



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 · Mathematics · Question Paper Compilation

English

All 48 Shifts (Sets) · Mathematics Section · Official Answer Key

About this Compilation

This booklet compiles all **48 shift papers** of the **RRB Group D (Level-1) 2025** examination (CEN 09/2025) in **English** (**Mathematics** section only), with the correct option marked as per the official answer key.

✓ Correct option (highlighted green)

How to use

- Use the **Index** page to jump directly to any set (clickable).
- Questions are grouped by subtopic within each section, so similar questions sit together.
- Diagram and wide-table questions appear at the end of their section at full width.
- The correct answer is highlighted in green with a tick.

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Set 48

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Mathematics

25 Questions • Answer Key

Q1 Average Speed

A tourist bus covers a distance of 500 kilometers. It travels the first 40% of the distance at a speed of 80 km/hr and the rest of the distance at 75 km/hr. If it takes a 30-minute stop for lunch during the journey, what is the average speed for the entire trip? (Rounded off to two decimal places.)

A. 72.54 km/hr

B. 75 km/hr

C. 71.43 km/hr



D. 76.92 km/hr

Q2 Basic Percentage

A family earns ₹50,000 per month and spends ₹35,000. What percentage of the income is saved?

A. 30%



B. 25%

C. 20%

D. 15%

Q3 Basic TSD

Kaushal travelled for 16 hours 20 minutes at the speed of 90 km/h. At what speed (in km/h) should he travel to cover the same distance in 14 hours?

A. 102

B. 103

C. 104

D. 105



Q4 CP-SP Relation

An article is sold at a profit of 20%. If the selling price had been increased by ₹100, the profit percentage would have doubled. What was the cost price of the article?

A. ₹250

B. ₹500



C. ₹400

D. ₹200

Q5 Grouped Data Median

Find the median from the following data.

Class interval x	f
20-40	4
40-60	6
60-80	10
80-100	12
100-120	8

A. 82

B. 80



C. 78

D. 75

Q6 HCF/LCM Word Problems

A blue light blinks every 6 seconds and a red light blinks every 9 seconds. After how many seconds will both lights blink together again?

A. 9 seconds

B. 18 seconds



C. 3 seconds

D. 12 seconds

Q7 Half-Yearly Compounding

Find the ratio of compound interest on ₹10,000 for 1 year at the rate 8% compounded half-yearly and yearly.

A. 53 : 45

B. 62 : 49

C. 61 : 52

D. 51 : 50



Q8 Half-Yearly Compounding

A sum of ₹10,000 is invested for 2 years at 20% per annum interest, compounded half-yearly. What is the compound interest earned at the end of 2 years?

(use $(1.10)^4 = 1.4641$)

A. ₹4,641



B. ₹4,440

C. ₹4,660

D. ₹4,461



Q9 Laws of Indices

Given that $113^{0.99} = x$, $113^{0.77} = y$ and $x^2 = y^2$, then the value of z is close to:

A. 1.48

B. 1.56

C. 3.04

D. 2.89

Q10 Leak Based

A pipe can fill a cistern in 8 hours. Due to a leak at the bottom, it is filled in 10 hours. In how many hours can the leak alone empty the full cistern?

A. 40 hours

B. 45 hours

C. 30 hours

D. 35 hours

Q11 MP with Discount and Profit

A trader gains 72% by selling an article after two successive discounts of 50% and 14% on its marked price. If the cost price of the article is increased by 36%, then what single discount should he now give on the same marked price to get the same profit percentage as earlier?

A. 41.52%

B. 40.56%

C. 47.46%

D. 46.78%

Q12 Mean Proportional

Which value is the mean proportional between 18 and 45?

A. $20\sqrt{7}$

B. $9\sqrt{10}$

C. $25\sqrt{5}$

D. $10\sqrt{17}$

Q13 Melting & Recasting

A cylinder of height 72 cm and base radius 16 cm is melted to form a sphere. Find the radius of the sphere.

A. 22 cm

B. 26 cm

C. 24 cm

D. 20 cm

Q14 Mode

In a moderately skewed data distribution, the ratio of the arithmetic mean to the median is 4 : 5. If the sum of the mean and the median is 90, what is the mode of this distribution?

A. 70

B. 65

C. 75

D. 60

Q15 Proportion

Find the fourth proportional to 8.6, 10.75, and 6.

A. 7

B. 7.2

C. 7.5

D. 7.25

Q16 Surface Area (TSA/LSA)

The length of a side of a cube is $(2x - 5)$ cm. What is total surface area of the cube?

A. $4x^2 - 20x + 25$

B. $6(4x^2 - 20x - 25)$

C. $6x^2 - 30x + 25$

D. $24x^2 - 120x + 150$

Q17 Two Items Mixing

If 4 kg of rice costing ₹40 per kg is mixed with 6 kg of rice costing ₹50 per kg, what is the price per kg of the mixture (in ₹)?

A. 46

B. 44

C. 48

D. 50

Q18 Two Successive Changes

A company's revenue increases by 40% in one quarter and then decreases by 20% in the next. If the initial revenue was ₹1,00,000, what is the final revenue?

A. ₹1,08,000

B. ₹1,14,000

C. ₹1,12,000

D. ₹1,20,000



Q19 Value Decrease Over Time

A machine is purchased for ₹18,200 and its value decreases by 10% every year. If the depreciation is compounded annually, what will be the value of the machine after 2 years?

A. ₹16,480

B. ₹13,424

C. ₹15,200

D. ₹14,742

**Q20 Volume**

A cube of edge 20 cm is immersed completely in a rectangular vessel containing water. The measurements of the vessel are 25 cm × 25 cm. Find the rise (in cm) of water level.

A. 16.5

B. 20

C. 8

D. 12.8

**Q21 Order of Operations**

Simplify: $\frac{\frac{7}{2} \div \frac{3}{2} \times \frac{5}{2}}{8 \div \frac{5}{2} \text{ of } \frac{1}{2}} \div \frac{25}{8}$.

A. $\frac{11}{24}$

B. $\frac{5}{24}$

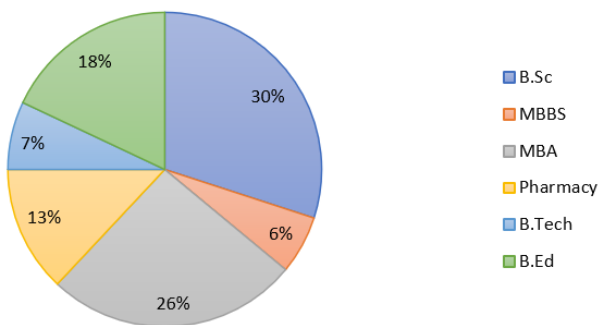
C. $\frac{13}{24}$

D. $\frac{7}{24}$

**Q22 Percentage Based**

In the following pie chart, the percentage distribution of students in different courses are shown. What is the total number of students in B.Ed., Pharmacy and MBBS together?

Total number of students = 6800



A. 2145

B. 2645

C. 2516

D. 2428



Q23 Pythagorean Identities

Find the value of $(\sin A + \operatorname{cosec} A)^2 + (\cos A + \sec A)^2 + (\operatorname{cosec}^2 A - \sec^2 A)$.

A. $2\cot^2 A$

B. $7 - 2\cot^2 A$

C. $7 + 2\cot^2 A$



D. $-2\cot^2 A$

Q24 Pythagorean Identities

Simplify: $(\sec A + \tan A) \times (1 - \sin A) \times \sec A$

A. 0.5

B. 0

C. 2

D. 1



Q25 Sector Area & Arc Length

For a circle of diameter 16 cm, the area of a sector is $\frac{16\pi}{3} \text{ cm}^2$. The angle of the sector is

A. 60°

B. 15°

C. 30°



D. 45°



Mathematics

25 Questions • Answer Key

Q1 2-Year Difference

The difference between compound interest and simple interest at a rate of 5% per annum over a period of 2 years on an amount of ₹15,000 is:

A. ₹37.50



B. ₹33.60

C. ₹42.10

D. ₹41.90

Q2 Age in Ratio Form

B is as much younger to A as he is elder to C. The ratio of the ages of A and C is 9 : 8 and sum of their ages is 68. What is the difference between the ages of A and B?

A. 2



B. 5

C. 4

D. 6

Q3 Angle of Elevation

From a point on the ground, the angle of elevation to the top of a tree is 45° . If the point is 20 m away from the base, what is the height of the tree?

A. 15 m

B. 18 m

C. 20 m



D. 22 m

Q4 Basic TSD

Sam covered a certain distance at a certain speed. Had he moved 4.5 kmph faster, he would have taken 30 minutes less. If he had moved 4.5 kmph slower, he would have taken 35 minutes more. Find the distance covered by him.

A. 409.5 km



B. 411.5 km

C. 420 km

D. 429.5 km

Q5 Chord Properties

In a circle of radius 5 cm, AB and AC are two equal chords such that $AB = AC = 7$ cm. What is the length of the chord BC? (Rounded off to 3 decimal places.)

A. 9.992 cm

B. 9.990 cm

C. 9.998 cm



D. 9.996 cm

Q6 Curved & Total Surface Area

For a cone, the curved surface area is two-thirds of its total surface area. What is the ratio of its slant height to its radius?

A. 3 : 1

B. 1 : 2

C. 1 : 1

D. 2 : 1



Q7 Curved & Total Surface Area

The slant height of a cone is 25 cm, and the radius of its base is 17 cm. Find its total surface area. (Use $\pi = 22/7$.)

A. 1283 cm²B. 2244 cm²C. 3300 cm²D. 2750 cm²

Q8 Dividing Quantity in Ratio

A sum of money is divided among P, Q, and R in the ratio 2:3:5. If R gets Rs. 290 more than Q, what is the total sum?

A. Rs. 1200

B. Rs. 900

C. Rs. 1100

D. Rs. 1450



Q9 Find Time

What is the time (in years) required for a sum of ₹12,000 at 6% per annum simple interest to earn ₹2,160?

- A. 2 years
- B. 2.5 years
- C. 3.5 years
- D. 3 years

**Q10 HCF and LCM**

The product of the HCF and LCM of two numbers is 1944. Find the second number, if the first number is 54.

- A. 24
- B. 42
- C. 48
- D. 36

**Q11 Half-Yearly Compounding**

The compound interest (in ₹, rounded off to the nearest tens) on ₹10,000 at the rate of 8% per annum for 1.5 years, if interest is compounded half-yearly, is:

- A. 1,250
- B. 1,150
- C. 1,350
- D. 1,450

**Q12 Laws of Indices**

Given that $17^{0.3} = x$, $17^{0.5} = y$ and $x^z = y^5$, then the value of z is close to:

- A. 8.33
- B. 7.67
- C. 10.33
- D. 8.67

**Q13 Percentage Increase/Decrease**

The income of Raman is ₹70,000. He saves 26% of his income. If his income increases by 32% and expenditure increases by 45%, then his savings will:

- A. increase by ₹909
- B. increase by ₹913
- C. decrease by ₹908
- D. decrease by ₹910

**Q14 Profit/Loss Percentage**

Rajesh started a business with ₹50,000. In the first year, he made a profit of 20%. He reinvested all the money (original + profit) in the second year. In the second year, he suffered a loss of 15%. At the end of the second year, he sold his remaining business assets and received an additional ₹8,000 as goodwill. What is his overall profit or loss percentage on his original investment?

