q8 Biological magnification

In a food chain, the maximum concentration of non-biodegradable pollutants would be found in:

- A. Herbivores
- B. Top carnivores ✓
- C. Decomposers
- D. Producers

Q9 Biological magnification

Increase in concentration of harmful chemicals progressively through the trophic levels is called _____.

- A. Recycling
- B. Decomposition
- C. Pollution
- D. Biomagnification ✓



Q10 Biological magnification

Why top-level consumers are most affected by biological magnification in a food chain?

- A. They have the shortest lifespan in the ecosystem
- B. They are primary producers and thus first to be exposed to toxins
- C. They eat less quantity of food compared to others
- D. They accumulate the highest concentration of toxins through the food chain ✓

Q11 Biological magnification

Why does biological magnification increase at higher trophic levels?

- A. Chemicals are not degraded and accumulated at each trophic level ✓
- B. Chemicals are degraded and accumulated only at higher trophic levels
- C. Water content increases at each trophic level
- D. Energy increases at higher levels in food chain

Q12 Components of an ecosystem

Which of the following best defines an ecosystem?

- A. A community without physical factors
- B. A habitat containing animals only
- C. A group of plants only
- D. A system formed by the interaction of biotic and abiotic components ✓

Q13 Decomposers

Which statement correctly explains the role of decomposers in an ecosystem?

- A. They break down organic substances into simple inorganic substances ✓
- B. They convert solar energy into chemical energy
- C. They occupy the first trophic level
- D. They increase atmospheric pollution

Q14 Decomposers in ecosystem

In an ecosystem, what is the role played by decomposers?

- A. They synthesize food by photosynthesis
- B. They break down dead organic matter ✓
- C. They transfer energy directly to carnivores
- D. They regulate the water level in soil

Q15 Energy flow and ten percent law

Most of the energy fixed by autotrophs is _____ at each trophic level.

- A. Utilized for locomotion
- B. Stored in the organism
- C. Lost to the environment as heat ✓
- D. Converted into organic matter

Q16 Energy flow and ten percent law

Which of the following statements is correct about energy flow in an ecosystem?

- A. Energy remains constant within the ecosystem
- B. Most energy is used for building biomass within the ecosystem
- C. Energy is recycled by decomposers within the ecosystem
- D. Energy flows in one direction in the ecosystem ✓

Q17 Food chain and food web

In a grassland food web, grass is eaten by rabbits and insects. Frogs eat insects, while foxes eat rabbits. If insect population declines sharply, which effect is most likely?

- A. Fox population will increase rapidly
- B. Frog population will suddenly decrease ✓
- C. Grass population will perish
- D. Rabbit population will diminish

Q18 Food chain and food web

Consider the following statements and select the correct option.

Statement 1: Food chains in an ecosystem are interlinked to form a food web.

Statement 2: Food webs show the interdependence of organisms.

- A. Both statements are true ✓
- B. Both statements are false
- C. Statement 1 is true and Statement 2 is false
- D. Statement 1 is false and Statement 2 is true



Q19 Food chain and food web

Which of the following best describes a food web?

- A. Role of decomposers at multiple trophic levels in food chains
- B. Relationship between producers in different food chains
- C. Interconnections between trophic levels in several food chains ✓
- D. Bidirectional pathway of energy transfer in food chains

Q20 Food chain and food web

Food webs help in maintaining ecosystem stability because they:

- A. stop energy flow
- B. provide alternative food sources ✓
- C. reduce the number of consumers
- D. increase competition

Q21 Food chain and food web

The difference between a food chain and a food web is that:

- A. energy transfer efficiency is higher in food chains than in food webs
- B. a food chain represents a single linear pathway, while a food web shows interconnected feeding relationships ✓
- C. a food chain always involves decomposers, while food webs do not
- D. food chains exist in aquatic ecosystems, while food webs are only in terrestrial ecosystems

Q22 Food chain and food web

If all the snakes in a food chain disappear, what will be the immediate effect on the food chain?