- A. 20% profit
- B. 18% profit
- C. 12% loss
- D. 15% loss

**Q15 Single Change**

The production of a factory increased from 1,200 units to 1,500 units. Find the percentage increase in production.

- A. 22%
- B. 20%
- C. 25%
- D. 30%

**Q16 Successive Discount**

The marked price of a cooker is same at four shops I, II, III and IV.

Shop I allows two successive discounts of 46% and 13%, shop II allows successive discounts of 55% and 69%, shop III allows successive discounts of 47% and 68%, and shop IV allows successive discounts of 91%, 98%, and 18% on the marked price of the cooker.

Which shop is selling the cooker at the lowest price?

- A. III
- B. IV
- C. I
- D. II

**Q17 Time-based Partnership**

Amit and Bharat started a business with investments of ₹40,000 and ₹55,000, respectively. After 6 months, Chetan joined with ₹60,000. If the annual profit is ₹47,400, what is Bharat's share?

- A. ₹20,886
- B. ₹20,856
- C. ₹20,716
- D. ₹20,756



Q18 Two Items Mixing

If 2 liters of juice costing ₹30 per liter are mixed with 8 liters of juice costing ₹50 per liter, what is the price per liter (in ₹) of the mixture?

A. 50

B. 44

C. 48

D. 46

**Q19 Two Trains Crossing**

A train, 150 m long, running at 60 km/h passes another train, which is twice as fast as this train and is running on a parallel line in the opposite direction, in 8 seconds. Find the length (in m) of the second train.

A. 320

B. 280

C. 250



D. 300

Q20 Two Triangle Problems

As observed from the top of a 150 m high lighthouse from the sea-level, the angles of depression of two ships are 30° and 60° . If one ship is exactly behind the other on the same side of the lighthouse, then find the difference between the horizontal distances of both ships from the base of lighthouse (Use $\sqrt{3}=1.7$).

A. 183 m

B. 178 m

C. 168 m

D. 170 m

**Q21 Combined Work Rate**

Riya can complete a piece of work in 15 days, while Neha can complete the same work in 20 days. If both of them work together, how many days will they take to complete the work?

A. $\frac{29}{3}$ days

B. $\frac{60}{7}$ days



C. $\frac{75}{8}$ days

D. $\frac{35}{4}$ days

Q22 Index Simplification

Simplify:

$$(7^7 \times 7^{-5} \div 7^{-4}) \div \left(7^0 \times 7^{-2} \text{ of } \left(\frac{1}{7} \right)^{-5} \right)$$

A. 343



B. 7

C. 1

D. 49



Q23 Mean of Grouped Data

What is the mean of the following distribution?

Marks	14	28	55	75	93
No. of Students	33	81	73	44	35

A. 46

B. 39

C. 50



D. 42

Q24 Mean of Grouped Data

What is the value of $(8x + 2y)$, if mean of the following distribution is 56?

Class	0-20	20-40	40-60	60-80	80-100	Total
Frequency	3	12	x	5	y	70

A. 292

B. 294

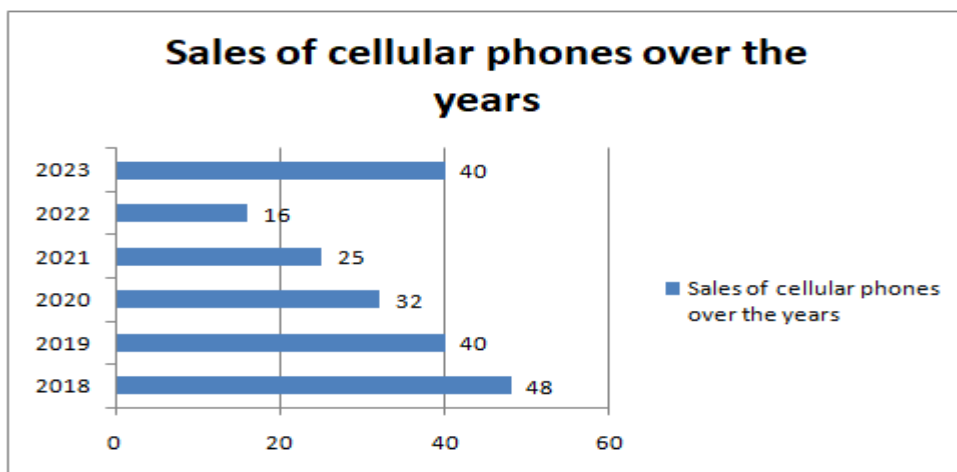
C. 302

D. 298

**Q25** Single Parameter

The bar graph below shows the sales (in thousands) of cellular phones from 2018 to 2023. Study the graph and answer the question.

Find the average sales of cellular phones (in thousands) from 2021 to 2023.



A. 26

B. 28

C. 25

D. 27



Mathematics

25 Questions • Answer Key

Q1 Annual Compounding

A plant grows by 12.5% per annum. If its current height is 64 cm, what will be its height after 2 years, assuming the growth is compounded annually?

- A. 85 cm
- B. 81 cm
- C. 80 cm
- D. 88 cm



Q2 Area/Volume Error

The radius of a cylinder is increased by 20% and its height is decreased by 10%. Find the percentage change in its volume.

- A. 29.6% increase
- B. 29.6% decrease
- C. 26.9% increase
- D. 26.9% decrease



Q3 Average Speed

A student rides a bicycle for 12 km at an average speed of 10 km/hr. At what speed should he cover the next 10 km to have an average speed of 11 km/hr for the whole journey?

- A. 12.5 km/hr
- B. 10.8 km/hr
- C. 11 km/hr
- D. 15 km/hr



Q4 Basic Time & Work

12 men can finish a task in 20 days. How many days will 30 men take to complete the same task?

- A. 8 days
- B. 9 days
- C. 12 days
- D. 11 days



Q5 Equal Installments

A person borrowed an amount of ₹15 lakhs at a simple interest rate of 7% per annum for 5 years. If he wants to pay the total amount in equal monthly installments, then find the monthly installment.

- A. ₹44,000
- B. ₹41,640
- C. ₹33,750
- D. ₹32,600



Q6 Half-Yearly Compounding

If a certain amount of money is compounded semi-annually and becomes ₹1,600 after 3 years and ₹6,400 after 6 years, what is the principal amount?

- A. ₹440
- B. ₹400
- C. ₹375
- D. ₹410



Q7 Laws of Indices

Given that $102^{0.77} = x$, $102^{0.44} = y$ and $x^z = y^8$, then the value of z is close to:

- A. 3.44
- B. 5.23
- C. 4.57
- D. 6.05



Q8 MP with Discount and Profit

A shopkeeper marks the price of an article at 44% above its cost price and then offers two successive discounts of 39% each. What is his loss percentage? (Round off to the nearest integer)

- A. 45%
- B. 48%
- C. 47%
- D. 46%



Q9 Multiple Pipes

Pipe A can fill a tank in 4 hours, pipe B can fill the same tank in 8 hours and pipe C can fill the same tank in 8 hours. The time taken (in hours) by them to fill half of the same tank if they operate together is:

A. 4

B. 3

C. 1



D. 2

Q10 Percentage Increase/Decrease

The income of Raman is ₹34,000. He saves 5.5% of his income. If his income increases by 17% and expenditure increases by 10%, then his savings will:

A. decrease by ₹10,285

B. increase by ₹2,567



C. increase by ₹10,284

D. decrease by ₹2,657

Q11 Rules for 2,3,4,5,6

Find the smallest digit value for A such that 58A4 is divisible by 4.

A. 4

B. 2

C. 6

D. 0

**Q12 Simple Mean**

What is the average of the numbers 4, 8, and 12?

A. 8



B. 6

C. 12

D. 10

Q13 Still Water Speed

A boatman is rowing on a river. He takes 4 hours to travel upstream and 2.5 hours to travel downstream. If the speed of the river's current is 3 km/h, what is the boat's speed in still water?

A. 11 km/h

B. 14 km/h

C. 12 km/h

D. 13 km/h

**Q14 Two Successive Changes**

The price of a laptop increases by 20% in the first year and again by 10% in the second year. If the original price was ₹50,000, find the final price after two years.

A. ₹65,000

B. ₹67,000

C. ₹66,000



D. ₹68,000

Q15 Two Triangle Problems

The angle of elevation of a cloud from a point 60 m above a lake is 30° , and the angle of depression of its reflection is 60° . Find the height of the cloud.

A. 60 m

B. 120 m



C. 80 m

D. 100 m

Q16 Weighted Average

The numbers 1, 3, and 14 are assigned weights 3, 1, and 1, respectively. Find their weighted arithmetic mean.

A. 4



B. 3

C. 8

D. 6

Q17 $(a+b)^2$, $(a-b)^2$

Simplify the following expression.

$$(2x + 3y)^2 - (2x - 3y)^2 + 12xy$$

A. $24xy$ B. $60xy$ C. $36xy$ D. $48xy$ 

Q18 Building/Tower Problems

From the top of a tower, the angle of depression to a point A on ground is 30° . From the same point on the tower, the angle of elevation to a balloon vertically above point A is 60° . If the horizontal distance between the tower and point A is 40 meter, the height (in meter) of the balloon above the point A is

A. $\frac{40}{\sqrt{3}}$

B. $\frac{80}{\sqrt{3}}$ ✓

C. $\frac{160}{\sqrt{3}}$

D. $\frac{120}{\sqrt{3}}$

Q19 False Weight

A dishonest shopkeeper promises to sell his goods at cost price. However, he uses a weight that actually weighs 20% less than what is written on it. Find his profit percentage.

A. 24.6%

B. 23.62%

C. 25% ✓

D. 26.02%

Q20 Grouped Data Median

Find the median of the given data.

Class interval	0-5	5-10	10-15	15-20	20-25	25-30
Frequency	3	7	5	4	8	6

A. 12.62

B. 18.54

C. 15.28

D. 16.875 ✓

Q21 Laws of Indices

Solve for x :

$$\left[\left(\frac{3}{4}\right)^2\right]^{4x+3} = \left[\left(\frac{9}{16}\right)^{1/2}\right]^{x-2}^2$$

A. $1\frac{3}{4}$

B. $-2\frac{1}{4}$

C. $-4\frac{2}{3}$ ✓

D. $3\frac{1}{2}$



Q22 Mean Proportional

Find the mean proportional of 6.5 and 24.

A. $2\sqrt{39}$



B. $3\sqrt{39}$

C. $4\sqrt{39}$

D. $\sqrt{39}$

Q23 SSS, SAS, ASA, AAS, RHS

In $\triangle XYZ$ and $\triangle PQR$, if $XY = PQ$ and $YZ = QR$, then one can infer that $\triangle XYZ \cong \triangle PQR$ when:

A. $\angle XYZ = \angle PQR$



B. $\angle YXZ = \angle QPR$

C. $\angle XZY = \angle QPR$

D. $\angle XZY = \angle PRQ$

Q24 Sector Area & Arc Length

A circular track has a radius of 28 m. If a sector (the pie-shaped region enclosed by two radii and the arc connecting their endpoints) subtending 90° is to be fenced along its boundary three times at the rate of ₹15 per meter, the total cost of fencing is:

(Use $\pi = \frac{22}{7}$)

A. ₹5,400

B. ₹4,500



C. ₹1,500

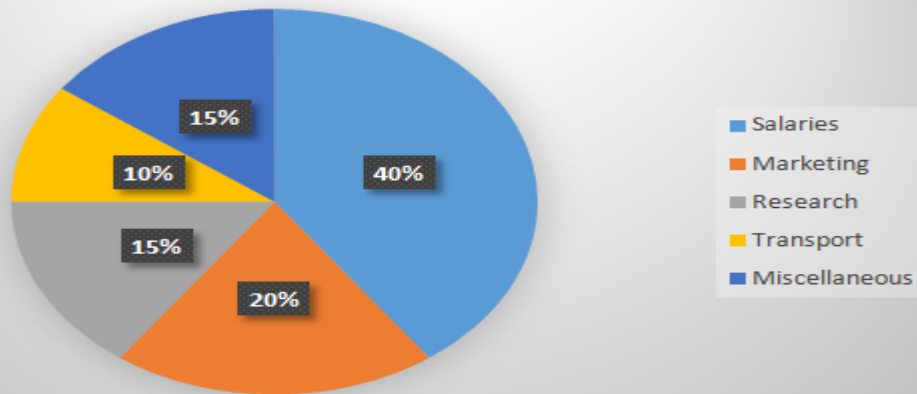
D. ₹1,800



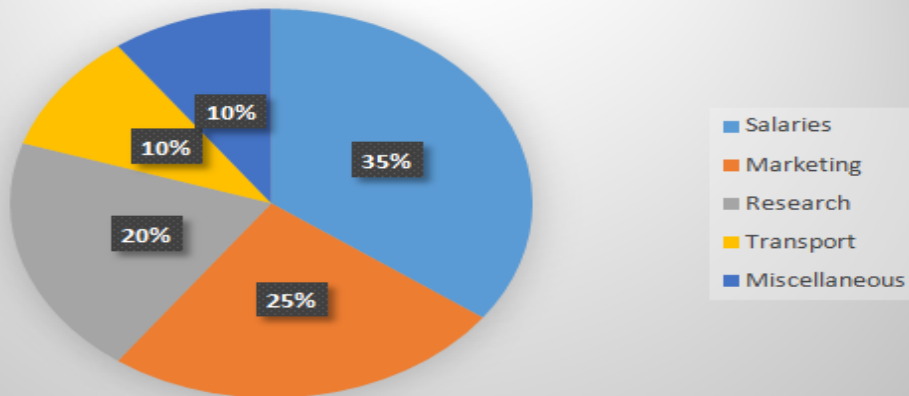
Q25 Year-on-Year Comparison

The given pie charts show the distribution of expenditure of a company across multiple areas in 2024 and 2025. The total expenditure in 2024 was ₹18,00,000 and the total expenditure in 2025 was ₹24,00,000. Find the increase in expenditure (in ₹) on Research from 2024 to 2025.

Percentage wise expenditure distribution in 2024



Percentage wise expenditure distribution in 2025



A. 1,80,000

B. 2,70,000

C. 2,40,000

D. 2,10,000



Mathematics

25 Questions • Answer Key

Q1 Annual Compounding

A sum of money amounts to ₹1,200 after 4 years and ₹2,400 after 8 years at compound interest. What is the principal?

- A. ₹640
- B. ₹598
- C. ₹575
- D. ₹600



Q2 Annual Compounding

Arun had ₹1,681 with him. He divided this amount between his sons, Mahesh and Vijay, and asked them to invest it at a rate of 5% per annum, compounded annually. It was observed that Mahesh and Vijay received the same amount after 14 years and 15 years, respectively. How much money (in ₹) did Arun give to Mahesh?

- A. 861
- B. 711
- C. 820
- D. 920



Q3 Basic Profit & Loss

A shopkeeper buys two watches for ₹1,200 each. He sells the first watch at a profit of 15% and the second watch at a loss of 10%. He then gives ₹100 cashback to the buyer who bought the first watch. What is the shopkeeper's overall profit or loss?

- A. ₹60 profit
- B. ₹15 profit
- C. ₹30 loss
- D. ₹40 loss



Q4 Basic TSD

Kaushal travelled for 2 hours 55 minutes at the speed of 24 km/h. At what speed (in km/h) should he travel to cover the same distance in 5 hours?

- A. 11
- B. 14
- C. 13
- D. 12



Q5 Curved & Total Surface Area

A cone has a slant height of 15 cm and the radius of its base is 9 cm. A sector of a circle with a radius of 15 cm and a central angle of 120° is used to make the cone. What is the total surface area of the cone?

- A. $216\pi \text{ cm}^2$
- B. $312\pi \text{ cm}^2$
- C. $226\pi \text{ cm}^2$
- D. $261\pi \text{ cm}^2$



Q6 Dividing Quantity in Ratio

A sum of money is divided amongst A, B, C and D in the ratio of 3 : 7 : 9 : 13. If the share of D is ₹6,890, then what will be the share of A (in ₹)?

- A. 1,500
- B. 1,590
- C. 1,560
- D. 1,530



Q7 Find Principal

If the simple interest earned on a sum for 3 years at 5% per annum is ₹1,500, what was the sum?

- A. ₹10,000
- B. ₹8,000
- C. ₹9,000
- D. ₹7,000



Q8 HCF and LCM

Two numbers are 12 and 18. What is the product of their HCF and LCM?

- A. 216
- B. 324
- C. 108
- D. 432



Q9 HCF/LCM Word Problems

The HCF and the LCM of two numbers are 4 and 288, respectively. If one of the numbers is 32, then what is the other number?

A. 24

B. 18

C. 36



D. 48

Q10 Leaving Midway

Anshu can do a piece of work in 24 days, and Kajal can do it in 28 days. They work together for 6 days after which Anshu leaves the work, and the remaining work is completed by Kajal alone. In how many days will the entire work be completed?

A. 28 days

B. 18 days

C. 21 days



D. 24 days

Q11 Mean Proportional

If 7 and 20 are two numbers, what is their mean proportional?

A. $10\sqrt{15}$

B. $16\sqrt{5}$

C. $2\sqrt{35}$



D. $14\sqrt{10}$

Q12 Median

The mean and the mode of a set of data are 46.6 and 45.1, respectively. Find the median of the data, using the empirical formula.

A. 46.7

B. 46.1



C. 46.8

D. 47.9

Q13 Price and Consumption

The price of petrol increases by 10%. By what percentage must a person reduce consumption so that the total expenditure on petrol increases by only 5%? (Round off your answer to two decimal places.)

A. 4.15%

B. 4.45%

C. 4.55%



D. 4.35%

Q14 Rectangle & Square

If the area of a rectangle is 12 cm^2 and its diagonal measures 5 cm, then find the perimeter of the rectangle.

A. 16 cm

B. 15 cm

C. 14 cm



D. 13 cm

Q15 Round Trip

A man can row at 9 km/h in still water. When the river flows at 5 km/h, it takes him 2.4 hours to row to a certain place and return. How far is the place? (Rounded off to 2 decimal places)

A. 7.47 km



B. 6.42 km

C. 9.54 km

D. 8.18 km

Q16 Rules for 2,3,4,5,6

If a 7-digit number 91056A4 is completely divisible by 3, what is the least value of A?

A. 10

B. 5

C. 1

D. 2

**Q17 Successive Discount**

The marked price of a cooker is same at four shops I, II, III and IV.

Shop I allows two successive discounts of 78% and 25%, shop II allows successive discounts of 83% and 29%, shop III allows successive discounts of 33% and 81%, and shop IV allows successive discounts of 84%, 83%, and 82% on the marked price of the cooker.

Which shop is selling the cooker at the lowest price?

A. III

B. IV



C. I

D. II



Q18 Two Successive Changes

The present salary of an officer is ₹15,000. It was increased by 10% in the first year, decreased by 20% in the second year. What was his salary at the end of the second year?

A. ₹13,600

B. ₹13,400

C. ₹13,200



D. ₹13,800

Q19 Weighted Average

The average daily wage of 90 workers in a factory is ₹140, and the average daily wage of female workers is ₹130. If one-third of the workers are male, what is the average daily wage of the male workers?

A. ₹164

B. ₹160



C. ₹152

D. ₹156

Q20 Weighted Average

A student scored 60 and 80 in two tests with weights 2 and 3, respectively. What is the weighted average score?

A. 73

B. 72



C. 75

D. 70

Q21 $(a+b)^2, (a-b)^2$

To a square plot having an area of $x \text{ m}^2$, a strip having an area of $\frac{1}{4}\sqrt{x} \text{ m}^2$ and a patch having an area of $a^2 \text{ m}^2$ are added. If the total area can now be expressed as a perfect square using powers of x and constants, find the positive value of a .

A. $\frac{1}{8}$



B. $\frac{1}{2}$

C. $\frac{1}{4}$

D. $\frac{1}{16}$

Q22 Basic Trigonometric Ratios

If θ is an acute angle and $9\sin\theta = 5$, then find the value of $\frac{2}{3}\sqrt{5 \cot^2\theta - 14 \tan^2\theta}$

A. $\sqrt{\frac{11}{5}}$



B. $\frac{5}{\sqrt{11}}$

C. $\frac{11}{\sqrt{5}}$

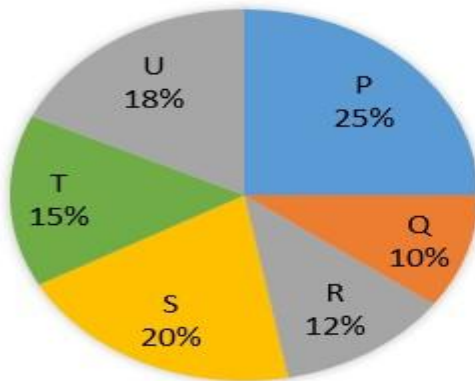
D. $\sqrt{\frac{5}{11}}$



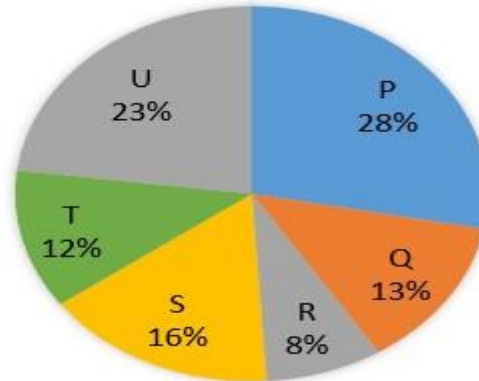
Q23 Double Pie Chart

Study the two pie charts and answer the question that follows. The first pie chart shows the percentage distribution of total population of six villages in 2024 and second pie chart shows the percentage distribution of female population in these six villages in 2024.

Total population of
six villages in 2024 = 1,50,000



Female population of
six villages in 2024 = 75,000



What is the total number of males in village T and P together?

- A. 37,500
- B. 60,000
- C. 75,000
- D. 30,000

**Q24 Parallel Lines & Transversal**

Two parallel lines are cut by a transversal. If one of the interior angles measures 70° , find the measure of the consecutive interior angle on the same side of the transversal.

- A. 35°
- B. 110°
- C. 70°
- D. 140°

**Q25 Trigonometric Identities**

Simplify the following.

$$\frac{\sin A - \sin B}{\cos A + \cos B} + \frac{\cos A - \cos B}{\sin A + \sin B} + \frac{2(1 + \cos A)(1 - \sin A)}{(1 - \sin A + \cos A)^2}$$

- A. $\sec A$
- B. 0
- C. $\sin A$
- D. 1



Mathematics

25 Questions • Answer Key

Q1 Arithmetic Mean

Calculate the mean of the following numbers: 283, 261, 253, 175, 186 and 192

A. 235

B. 220

C. 230

D. 225 ✓

Q2 Direct Proportion

If one dozen notebooks cost ₹360, then what will be the cost of 5 such notebooks?