- A. Frog population will increase ✓
- B. Grass population will decrease
- C. Tiger population will increase
- D. Tree population will decrease

Q23 Food chains and webs

Why are food webs considered more stable than food chains?

- A. They have a larger number of producers
- B. They do not contain any carnivores
- C. They show no energy transfer between trophic levels
- D. They display multiple feeding possibilities ✓

Q24 Food chains and webs

Which of the following correctly represents a food chain?

- A. Deer → Grass → Tiger
- B. Tiger → Grass → Deer
- C. Grass → Deer → Tiger ✓
- D. Grass → Tiger → Deer

Q25 Natural and artificial ecosystems

Which of the following is an example of an artificial ecosystem?

- A. Crop-field ✓
- B. Pond
- C. Forest
- D. Lake

Q26 Producers and trophic levels

Which type of organisms is always found at the beginning of a food chain?

- A. Carnivore
- B. Producer ✓
- C. Herbivore
- D. Decomposer

Q27 Producers consumers decomposers

In a food web, herbivores are generally:

- A. Producers
- B. Decomposers
- C. Primary consumers ✓
- D. Secondary consumers

Q28 Producers consumers decomposers

Which of the following organisms break down complex organic substances from dead organisms into simple inorganic substances?

- A. Decomposers ✓
- B. Herbivores
- C. Autotrophs
- D. Parasites



Q29 Producers consumers decomposers

In an ecosystem, the organisms that recycle nutrients by breaking down dead matter are called:

- A. Consumers
- B. Herbivores
- C. Producers
- D. Decomposers



Q30 Producers consumers decomposers

What is the role of decomposers in an ecosystem?

- A. Bring about the death of plants
- B. Break down dead remains of organisms
- C. Convert light energy into chemical energy
- D. Synthesize organic substances from inorganic substances



Q31 Producers in an ecosystem

In a garden ecosystem with rose plants, jasmine plants, insects, snake, and birds, which group captures solar energy and converts it into food for other organisms?

- A. Insects
- B. Rose and Jasmine plants
- C. Rose plant only
- D. Birds



Q32 Producers in an ecosystem

Which of the following groups of organisms are NOT classified as consumers?

- A. Carnivores
- B. Producers
- C. Decomposers
- D. Herbivores



Q33 Ten per cent law

Why are food chains generally made of only 3-4 trophic levels?

- A. Energy availability to next trophic level is very low
- B. Top carnivores cannot be eaten by any organism
- C. Producer population is low
- D. Decomposers terminate the food chain



Q34 Trophic levels

Which group of organisms depends solely and directly on producers for food?

- A. Carnivores
- B. Herbivores
- C. Decomposers
- D. Omnivores



Q35 Trophic levels

Which of the following organisms is likely to occupy more than one trophic levels?

- A. Deer
- B. Tiger
- C. Rabbit
- D. Peacock



Q36 Trophic levels and pyramids

In a grassland ecosystem, which organisms will show the largest number of individuals?

- A. Frog
- B. Hawk
- C. Snake
- D. Grass



Q1 Biodegradable and non-biodegradable

Which of the following pairs correctly represents biodegradable and non-biodegradable substances, respectively?

- A. Glass – Leaves
- B. Paper – Plastic**
- C. Metal – Food waste
- D. Plastic – Cotton

Q2 Biodegradable and non-biodegradable waste

What is the main environmental concern associated with non-biodegradable waste?

- A. It accumulates and causes pollution**
- B. It improves soil fertility
- C. It is quickly recycled by organisms
- D. It breaks down easily in nature

Q3 Biodegradable and non-biodegradable waste

Why are non-biodegradable wastes considered more dangerous than biodegradable wastes?

- A. They increase the microbial activity
- B. They persist in the environment**
- C. They decompose rapidly
- D. They release oxygen

Q4 Biodegradable and non-biodegradable waste

Which of the following is NOT biodegradable?

- A. Paper
- B. Leather
- C. Wool
- D. Plastic**

Q5 Biodegradable and non-biodegradable waste

Why are non-biodegradable substances harmful to the environment?