A. ₹160

B. ₹150 ✓

C. ₹120

D. ₹180

Q3 Equal Installments

Mr. X borrowed an amount of ₹50,000 for 40 months. If he repaid ₹1,625 as monthly installment, then find the simple rate of interest.

A. 9% ✓

B. 8%

C. 7.5%

D. 6.8%

Q4 Find Principal

A certain sum of money is invested at simple interest for 3 years at 3% per annum. The simple interest earned is equal to half of the compound interest earned on ₹6,000 invested for 2 years at 6% per annum, compounded annually. Find the sum invested at simple interest.

A. ₹4,120 ✓

B. ₹4,350

C. ₹3,650

D. ₹3,890

Q5 Finding Value from Percentage

In an election, a total of 8,000 votes were cast. Candidate X received 55% of the total votes. Find the number of votes received by candidate X.

A. 4,000

B. 4,400 ✓

C. 4,600

D. 4,200

Q6 Half-Yearly Compounding

The compound interest (in ₹, rounded off to the nearest tens) on ₹12,000 at the rate of 10% per annum for 1.5 years, if interest is compounded half-yearly, is:

A. 1,870

B. 1,980

C. 1,890 ✓

D. 1,970

Q7 Interior/Exterior Angle Formulas

Let A be a regular polygon such that each interior angle of A exceeds its exterior angle by 120° . Find the number of sides of A.

A. 18

B. 10

C. 12 ✓

D. 15

Q8 MP with Discount and Profit

A trader gains 50% by selling an article after two successive discounts of 25% and 80% on its marked price. If the cost price of the article is increased by 74%, then what single discount should he now give on the same marked price to get the same profit percentage as earlier?

A. 69.5%

B. 72.62%

C. 73.9% ✓

D. 66.56%



Q9 Proportion

If the numbers 25, 35, 45.2, and x are in proportion, find the value of x .

A. 63.28



B. 52.56

C. 70.78

D. 56.23

Q10 Proportion

Find the fourth proportional to 2.5, 4, and 10.

A. 12

B. 16



C. 14

D. 18

Q11 Relative Speed

A train leaves Station A for Station B at 7:00 a.m., traveling at a speed of 80 km/h. Another train leaves Station B for Station A at 8:30 a.m., traveling at 100 km/h on the same track. If the distance between the two stations is 550 km, at what time will the two trains meet each other?

A. 10:35:20 a.m.

B. 10:52:20 a.m.

C. 10:53:20 a.m.



D. 10:53:21 a.m.

Q12 Rules for 2,3,4,5,6

If a 7-digit number 87321A6 is completely divisible by 6, what is the least value of A?

A. 0



B. 3

C. 1

D. 2

Q13 Simple Mean

What is the average of 2, 4, 6, and 8?

A. 4

B. 7

C. 6

D. 5

**Q14 Simultaneous Fill & Empty**

A water tank has two inlet pipes A and B, and one outlet pipe C. Pipe A alone can fill the tank in 12 hours, pipe B alone can fill it in 18 hours, and pipe C alone can empty the full tank in 24 hours. If all three pipes are opened together, in how much time will the tank be filled? (Rounded off to one decimal place)

A. 11.2 hours

B. 10.3 hours



C. 9.5 hours

D. 12.5 hours

Q15 Two Successive Changes

A trader purchases oil at ₹500 per barrel. He first increases the price by 20% and later decreases the increased price by 10%. What is the final price per barrel?

A. ₹550

B. ₹560

C. ₹540



D. ₹500

Q16 Two Trains Crossing

A train 500 m long and traveling at 72 km/h crosses another train 410 m long and moving at 54 km/h in the opposite direction. How much time will it take for the trains to completely cross each other?

A. 18 seconds

B. 26 seconds



C. 32 seconds

D. 40 seconds

Q17 Volume

The volume and height of a cylinder are 1232 cm^3 and 24.5 cm, respectively. Find the radius (in cm) of the cylinder. (Use $\pi = 22/7$)

A. 4



B. 5

C. 10

D. 11



Q18 Area of Regular Polygons

A regular hexagonal garden has each side measuring 21 m. A circular fountain of radius 7 m is built at the centre. Find the area (rounded off to one decimal place) of the remaining garden.

(Use $\pi = \frac{22}{7}$ and $\sqrt{3} = 1.73$)

A. 996.4 m²

B. 981.4 m²

C. 990.4 m²



D. 986.4 m²

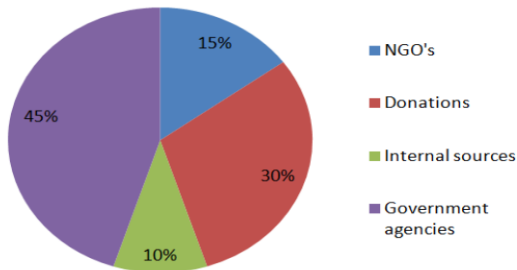
Q19 Double Pie Chart

Study the following pie charts carefully and answer the question given below it.

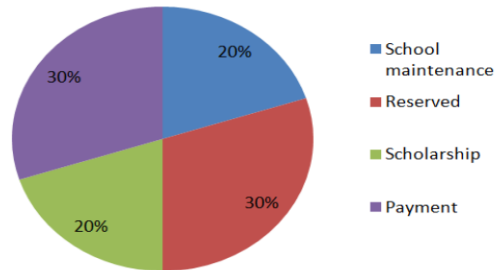
The entire fund that school gets from different sources is equal to ₹700 lakh.

If the school managed school maintenance from the government agencies fund only, how much fund (in ₹) from government agencies would still be left for other uses?

Sources of funds in school



Uses of funds by school



A. 165 lakh

B. 155 lakh

C. 175 lakh



D. 185 lakh

Q20 Family Age Problems

The sum of the present ages of a mother and her daughter is 50 years. Five years ago, the mother was seven times as old as her daughter. What is the present age of the daughter?

A. 12 years

B. 14 years

C. 11 years

D. 10 years



Q21 MP with Discount and Profit

A dealer buys an article at a discount of 25% on its list price and marks it at 35% above the list price. If he allows a discount of 20% on the new marked price, find his profit percent.

A. 44%



B. 34%

C. 42%

D. 36%

Q22 Mean of Grouped Data

If the mean of the following data is 49, then what is the value of x?

Class	20-30	30-40	40-50	50-60	60-70
Frequency	24	34	15	36	x

A. 61

B. 84

C. 56



D. 77

Q23 Pythagorean Identities

If $\cos\theta + \cos^2\theta = \sec^2\theta - \tan^2\theta$, then the value of $\sin^2\theta + \sin^4\theta$ is:

A. 0

B. cosec θ

C. 1

D. $\cos^2\theta$ **Q24** $a^2 - b^2$

Simplify: $\sqrt{(272)^2 - (128)^2}$.

A. 256

B. 200

C. 144

D. 240

**Q25** $\sin^2 + \cos^2 = 1$

For an acute angle θ , if $\sin\theta + \cos\theta = \sqrt{2}$, find the value of $\sin^4\theta + \cos^4\theta$.

A. $\frac{1}{\sqrt{2}}$

B. 1

C. $\frac{1}{2}$ D. $\frac{1}{4}$ 

Mathematics

25 Questions • Answer Key

Q1 2-Year Difference

The compound interest on a sum for two years is ₹1,560 and the corresponding simple interest is ₹1,500. Find the compound interest on the same sum at the same rate of interest for three years.

- A. ₹2,466.50
- B. ₹2,245.60
- C. ₹2,345.30
- D. ₹2,434.80



Q2 Angle of Elevation

A boy is standing at a distance of 20 m from a tree. The angle of elevation of the top of the tree from his eyes is 45° . Find the height of the tree. (Ignore the boy's height.)

- A. 20 m
- B. 10 m
- C. 40 m
- D. 15 m



Q3 Annual Compounding

A sum of ₹60,000 amounts to ₹71,460.96 after 3 years when interest is compounded yearly. Find the annual rate of interest.

- A. 8 %
- B. 5 %
- C. 7 %
- D. 6 %



Q4 Average Speed

A car covers the first 120 km at 40 km/hr, the next 180 km at 60 km/hr, and the last 100 km at 50 km/hr. Find the average speed of the car for the entire journey.

- A. 55 km/hr
- B. 51 km/hr
- C. 53 km/hr
- D. 50 km/hr



Q5 Basic Ratio

Two numbers are in the ratio 2:3. If 8 is subtracted from each number, the resulting ratio becomes 1:2. What was the original larger number?

- A. 16
- B. 18
- C. 24
- D. 12



Q6 Building/Tower Problems

The angles of elevation of the top of a tower from two points given on the same straight line and on the same side of the tower are 30° and 60° . If the distance between the two points is 20 m, find the height of the tower.

- A. $8\sqrt{3}$ m
- B. 8 m
- C. $10\sqrt{3}$ m
- D. 12 m



Q7 CP-SP Relation

A dealer sells an article at a 25% profit. The buyer then sells it at a 10% loss. If the original cost price was ₹1,200, what is 40% of the final selling price of the article?

- A. ₹630
- B. ₹480
- C. ₹600
- D. ₹540



Q8 Decimal Operations

Simplify: $0.65 \div 0.13 + 3.5 - 2.825$

- A. 5.175
- B. 5.375
- C. 5.875
- D. 5.675



Q9 Finding Present Age

A's age 6 years ago was half of what it will be 6 years from now. What is A's present age (in years)?

A. 24

B. 18



C. 12

D. 30

Q10 Finding Value from Percentage

Ravi spends 80% of his monthly income. If his monthly income is ₹25,000, find his monthly savings.

A. ₹5,000



B. ₹6,000

C. ₹7,000

D. ₹4,000

Q11 Laws of Indices

Given that $69^{0.96} = x$, $69^{0.75} = y$ and $x^z = y^2$, then the value of z is close to:

A. 0.85

B. 1.56



C. 3.48

D. 2.93

Q12 Multiple Pipes

Pipe A can fill a tank in 4 hours, pipe B can fill the same tank in 6 hours and pipe C can fill the same tank in 12 hours. The time taken (in hours) by them to fill half of the same tank if they operate together is:

A. 1



B. 3

C. 4

D. 2

Q13 Percentage Increase/Decrease

The income of Raman is ₹61,500. He saves 17% of his income. If his income increases by 38% and expenditure increases by 20%, then his savings will:

A. decrease by ₹13,159

B. increase by ₹13,156

C. increase by ₹13,161



D. decrease by ₹13,165

Q14 Proportion

Find the fourth proportional to the numbers 8, 32 and 17.

A. 56

B. 68



C. 46

D. 58

Q15 Relative Speed

The distance between two cities, A and B, is 250 km. A motorcyclist starts from A towards B at 6:30 a.m. at a speed of 40 km/hr. Another motorcyclist starts from B towards A at 8:30 a.m. at a speed of 50 km/hr. At what time will they cross each other?

A. 1:27:48 p.m.

B. 2:25:24 p.m.

C. 11:33:51 a.m.

D. 10:23:20 a.m.

**Q16 Successive Discount**

The marked price of a cooker is same at four shops I, II, III and IV.

Shop I allows two successive discounts of 46% and 62%, shop II allows successive discounts of 16% and 77%, shop III allows successive discounts of 74% and 54%, and shop IV allows successive discounts of 12%, 98%, and 86% on the marked price of the cooker.

Which shop is selling the cooker at the lowest price?

A. IV



B. II

C. I

D. III

Q17 Tangent from External Point

A tangent is drawn to a circle of radius 12 cm from a point situated at a distance of 13 cm from the centre of the circle. The length of the tangent will be:

A. 12 cm

B. 6 cm

C. 8 cm

D. 5 cm



Q18 Two Items Mixing

430 grams of sugar solution has 20% of sugar in it. How much sugar should be added to make it 50% in the solution?

A. 248 grams

B. 258 grams



C. 278 grams

D. 268 grams

Q19 Volume

A spherical tank with radius 2 meters is filled with water up to three-fourths of its volume. How many cubic meters of water does it contain? (Use $\pi = 3.14$)

A. 33.36

B. 25.12



C. 36.84

D. 29.24

Q20 3D Mensuration

A cylindrical tank of radius 3.5 m and height 10 m is filled with water. The water is to be emptied into a cuboidal tank of length 7 m and breadth 5 m. Find the height of the water in the cuboidal tank after the entire water from the cylinder is poured into it. (Use $\pi = \frac{22}{7}$)

A. 12 m

B. 10 m

C. 11 m



D. 13 m

Q21 Bracket Simplification

Simplify: $6 \div \left[(9 - 6) \div \left\{ (5 - 3) \div \left(2 + \frac{8}{13} \right) \right\} \right]$

A. $\frac{7}{17}$

B. $\frac{34}{13}$

C. $\frac{26}{17}$



D. $\frac{13}{17}$

Q22 Find Time

If ₹2,500 earns a simple interest of ₹500 at a rate of 5% per annum, how long was the money invested?

A. 3 years

B. 4 years



C. 6 years

D. 5 years



Q23 Grouped Data Mode

Calculate mode from the given data.

Class Interval	0-5	5-10	10-15	15-20	20-25
Number of states	15	10	6	7	2

A. 0.25

B. 3.75



C. 2.65

D. 1.45

Q24 Mean of Grouped Data

What is the value of $(2x + 4y)$, if mean of the following distribution is 42?

Class	0-20	20-40	40-60	60-80	80-100	Total
Frequency	8	20	x	2	y	70

A. 75

B. 86

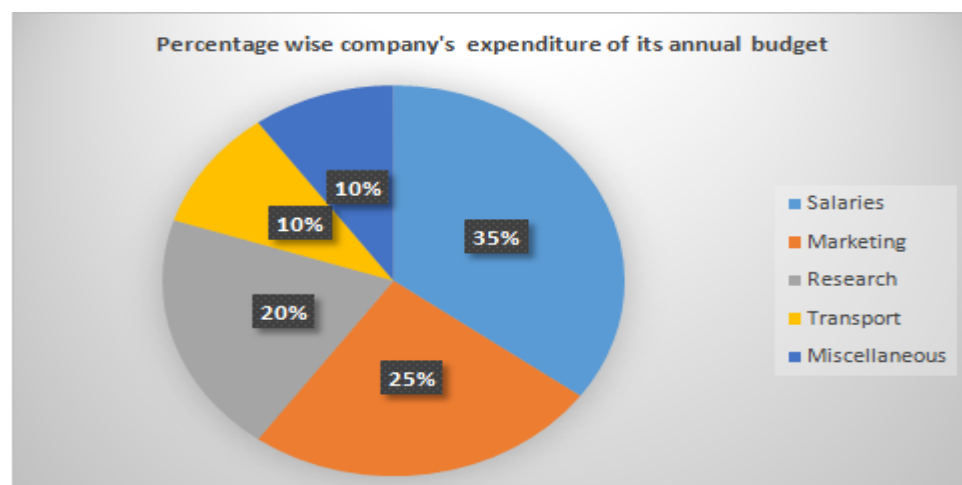


C. 100

D. 68

Q25 Percentage Based

A company spends its annual budget in the following sectors. If total budget is ₹20,00,000, how much amount (in ₹) is spent on Research and Transport together?



A. 6,00,000



B. 5,50,000

C. 5,00,000

D. 6,50,000



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Mathematics

25 Questions • Answer Key

Q1 $(a+b)^2, (a-b)^2$

Simplify:

$$(2a + 3b)^2 - (2a - 3b)^2$$

A. 18ab

B. 20ab

C. 25ab

D. 24ab

**Q2** Annual Compounding

A sum amounts to a compound interest, compounded annually of ₹4,837.50 in 2 years at the rate of 15% per annum. Find the principal amount.

A. ₹15,000



B. ₹13,000

C. ₹14,000

D. ₹12,000

Q3 Annual Compounding

Rishi has ₹1,681, which he distributes between his two sons, Shan and Piyush. He instructs them to invest their respective amounts at a compound interest rate of 5% per annum, compounded annually. After 13 years, Shan's investment matures to the same amount as Piyush's investment after 14 years. Determine the amount (in ₹) that Rishi gave to Shan.

A. 861



B. 820

C. 711

D. 920

Q4 Average Speed

One-third of a journey is covered at a speed of 56 km/hr, the next one-third of the journey is covered at a speed of 7 km/hr, and the remaining journey is covered at a speed of 14 km/hr. The average speed (in km/hr, rounded off to 1 decimal place) for the entire journey is:

A. 7.9

B. 18.1

C. 13.6

D. 12.9

**Q5** Basic Time & Work

15 workers can build a wall in 22 days. How many days will 12 workers take to build the same wall (assuming the same efficiency).

A. 25 days

B. 30 days

C. 28.5 days

D. 27.5 days

**Q6** Composite 3D Shapes

A solid cylinder of base radius 7 cm and height 12 cm has a conical cavity of the same base radius and 8 cm height. Find the volume of the remaining solid.

[Use $\pi = 22/7$ and round off your answer to two decimal places.]

A. 1417.33 cm³B. 1437.33 cm³C. 1452.33 cm³D. 1402.33 cm³**Q7** Find SI

What is the simple interest on a sum of ₹10,000 at 5% per annum for 2 years?

A. ₹1,200

B. ₹1,500

C. ₹800

D. ₹1,000

**Q8** Finding HCF

Find the HCF of the numbers 252, 396, and 524.

A. 9

B. 36

C. 4



D. 12



Q9 Median

In a moderately asymmetrical frequency distribution, the values of the mean and mode are 54.3 and 62.1, respectively. Find the median value.

A. 56.9



B. 57.2

C. 55.7

D. 57.9

Q10 Multiple Pipes

Pipe A can fill a tank in 4 hours, pipe B can fill the same tank in 5 hours and pipe C can fill the same tank in 20 hours. The time taken (in hours) by them to fill half of the same tank if they operate together is:

A. 2

B. 4

C. 3

D. 1

**Q11 Population Based Problems**

The population of a town decreased from 80,000 to 72,000. Find the percentage decrease in population.

A. 10%



B. 12%

C. 15%

D. 8%

Q12 Profit/Loss Percentage

If the cost price of an article is ₹500 and is sold at ₹400, then find the loss percentage.

A. 80%

B. 25%

C. 20%



D. 100%

Q13 Ratio Comparison

Arrange the following ratios in descending order.
2: 5, 3: 8, 5: 6, 4: 7

A. $5:6 > 3:8 > 2:5 > 4:7$

B. $5:6 > 3:8 > 4:7 > 2:5$

C. $5:6 > 4:7 > 2:5 > 3:8$



D. $5:6 > 4:7 > 3:8 > 2:5$

Q14 Relative Speed

Two trains leave the same station and travel in the same direction. If the faster train moves at 54 km/h and the distance between them becomes 42 km after 6 hours, what is the speed of the slower train?

A. 47 km/h



B. 48 km/h

C. 45 km/h

D. 50 km/h

Q15 Rules for 7,8,9,11

If a 7-digit number 65873A8 is completely divisible by 22, what is the value of A?

A. 7

B. 1

C. 2



D. 3

Q16 Simple Mean

Find the average of 453, 397, 332 and 84.

A. 316.5



B. 306.5

C. 326.5

D. 336.5

Q17 Successive Discount

The marked price of a cooker is same at four shops I, II, III and IV.

Shop I allows two successive discounts of 80% and 44%, shop II allows successive discounts of 58% and 62%, shop III allows successive discounts of 67% and 85%, and shop IV allows successive discounts of 41%, 91%, and 74% on the marked price of the cooker.

Which shop is selling the cooker at the lowest price?

A. I

B. IV



C. III

D. II



Q18 Time-based Partnership

Three partners, P, Q, and R, start a business by investing capital in the ratio 5 : 4 : 3. At the end of one year, the business earns a total profit of Rs. 48,000. If Q withdraws his investment after 6 months, while P and R keep their investments in the business for the entire year, what amount of profit should Q receive?

A. Rs. 9,600



B. Rs. 8,000

C. Rs. 6,000

D. Rs. 12,000

Q19 Two Successive Changes

The price of an article is increased by 36%. After this increase, it is decreased by 30%. If the final price of the article is ₹132 less than the original price, find the original price of the article.

A. ₹2,940

B. ₹2,280

C. ₹2,460

D. ₹2,750

**Q20 Base-Height Method**

Find the height of the triangle whose base is one-fourth of its height and area is 169 cm^2 .

A. 26 cm

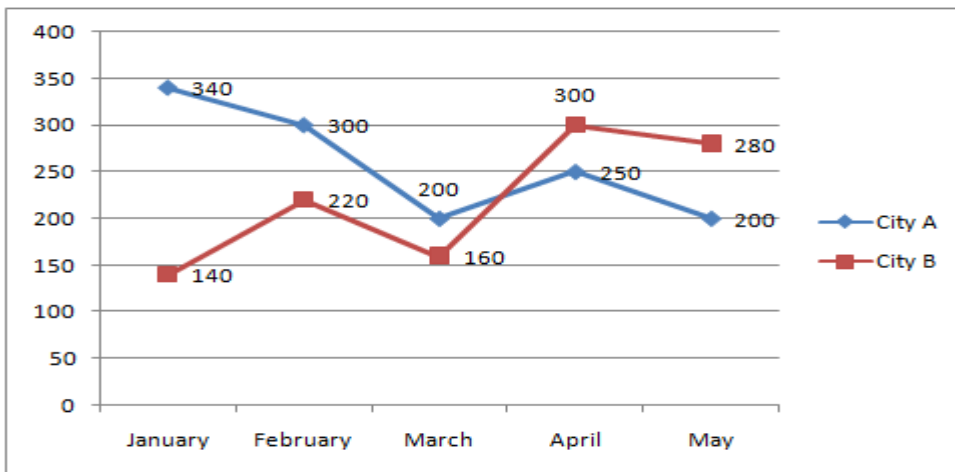
B. 19.5 cm

C. $13\sqrt{6}$ cm

D. $26\sqrt{2}$ cm

**Q21 Comparative Trend**

The given line graph shows the number of tourists (in hundreds) in two cities A and B in five different months in the year 2023. Study the graph and answer the question that follows.



What is the ratio between the total number of tourists in city B in February to May to that in city A in January to February?