- A. They decompose very quickly
- B. They persist for a long time and may harm organisms**
- C. They enrich the soil
- D. They increase the oxygen level in air

Q6 Biodegradable and non-biodegradable waste

Which of the following statements regarding biodegradable waste is correct?

- A. It consists of man-made substances
- B. It persists in the environment
- C. It cannot be recycled
- D. It can be decomposed by biological processes**

Q7 Biodegradable and non-biodegradable waste

Which of the following is considered as a nonbiodegradable substance?

- A. Plastic bags**
- B. Cotton dresses
- C. Banana leaves
- D. Wooden plates

Q8 Composting and waste management

Why is composting considered environmentally beneficial?

- A. It generates biodegradable waste
- B. It increases non-biodegradable waste
- C. It converts organic waste into useful manure**
- D. It releases toxic gases

Q9 Effects of UV radiation

The primary harmful effect of UV radiation on humans, if not blocked by the ozone layer, is:

- A. anaemia
- B. asthma
- C. skin cancer**
- D. hypertension

Q10 Overuse of fertilisers

All of the following are consequences of overuse of nitrogen fertilisers, **EXCEPT** _____.

- A. Increased oxygen in water bodies**
- B. Algal bloom formation
- C. Soil and water degradation
- D. Fish death due to oxygen depletion



Q11 Ozone depletion and CFCs

Which of the following chemical compounds is mainly responsible for ozone depletion in the upper atmosphere?

- A. Oxides of nitrogen
- B. Chlorofluorocarbons
- C. Sulphur dioxide
- D. Methane

**Q12 Ozone depletion and CFCs**

Which of the following devices earlier used CFCs extensively?

- A. Solar cooker
- B. Bicycle
- C. Refrigerator
- D. Water purifier

**Q13 Ozone depletion and CFCs**

Which of the following environmental problems is related to the penetration of harmful UV rays into our atmosphere?

- A. Acid rain
- B. Greenhouse effect
- C. Ozone hole
- D. Global warming

**Q14 Ozone depletion and CFCs**

Why is depletion of the ozone layer by chlorofluorocarbons (CFCs) considered dangerous for organisms?

- A. It leads to an increase in atmospheric oxygen levels
- B. It leads to the generation of infrared radiation
- C. It leads to penetration of UV rays into the atmosphere
- D. It leads to an decrease in rainfall

**Q15 Ozone depletion and CFCs**

If the ozone layer becomes thinner, which of the following could happen on Earth?

- A. Reduction in oxygen levels
- B. Cooling of the Earth's atmosphere only
- C. Decrease in sunlight reaching plants
- D. Increase in ultraviolet radiation reaching Earth

**Q16 Ozone layer and depletion**

What is the main function of the ozone layer in the upper part of the atmosphere?

- A. Producing oxygen to support aerobic life
- B. Absorbing ultraviolet radiation coming from the sun
- C. Causing rainfall
- D. Increasing atmospheric carbon dioxide levels

**Q17 Pesticides and fertilisers**

Why cannot pesticide residues always be removed from food by washing?

- A. Because they evaporate easily
- B. Because they are present only on the surface
- C. Because they dissolve in water
- D. Because they are accumulated within the tissues

**Q18 Waste management and recycling**

A city observes increased waste generation due to lifestyle changes and disposable packaging. What is the most effective solution to minimize environmental impact according to waste management principles?

- A. Burning all waste to reduce volume
- B. Promoting segregation and recycling of non-biodegradable waste
- C. Increasing landfill space for all waste
- D. Ignoring segregation and focusing only on biodegradable waste

**Q19 Waste management and recycling**

Which of the following practices can reduce the volume of non-biodegradable waste?