A. 2:3

B. 5:6

C. 6:5

D. 3:2



Q22 Mean of Grouped Data

If the mean of the following data is 45, then what is the value of x?

Class	10-20	20-30	30-40	40-50	50-60
Frequency	41	46	28	12	x

A. 250

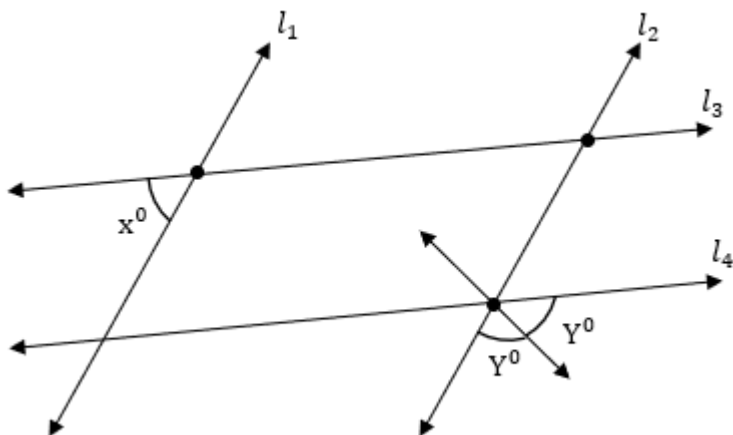
B. 238

C. 243

D. 245

Q23 Parallel Lines & Transversal

Consider the following figure:



If $l_1 \parallel l_2$ and $l_3 \parallel l_4$, then which one of the following relations is correct?

A. $2Y^\circ + x^\circ = 180^\circ$ B. $Y^\circ + 2x^\circ = 180^\circ$ C. $Y^\circ + x^\circ = 180^\circ$ D. $2Y^\circ = x^\circ$ **Q24 Pythagorean Identities**

If $\sin A = \frac{3}{5}$, then find the value of $\sqrt{\frac{1 + \sin A}{1 - \sin A}} + \sqrt{\frac{1 - \sin A}{1 + \sin A}} + \sqrt{\frac{\sec A - \tan A}{\sec A + \tan A}}$.

A. 7

B. 3

C. 5

D. 1



Q25 tan-cot Relation

If $\tan\theta + \cot\theta = 2$, find $\tan^2\theta + \cot^2\theta$.

A. 0

B. 2



C. 1

D. 4



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Mathematics

25 Questions • Answer Key

Q1 2-Year Difference

The compound interest on a sum for two years is ₹1,560 and the corresponding simple interest is ₹1,500. Find the compound interest on the same sum at the same rate of interest for 3 years.

- A. ₹2634.80
- B. ₹2260.20
- C. ₹2456.40
- D. ₹2434.80



Q2 Age in Ratio Form

If the ratio of the present age of Anusha to the present age of Vishnu is 8:5 and the sum of their present ages is 78 years, find the present age of Vishnu.

- A. 32 years
- B. 30 years
- C. 34 years
- D. 36 years



Q3 Annual Compounding

Divide ₹16,165 between Prateek and Siva Prasad such that Prateek's share at the end of 3 years is equal to Siva Prasad's share at the end of 5 years, with compound interest at 20% per annum, compounded annually. Then Prateek's share is:

- A. ₹9144
- B. ₹7021
- C. ₹9540
- D. ₹6625



Q4 Basic Ratio

Two numbers are, respectively, 15% and 40% more than the third number. What is the ratio between the two numbers?

- A. 24 : 28
- B. 20 : 28
- C. 23 : 28
- D. 23 : 26



Q5 Basic TSD

A student is travelling to an examination center. If he travels by his bicycle at 10 km/hr, he will be 15 minutes late. If he travels by an auto at 12 km/hr, he will be 5 minutes early. What is the distance to the examination center?

- A. 15 km
- B. 24 km
- C. 20 km
- D. 18 km



Q6 Crossing Bridge/Platform

A train with a speed of 126 km/hr crosses a bridge in 50 seconds. Another train 150 m longer than the first train, crosses the same bridge at 90 km/hr. The time (in seconds) taken by the second train to cross the bridge, is:

- A. 70
- B. 68
- C. 76
- D. 74



Q7 Finding Value from Percentage

A person spends 70% of his income and saves ₹6,000. Find his total income.

- A. ₹18,000
- B. ₹20,000
- C. ₹22,000
- D. ₹24,000



Q8 HCF/LCM Word Problems

Rahul visits the library every 6 days, Priya visits every 8 days, and Amit visits every 12 days. If all three meet at the library today, after how many days will they all next meet there?

- A. 16 days
- B. 20 days
- C. 24 days
- D. 28 days



Q9 Indices/Exponents

Arrange the following in descending order: 16^6 , 27^4 , 5^{12} .

A. $5^{12} > 16^6 > 27^4$ ✓

B. $27^4 > 16^6 > 5^{12}$

C. $27^4 > 5^{12} > 16^6$

D. $16^6 > 5^{12} > 27^4$

Q10 Laws of Indices

Given that $148^{0.27} = x$, $148^{0.51} = y$ and $x^z = y^6$, then the value of z is close to:

A. 13.37

B. 10.11

C. 11.33 ✓

D. 12.22

Q11 MP with Discount and Profit

A shopkeeper increases the price of an article by 20% above the cost price and then offers a discount of 25% on the new price. Later, he again increases the discounted price by 10%. If the cost price of the article was ₹500, what is the final price of the article?

A. ₹490

B. ₹485

C. ₹495 ✓

D. ₹510

Q12 Median

The mean and the mode of a set of data are 16.4 and 24, respectively. Find the median of the data, using the empirical formula. (Round off to one decimal place)

A. 20.7

B. 18.9 ✓

C. 20.4

D. 19.6

Q13 Multiple Pipes

Pipe A can fill a tank in 3 hours, pipe B can fill the same tank in 24 hours and pipe C can fill the same tank in 8 hours. The time taken (in hours) by them to fill half of the same tank if they operate together is:

A. 3

B. 1 ✓

C. 4

D. 2

Q14 Number of Diagonals

Let A be a regular polygon such that the sum of the interior angles of A is 2340° . Find the number of diagonals of A.

A. 86

B. 90 ✓

C. 100

D. 120

Q15 Profit/Loss Percentage

A trader buys an article for ₹350 and sells it for ₹420. Find his profit percentage.

A. 20% ✓

B. 15%

C. 30%

D. 25%

Q16 Proportion

If 7, 14.2, 21.7, and x are in proportion, what is the value of x ?

A. 44.02 ✓

B. 48.08

C. 50.12

D. 46.04

Q17 Sphere & Hemisphere

The surface area of a sphere is numerically equal to the volume of the same sphere. What is the radius of the sphere?

A. 3 units ✓

B. 9 units

C. 4 units

D. 6 units

Q18 Successive Discount

The marked price of a cooker is same at four shops I, II, III and IV.

Shop I allows two successive discounts of 78% and 43%, shop II allows successive discounts of 74% and 83%, shop III allows successive discounts of 15% and 93%, and shop IV allows successive discounts of 93%, 84%, and 42% on the marked price of the cooker.

Which shop is selling the cooker at the lowest price?

A. III

B. I

C. IV ✓

D. II



Q19 Weighted Average

A factory buys 10 machines: 6 of Machine A, 4 of Machine B. Their prices are ₹20300 and ₹87000, respectively. Find the average cost of the machines.

A. ₹46960

B. ₹46980



C. ₹46970

D. ₹46990

Q20 Basic Trigonometric Ratios

If $\operatorname{cosec} A = \sqrt{10}$, find the value of $\frac{3 \sin^2 A + 4 \cot^2 A}{6(\tan^2 A + \cos^2 A)}$.

A. $\frac{545}{91}$

B. $\frac{726}{91}$

C. $\frac{1089}{182}$



D. $\frac{1017}{182}$

Q21 Basic Trigonometric Ratios

If $\tan A = \frac{27}{36}$ and A is an acute angle, find the value of $\sqrt{1 + \frac{2 \sin A + \cos A}{5 \cos A - \sin A}}$.

A. $5\sqrt{\frac{3}{17}}$

B. $\frac{5\sqrt{3}}{17}$

C. $3\sqrt{\frac{3}{17}}$

D. $\frac{3\sqrt{3}}{17}$

**Q22 Cylinder**

A steel factory constructs a closed cylindrical tank. The entire outer surface (including top and bottom) is painted at ₹3 per cm^2 . The total painting cost is ₹2,772. If the height of the cylinder is twice its radius, what is its volume? (Use $\pi = \frac{22}{7}$)

A. 2,282 cm^3

B. 2,246 cm^3

C. 2,156 cm^3



D. 2,236 cm^3



Q23 Find Rate

If the simple interest on ₹4,000 for 3 years is ₹960, what is the rate of interest per annum?

A. 8%



B. 7%

C. 9%

D. 6%

Q24 Mean of Grouped Data

Find the Arithmetic mean of the following data:

x_i	5	12	10	15	18
f_i	24	25	28	30	40

(Answer correct to two decimal places)

A. 16.72

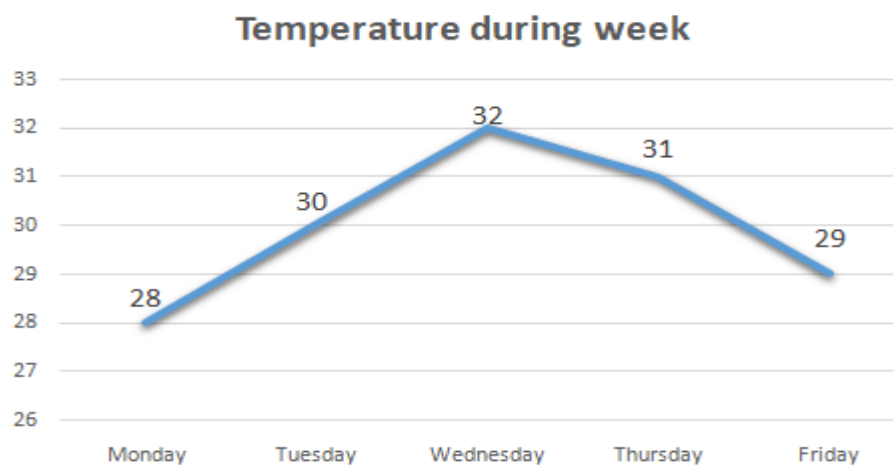
B. 11.72

C. 10.66

D. 12.72

**Q25 Trend Analysis**

The given line graph data shows the temperature (in °C) recorded during a week. On which day was the second highest temperature recorded?



A. Wednesday

B. Tuesday

C. Friday

D. Thursday



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Mathematics

25 Questions • Answer Key

Q1 Algebraic Identities

If $a + b = 9$ and $ab = 13$, then the value of $(a^2 + b^2)(a^3 + b^3)$ is:

A. 20,390

B. 20,190

C. 20,590

D. 20,790 ✓

Q2 Annual Compounding

A sum of money amounts to ₹9,016 at the rate of 12% compound interest per annum, compounded annually for 2 years. The sum of money is:

A. ₹7,163.50

B. ₹7,175.50

C. ₹7,187.50 ✓

D. ₹7,189.50

Q3 Annual Compounding

Gopal had ₹1,681 with him. He divided this amount between his sons, Akshay and Arjun, and asked them to invest their respective shares at a rate of 5% per annum, compounded annually. It was observed that Akshay and Arjun received the same amount after 15 years and 16 years, respectively. How much (in ₹) did Gopal give to Akshay?