- A. Mix non-biodegradable waste with soil
- B. Use disposable plates and cups
- C. Dump all waste in water bodies
- D. Use reusable and recyclable products



Q1 Atmospheric pressure belts

A researcher collects air samples from 90° North latitude and finds a persistent high-pressure system. The underlying process that explains this observation is:

- A. Rising of warm air from the surface
- B. Convergence at sub-tropical latitudes
- C. Surface flow from equatorial regions
- D. Sinking of cold, dense air in polar regions ✓

Q2 Biodiversity and endemic species

Climate change increases rainfall in the Western Ghats and alters the ecosystem. Which long-term effect could this have on endemic species in the region?

- A. Endemic species will increase in population
- B. Endemic species will spread to new regions
- C. Endemic species will not be affected
- D. Endemic species may struggle to survive and adapt ✓

Q3 Biodiversity and endemic species

A science student is asked to explain why the Indian landscape supports high biodiversity. Which explanation best integrates the concepts of habitat diversity and endemism?

- A. Varied habitats create conditions for many endemic species ✓
- B. Single climate promotes species uniformity
- C. Focusing only on deserts enhances diversity
- D. Exclusive agriculture increases species variety

Q4 Biodiversity hotspots

A conservation biologist is prioritizing areas for protection. She notices a region with many species unique to that area, and much of its habitat has been destroyed. Based on definition, which term best describes this region?

- A. Biodiversity hotspot ✓
- B. Biodiverse ecosystem
- C. Ecological niche
- D. Endemic region

Q5 Biodiversity hotspots

A wildlife reserve in the Western Ghats is losing forest cover rapidly. Which statement best explains why this region is a global conservation priority?

- A. It is a crucial path used by migratory birds
- B. It is a biodiversity hotspot with many endemic species ✓
- C. It is a dry desert ecosystem that has few species
- D. It is a vast region with only widely distributed species

Q6 Biodiversity hotspots

A zoologist identifies the Lion-tailed macaque population declining due to fragmentation of its forest habitat. Which is the most likely ecological consequence if this trend continues?

- A. Loss of endemic species unique to the region ✓
- B. Increase in migratory bird populations
- C. Spread of invasive species from outside
- D. Introduction of common widespread species

Q7 Carbon cycle

Which human activity helps reduce disruption of the carbon cycle?

- A. Increasing fossil fuel use
- B. Deforestation
- C. Overuse of fertilisers
- D. Adoption of solar energy ✓

Q8 Composition of atmosphere

In which combined form is oxygen found in the air besides free O₂?

- A. Carbon dioxide ✓
- B. Methane
- C. Nitrogen gas
- D. Argon



Q9 Conservation of biodiversity

Which way did the Sangam Tinai classification and sacred groves help conserve biodiversity?

- A. They classified all Indian species
- B. They preserved locally diverse habitats ✓
- C. They increased agricultural output
- D. They introduced exotic species

Q10 Earth's spheres and cycles

A prolonged drought in a forest causes widespread plant death. Based on the Earth's interconnected spheres, a likely consequence of this is:

- A. Disrupted oxygen balance across spheres ✓
- B. Increased oxygen production in the atmosphere
- C. Immediate rise in nitrogen levels in rocks
- D. Stable carbon dioxide levels in the biosphere

Q11 Earth's spheres and cycles

A city implements stricter vehicle emission norms, reducing smog and ground-level ozone formation. Which spheres of earth are directly influenced by this policy?

- A. Lithosphere and atmosphere
- B. Atmosphere and biosphere ✓
- C. Lithosphere and hydrosphere
- D. Hydrosphere and biosphere

Q12 Earth's tilt and day length

A climate modeler wants to explain why polar regions have long periods of darkness and light during the year. Which factor is most responsible for this phenomenon?

- A. Ocean currents change the amount of sunlight received
- B. Only latitude determines day length at the poles
- C. Atmospheric composition blocks sunlight at the poles
- D. Earth's axial tilt and spherical shape affect sunlight distribution ✓

Q13 Endemic species and conservation

A conservation biologist is designing a strategy to protect the Nilgiri tahr, which is found only in a specific Indian region. Which approach would be most appropriate for its conservation, based on its classification?

- A. Prioritizing widespread species elsewhere
- B. Relocating species to other regions
- C. Focusing on its endemic habitat in the Western Ghats ✓
- D. Creating generic wildlife reserves

Q14 Global warming effects

A coastal region experiences algal blooms and coral bleaching after unusually high global temperatures. Which interaction between Earth's spheres best explains this effect?

- A. Ocean warming lowers CO₂ absorption and stresses marine life ✓
- B. Increased river flow improves the overall coral reef growth
- C. Land plant growth completely replaces marine ecosystem loss
- D. Reduced sunlight increases rate of photosynthesis in oceans

Q15 Greenhouse effect

Venus is hotter than Mercury, even though Mercury is closer to the Sun. Based on Earth's atmospheric science, which is the most plausible explanation?

- A. Mercury lacks any significant atmospheric layers
- B. Venus's atmosphere creates a strong greenhouse effect ✓
- C. Mercury's proximity to the Sun creates rapid heat loss
- D. Venus receives more sunlight due to its size

Q16 Greenhouse effect and global warming

Which wavelength range is primarily responsible for heating the Earth's surface and contributing to the greenhouse effect?

- A. Infrared radiation ✓
- B. Ultraviolet radiation
- C. Radio waves
- D. Visible light



Q17 Layers of the atmosphere

A weather balloon rises from sea level to 15 km altitude. The point of the temperature reverse from decreasing to increasing, and reason for this change is:

- A. At the base of the mesosphere due to air pressure changes
- B. At the top of the troposphere due to greenhouse gases
- C. At the midpoint of the troposphere due to nitrogen distribution
- D. At the start of the stratosphere due to ozone absorption of UV ✓

Q18 Local winds and breezes

A physician in a hilly village notices that bedrooms near the mountain base feel cooler at night. Which atmospheric process best explains this observation?

- A. Cold air descending as mountain breeze ✓

- B. Moist air flowing as sea breeze
- C. Cool air moving as land breeze
- D. Warm air rising as valley breeze

Q19 Local winds and breezes

A weather report for a Himalayan town mentions wind direction reversal every evening, affecting local farming. Which atmospheric phenomenon is primarily responsible for this reversal?

- A. Constant high-pressure wind flow

- B. Daily cycle of valley and mountain breezes ✓

- C. Movement of global wind belts
- D. Onset of monsoon winds

Q20 Nitrogen cycle

Which of the following bacteria is **INCORRECTLY** paired with its role?

- A. Azotobacter — Nitrogen fixation in soil
- B. Nitrobacter — Conversion of nitrite to nitrate
- C. Rhizobium — Nitrogen fixation in legumes
- D. Pseudomonas — Nitrification ✓

Q21 Ocean acidification

Excessive atmospheric CO₂ increases its dissolution in ocean water. This makes seawater more _____.

- A. Basic
- B. Acidic ✓
- C. Oxygenated
- D. Neutral

Q22 Ocean currents

A climatologist analyzes why the Southern Hemisphere gyres rotate in a specific direction. Which factor primarily explains the rotation pattern of these ocean gyres?

- A. Temperature gradients push water
- B. Earth's rotation deflects water movement ✓
- C. Wind direction drives all rotation
- D. Land mass distribution alters flow

Q23 Ocean currents

A biologist studies nutrient-rich waters that support large fish populations near continental coasts. Which physical mechanism naturally brings nutrients from deep to surface waters?

- A. Planetary winds at the equator
- B. Salinity stratification at depth
- C. Upwelling caused by ocean currents ✓
- D. Movement of surface water only

Q24 Oxygen cycle

All of the following processes consume atmospheric oxygen, EXCEPT:

- A. Photosynthesis by green plants ✓
- B. Combustion of fossil fuels
- C. Respiration by plants
- D. Respiration by animals

Q25 Pressure belts and winds

A meteorological station near 60° South detects winds converging and rising. The most likely consequence of this pattern in terms of pressure is:

- A. Formation of a sub-polar low pressure belt ✓
- B. Establishment of an equatorial low pressure zone
- C. Development of a high pressure zone
- D. Creation of a sub-tropical high pressure belt

Q26 Pressure belts and winds

An environmental scientist observes that global winds move from the equator towards the poles. Which process best accounts for this pattern?