A. 711

B. 920

C. 820

D. 861 ✓

Q4 Basic Ratio

Three numbers are in the ratio 4:5:6. If the sum of the largest and smallest numbers is 165 more than the third number, what is the largest number?

A. 192

B. 198 ✓

C. 194

D. 196

Q5 Basic TSD

Kaushal travelled for 1 hour 21 minutes at the speed of 80 km/h. At what speed (in km/h) should he travel to cover the same distance in 12 hours?

A. 7

B. 12

C. 8

D. 9 ✓

Q6 Consecutive Numbers

What will be the average of 5, 6, 7, 8, 9,, 66, 67, 68, 69, 70, 71?

A. 36

B. 34

C. 38 ✓

D. 32

Q7 Median

For a given data, if mean is 45.76 and mode is 29.44, then find the median using empirical formula.

A. 41.34

B. 43.78

C. 42.45

D. 40.32 ✓

Q8 Multiple Pipes

Pipe A can fill a tank in 3 hours, pipe B can fill the same tank in 42 hours and pipe C can fill the same tank in 7 hours. The time taken (in hours) by them to fill half of the same tank if they operate together is:

A. 1 ✓

B. 3

C. 2

D. 4



Q9 Profit/Loss Percentage

A beautician buys some beauty products worth ₹9,500 but later sells them for ₹7,885. Find her loss percentage.

A. 17%



B. 19%

C. 11%

D. 13%

Q10 Rules for 2,3,4,5,6

The 7-digit number 92A224B is divisible by 3. What is the minimum value of (A + B)?

A. 6

B. 3

C. 1

D. 2

**Q11 Rules for 2,3,4,5,6**

What is the least value that must be assigned to A so that the number 455A1280 is divisible by 30?

A. 3

B. 5

C. 4

D. 2

**Q12 Single Change**

The price of a mobile phone increased from ₹20,000 to ₹24,000. Find the percentage increase in price.

A. 20%



B. 18%

C. 25%

D. 15%

Q13 Single Change

If the price of a pen decreases from ₹24 to ₹18, the percentage decrease is:

A. 25%



B. 5%

C. 35%

D. 15%

Q14 Successive Discount

The marked price of a cooker is same at four shops I, II, III and IV. Shop I allows two successive discounts of 59% and 97%, shop II allows successive discounts of 67% and 14%, shop III allows successive discounts of 13% and 18% and shop IV allows successive discounts of 80%, 46%, and 90% on the marked price of the cooker. Which shop is selling the cooker at the lowest price?

A. I

B. II

C. III

D. IV

**Q15 Triangle Area & Perimeter**

In an isosceles triangle UVW, $UV = UW = 25$ cm and $VW = 14$ cm, find the area of triangle UVW.

A. 180 cm²

B. 192 cm²

C. 154 cm²

D. 168 cm²

**Q16 Trigonometric Identities**

If $\cos A - \sin A = \sqrt{2} \sin A$, then what is the value of $(\cos A - \sin A)/(\cos A + \sin A)$?

A. $\cos A$

B. $\cot A$

C. $\tan A$



D. $\sin A$

Q17 Two Trains Crossing

Two trains are running on parallel tracks in the same direction. The first train, 150 m long, moves at a speed of 54 km/hr, while the second train, 120 m long, runs at 36 km/hr. How long will it take for the first train, coming from behind, to pass the second train completely?

A. 36 s

B. 45 s

C. 54 s



D. 40 s



Q18 Ungrouped Data Median

Ten observations written in descending order are 45, 34, 32, 30, $2x - 15$, $x + 3$, 17, 15, 14, and 8. If the median is 24, then find the value of x .

A. 21

B. 24

C. 20



D. 25

Q19 Basic Ratio

If $a:b:c:d = \sqrt{4} : \sqrt{3} : \sqrt{2} : 1$, then what is the value of $\left(\frac{-a^2 + b^2 + c^2 + d^2}{a^2 - b^2 + c^2 - d^2} \right)$?

A. 2

B. 1



C. -1

D. -2

Q20 Curved & Total Surface Area

The circumference of the base of a solid cone is 16π cm and the height of the cone is 15 cm.

The cost of painting this solid at a rate of ₹14 per square cm (Use $\pi = \frac{22}{7}$) is:

A. ₹8,921

B. ₹8,800



C. ₹8,910

D. ₹8,822

Q21 Find SI

Riya deposited ₹5,000 in a bank at a rate of 6% per annum. What will be the simple interest earned after 3 years?

A. ₹600

B. ₹1000

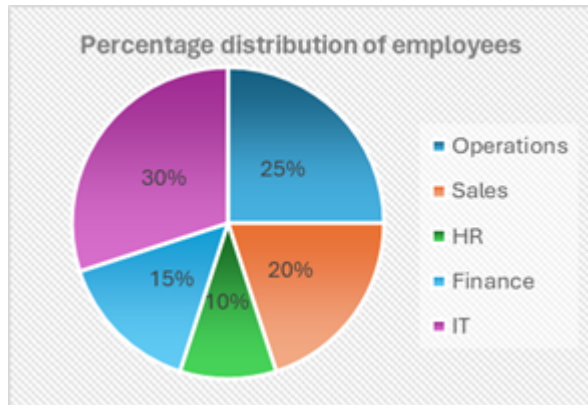
C. ₹750

D. ₹900



Q22 Percentage Based

A company has 1200 employees divided into various departments. The pie chart below shows the percentage distribution of employees across different departments.



If 15% of the employees in the Sales Department are transferred to the IT Department, how many employees will be left in Sales, and what will be the new percentage of IT employees in the company, respectively?

- A. 216, and 33%
- B. 216, and 32%
- C. 204, and 33%
- D. 204, and 32%

**Q23** Recurring Decimals

The number $1.\overline{074}$, when written in the form $\frac{p}{q}$, is equal to:

- A. $\frac{274}{999}$
- B. $\frac{174}{999}$
- C. $\frac{37}{27}$
- D. $\frac{29}{27}$

**Q24** Trapezium

A quadrilateral plot is in the shape of a trapezium. The lengths of the two parallel sides are $26\sqrt{3}$ m and $10\sqrt{3}$ m. The distance between them is 20 m. The plot is to be sold at ₹300 per square meter. What is the selling price of the plot?

- A. ₹2,54,960
- B. ₹2,56,788
- C. ₹2,59,800
- D. ₹2,57,575



Q25 $\sin^2 + \cos^2 = 1$

If $\sin\theta + \cos\theta = \sqrt{2}$, find $\sin\theta\cos\theta$.

A. 1

B. $\frac{1}{2}$



C. $\frac{1}{\sqrt{2}}$

D. 0



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Mathematics

25 Questions • Answer Key

Q1 Annual Compounding

Piyush has ₹1,681 with him. He divided this amount between his sons, Manoj and Anand, and asked them to invest their respective shares at a rate of 5% per annum, compounded annually. It was observed that Manoj and Anand received the same amount after 16 years and 17 years, respectively. How much (in ₹) did Piyush give Manoj?

A. 711

B. 861

C. 820

D. 920

Q2 Annual Compounding

A sum of ₹4,000 amounts to ₹4,410 in 2 years at compound interest, compounded annually. Find the annual rate of interest (in percentage).

A. 5%

B. 10%

C. 2.5%

D. 7.5%

Q3 Average Speed

A man travels from City A to City B at a speed of 60 km/h, then from City B to City C at 90 km/h, and finally returns directly from City C to City A at 72 km/h. If the distances between A and B and between B and C are equal, with B located between A and C, find his average speed for the entire journey.

A. 70 km/hr

B. 66 km/hr

C. 68 km/hr

D. 72 km/hr

Q4 Average Speed

One-third of a journey is covered at a speed of 62 km/hr, the next one-third of the journey is covered at a speed of 99 km/hr, and the remaining journey is covered at a speed of 51 km/hr. The average speed (in km/hr, rounded off to 1 decimal place) for the entire journey is:

A. 61.4

B. 60.8

C. 62.1

D. 65.5

Q5 Common Tangents

The distance between the centres of two circles having radii 11 cm and 5 cm, is 10 cm. The length of the direct common tangent of the two circles is:

A. 16 cm

B. 12 cm

C. 8 cm

D. 4 cm

Q6 Cost with Overhead Expenses

Arvind bought an article for ₹x. He sold it to Biru at a loss of 5%. Biru spent ₹118 on its transportation and sold it to Minu at a profit of 40%. If Minu bought it for ₹1,841, then what is the value of x?

A. ₹1,260

B. ₹1,251

C. ₹1,261

D. ₹1,225

Q7 Dividing Quantity in Ratio

A recipe requires flour, sugar, and butter in the ratio 3:2:1. If the total quantity of ingredients used is 18 cups, how many cups of sugar are needed?

A. 6

B. 9

C. 12

D. 3

Q8 Finding Ratio

A merchant has 2650 kg of rice, one part of which he sells at 36% profit and the rest at 16% profit. He gains 28% on the whole. Find the quantity sold at 16%.

A. 1020 kg

B. 1060 kg

C. 1040 kg

D. 1080 kg



Q9 HCF/LCM Word Problems

The HCF of two numbers is 11 and their LCM is 1870. If one number is 22, then find the unit's digit of the other number.

- A. 4
- B. 7
- C. 3
- D. 5

**Q10 Leaving Midway**

A person P can complete a project in 24 days, and the person Q can complete it in 36 days. They work together for 4 days, after which Q leaves. In how many days will P complete the remaining work? (Give your answer rounded off to two decimal places.)

- A. 17.33 days
- B. 17.67 days
- C. 17.87 days
- D. 17.53 days

**Q11 Order of Operations**

Evaluate: $16 - 5 \times 4 + 4$

- A. 0
- B. -1
- C. 2
- D. -2

**Q12 Percentage Increase/Decrease**

The income of Raman is ₹25,000. He saves 25.5% of his income. If his income increases by 20% and expenditure increases by 40%, then his savings will:

- A. decrease by ₹2,450
- B. decrease by ₹2,452
- C. increase by ₹2,446
- D. increase by ₹2,453

**Q13 Rules for 2,3,4,5,6**

If a 7-digit number 48085A7 is completely divisible by 3, what is the least value of A?

- A. 7
- B. 8
- C. 4
- D. 1

**Q14 Simple Ratio Partnership**

A and B invest ₹24,000 and ₹36,000, respectively, in a business for the same period. Find the ratio in which the profit should be divided between A and B.

- A. 3 : 2
- B. 2 : 3
- C. 5 : 4
- D. 4 : 5

**Q15 Successive Discount**

The marked price of a cooker is same at four shops I, II, III and IV.

Shop I allows two successive discounts of 32% and 67%, shop II allows successive discounts of 98% and 40%, shop III allows successive discounts of 37% and 74%, and shop IV allows successive discounts of 29%, 47%, and 92% on the marked price of the cooker.

Which shop is selling the cooker at the lowest price?

- A. II
- B. I
- C. III
- D. IV

**Q16 Two Successive Changes**

A man loses 22% of his money. After spending 25% of the remaining amount, he has ₹7,137 left. What was the amount of money he originally had?