- A. Uneven heating creates temperature differences between latitudes ✓
- B. Precipitation levels determine wind directions
- C. Ocean currents transfer heat faster than air masses
- D. Earth's rotation reverses wind direction at the equator



Q27 Renewable energy sources

A city is planning to build a new power plant and is choosing between several energy generation options. If the primary goal is to maximize the use of renewable and environmentally friendly energy, which option should the city select?

- A. A high-capacity natural gas station
- B. A large-scale coal-fired facility
- C. A utility-scale solar photovoltaic farm ✓
- D. A conventional nuclear power complex

Q28 Solar energy and insolation

A student is asked why solar panels are less efficient during early morning hours. Which electromagnetic property explains this observation?

- A. Speed of light is reduced in air
- B. Wavelength distribution changes
- C. Earth's rotation increases intensity
- D. Sunlight is less intense at low angle ✓

Q29 Solar energy and solar constant

A technician is designing a solar power plant in central India. Understanding the value of the solar constant is necessary for planning the plant's capacity as:

- A. It indicates energy available before atmospheric loss ✓
- B. It measures sunlight duration
- C. It shows only atmospheric absorption
- D. It gives maximum possible temperature

Q30 Solar heating and latitude

A physical geographer compares two coastal cities: one at the equator and one near the poles. Both receive the same duration of sunlight in a day. The reason the equatorial city remains warmer is:

- A. Both cities have similar temperatures due to equal sunlight duration
- B. The polar city absorbs less sunlight due to water proximity
- C. Surface reflection is higher at the equator, keeping it warmer
- D. Sunlight at the equator is more direct, concentrating energy ✓

Q31 Sustainable development

Which of the following combinations best supports sustainable development?

- A. Fossil fuels + deforestation
- B. Industrial expansion + waste dumping
- C. Overuse of water + plastic production
- D. Renewable energy + tree plantation ✓

Q32 Sustainable development

All of the following are ways to restore Earth's natural systems EXCEPT, _____.

- A. Save water and recycle waste
- B. Increase fossil fuel use ✓
- C. Use solar and wind energy
- D. Plant trees and practice sustainable farming

Q33 Valley and mountain breeze

During a field study, students notice that air flows from the valley floor up to the slopes every noon. Which atmospheric condition causes this pattern?

- A. Uneven heating of mountain slopes ✓
- B. Uniform heating of the valley floor
- C. Rotation of the Earth
- D. Sudden rainfall in the valley

Q34 Valley and mountain breeze

A climate scientist puts sensors on the valley floor and on the slopes. During the day, the sensors on the slopes show higher temperatures and more wind blowing up from the valley. Which phenomenon does this indicate?

- A. Daytime valley breeze due to slope heating ✓
- B. Land breeze from nearby plains
- C. Sea breeze from distant water bodies
- D. Nighttime mountain breeze after cooling

Q35 Water cycle

Arrange the following steps of the water cycle in the correct order:

1. Condensation
2. Evaporation
3. Precipitation
4. Collection in water bodies

- A. 3 → 2 → 1 → 4
- B. 1 → 2 → 3 → 4
- C. 2 → 3 → 1 → 4
- D. 2 → 1 → 3 → 4 ✓



Q36 Water cycle

Which of the following sequence **CORRECTLY** represents the movement of water in nature?

- A. Evaporation → Precipitation → Condensation
- B. Precipitation → Runoff → Evaporation
- C. Condensation → Precipitation → Evaporation
- D. Evaporation → Condensation → Precipitation ☒

Q37 Winds and pressure belts

An ecologist analyzes wind patterns and concludes they originate from the equator toward the poles. The underlying principle for this observation is:

- A. Tidal forces move atmospheric currents globally
- B. Earth's magnetic field directs winds from equator to poles
- C. Temperature gradients caused by uneven solar heating drive winds ☒
- D. Ocean salinity differences push air masses north and south