- A. ₹12,100
- B. ₹12,300
- C. ₹12,400
- D. ₹12,200

**Q17 Ungrouped Data Median**

The consumption of printing paper reams for the first 11 months of a computer operator is given as 21, 25, 30, 15, 17, 35, 28, 19, 42, 49, and 59. Find the median.

- A. 26
- B. 28
- C. 30
- D. 32



Q18 Volume

Two cylindrical containers have a total volume of 2,200 cm³. The first cylinder has a radius of 5 cm and a height of 10 cm. If the second cylinder has the same radius, determine the height of the second cylinder. (Use $\pi = 3.14$ and round your answer to two decimal places.)

A. 20.67 cm

B. 18.03 cm ☒

C. 19.10 cm

D. 19.85 cm

Q19 Angle of Elevation

The angle of elevation of the top of a building at a distance of 90 m from its foot on a horizontal plane is found to be 30°. Find the height of the building.

A. $\frac{30}{\sqrt{3}}$ mB. $30\sqrt{3}$ m ☒C. $60\sqrt{3}$ mD. $90\sqrt{3}$ m**Q20 Calculation Based**

The following table shows the number of books read by four students in a month.

Name of the student	Ravi	Sita	Amit	Neha
Number of books	12	14	11	13

What is the average number of books read by these students?

A. 12.5 ☒

B. 12

C. 13.5

D. 13

Q21 Find Rate

A sum of ₹800 invested on simple interest becomes ₹1,200 in 8 years. Find the rate of interest per annum.

A. 6.5%

B. $\frac{25}{4}\%$ ☒

C. 6%

D. $6\frac{1}{3}\%$ 

Q22 Mean of Grouped Data

What is the value of $(8x + 9y)$, if mean of the following distribution is 45?

Class	0-20	20-40	40-60	60-80	80-100	Total
Frequency	7	12	x	5	y	76

A. 423

B. 417



C. 424

D. 402

Q23 Pythagorean Identities

Find the value of $\left\{ 2\tan^2 A + \frac{4}{(1 + \cot^2 A)} + 2\sec^2 A + \frac{4}{(1 + \tan^2 A)} \right\}$.

A. $\sec^2 A - 2$ B. $4\sec^2 A - 2$ C. $\sec^2 A + 2$ D. $4\sec^2 A + 2$ **Q24** Two Variables (Simultaneous)

Which of the following equations represent the statement, "one fifth of m is twice of one third of n"?

A. $\frac{2m}{3} = 5n$ B. $\frac{m}{3} = \frac{2n}{5}$ C. $\frac{2m}{3} = \frac{n}{5}$ D. $\frac{m}{5} = \frac{2n}{3}$ **Q25** Volume

The height of a cone is 28 cm and the radius of its base is 14 cm. The volume of cone is (Take $\pi =$

A. $\frac{18248}{3} \text{ cm}^3$ B. 17248 cm^3 C. 18248 cm^3 D. $\frac{17248}{3} \text{ cm}^3$ 

Mathematics

25 Questions • Answer Key

Q1 Annual Compounding

Arun has a sum of ₹1,681 with him. He divides this amount between his two sons, Mahesh and Vijay. Mahesh invests his share at 5% per annum, compounded annually, for 17 years, while Vijay invests his share at the same rate for 18 years. After the respective periods, both receive equal amounts. Find the amount (in ₹) given to Mahesh.

- A. 711
- B. 820
- C. 920
- D. 861



Q2 Average Speed

One person travels three sides of an equilateral triangle at a speed of 12 km/hr, 24 km/hr and 8 km/hr. Find his average speed (in km/hr).

- A. 12.6
- B. 13.8
- C. 12
- D. 13.4



Q3 Basic Ratio

The incomes of A and B are in the ratio 5:7 and their expenditures are in the ratio 3:5. If each saves Rs. 4200, what is the income of A?

- A. Rs. 10500
- B. Rs. 12000
- C. Rs. 14000
- D. Rs. 8000



Q4 Basic Time & Work

If 8 workers can complete a task in 12 days, how many days will 6 workers take to complete the same task?

- A. 18 days
- B. 15 days
- C. 12 days
- D. 16 days



Q5 Cost with Overhead Expenses

Arvind bought an article for ₹x. He sold it to Biru at a loss of 25%. Biru spent ₹157 on its transportation and sold it to Minu at a profit of 40%. If Minu bought it for ₹1,715, then what is the value of x (in ₹)?

- A. 1,424
- B. 1,446
- C. 1,414
- D. 1,408



Q6 Find Principal

What sum (in ₹) will earn a simple interest of ₹960 in 4 years at 8% per year rate of interest?

- A. 4800
- B. 1500
- C. 3000
- D. 6000



Q7 Finding Value from Percentage

In a school election, 10% of the students did not vote. If the total number of students was 2,000, how many students voted?

- A. 1,900
- B. 1,800
- C. 1,700
- D. 1,600



Q8 Laws of Indices

Given that $109^{0.64} = x$, $109^{0.83} = y$ and $x^z = y^5$, then the value of z is close to:

- A. 6.48
- B. 7.82
- C. 7.91
- D. 5.06



Q9 Mean Proportional

Find the number which when subtracted from 11 and 67 will give 21 as their mean proportional.

- A. 8
- B. 3
- C. 6
- D. 4

**Q10 Mode**

The mean of a data set is 40 and the median is 35. Find the mode using the empirical relation.

- A. 25
- B. 30
- C. 45
- D. 40

**Q11 Successive Discount**

The marked price of a cooker is same at four shops I, II, III and IV. Shop I allows two successive discounts of 87% and 14%, shop II allows successive discounts of 16% and 92%, shop III allows successive discounts of 60% and 35% and shop IV allows successive discounts of 58%, 29%, and 87% on the marked price of the cooker. Which shop is selling the cooker at the lowest price?

- A. III
- B. IV
- C. II
- D. I

**Q12 Two Successive Changes**

A city's tree plantation drive increased the number of trees by 40%. A storm destroyed 30% of the new trees. The number of trees destroyed in the storm is what percent of the original tree count?

- A. 9%
- B. 12%
- C. 15%
- D. 18%

**Q13 Two Trains Crossing**

Two trains, one 120 m long and the other 180 m long, are running in opposite directions at 45 km/hr and 54 km/hr, respectively. How long will they take to cross each other completely? [Give your answer in seconds, correct to one place after decimal.]

- A. 12.0 s
- B. 10.9 s
- C. 9.5 s
- D. 11.5 s

**Q14 Value Decrease Over Time**

A car costing ₹2,20,000 depreciates at 5% per annum compounded annually. What is its value (in ₹) after 2 years?

- A. 1,98,550
- B. 1,85,500
- C. 1,80,500
- D. 1,75,000

**Q15 Volume**

Find the volume of a cylinder whose radius is 5 cm and total surface area is 408.2 cm^2 (use $\pi = 3.14$).

- A. 628 cm³
- B. 596 cm³
- C. 514 cm³
- D. 427 cm³

**Q16 Weighted Average**

A 5-member family consists of grandparents, parents, and one grandchild. The average age of the grandparents is 76 years, that of the parents is 40 years, and the age of the grandchild is 8 years. What is the average age of the family?

- A. 44 years
- B. 48 years
- C. 46 years
- D. 42 years



Q17 Combined Work Rate

A can do a work in 10 days and B in 15 days. They work together for 3 days. How much work is left?

A. $\frac{1}{2}$



B. $\frac{1}{4}$

C. $\frac{1}{8}$

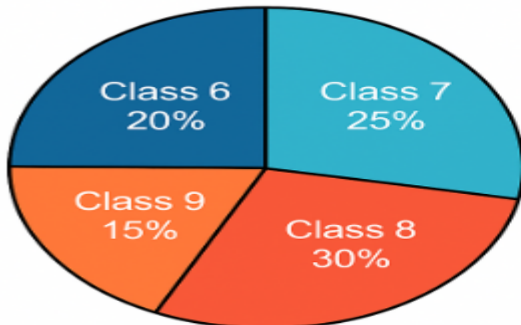
D. $\frac{1}{10}$

Q18 Double Pie Chart

Study the pie charts and answer the question that follows. The charts below show the distribution of students in a school.

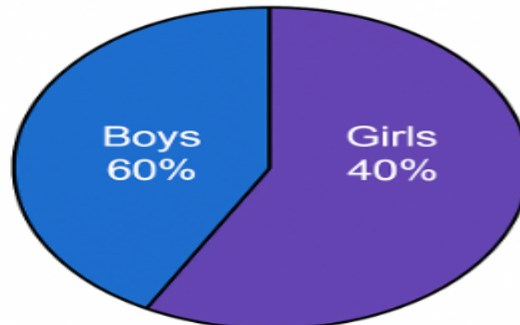
Class-wise Distribution of Students

(600)



Gender Distribution in Class 8

(180)



What is the number of girls in Class 8?

A. 60

B. 90

C. 72



D. 108

Q19 Mean of Grouped Data

If the mean of the following data is 50, then what is the value of x?

Class	10-20	20-30	30-40	40-50	50-60
Frequency	39	47	44	13	x

A. 674

B. 649

C. 648

D. 653

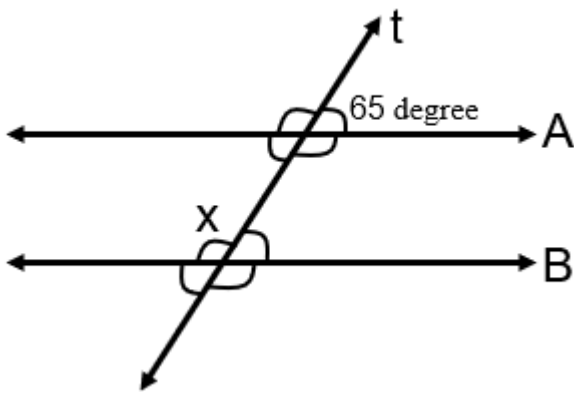


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Q20 Parallel Lines & Transversal

Find the value of x if A and B are two parallel lines.

A. 55° B. 115° ✓C. 105° D. 90° **Q21** Pythagorean Identities

The value of $\tan^2 \theta + \cot^2 \theta - \sec^2 \theta \operatorname{cosec}^2 \theta + 2$ is:

A. 0 ✓

B. -1

C. 2

D. 1

Q22 Two Variables (Simultaneous)

Two rectangular fields have lengths x and y meters respectively, where $x > y$. The sum of their lengths is equal to three times the difference of their lengths. What is the value of $\frac{3xy}{2(x^2 - y^2)}$?

A. $1\frac{1}{3}$ B. $\frac{2}{3}$ C. $1\frac{2}{3}$

D. 1 ✓

Q23 Volume

If the surface area of a sphere is divided by its radius, the result becomes 132 cm. Find the volume of the sphere.

(Take $\pi = \frac{22}{7}$)

A. 4911 cm³B. 4951 cm³C. 4851 cm³ ✓D. 5109 cm³

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Q24 $a^2 - b^2$

If $x = \sqrt{5776}$ and $y = \sqrt{2025}$, find $\frac{x^2 - y^2}{x - y}$

A. 122

B. 121



C. 120

D. 100

Q25 $\sin^2 + \cos^2 = 1$

If $\sin\theta + \cos\theta = \sqrt{3}$, then the value of $\sin^3\theta + \cos^3\theta$ is

A. $\sqrt{3}$

B. 3

C. -1

D. 0



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Mathematics

25 Questions • Answer Key

Q1 3-Year Difference

The difference between compound interest (compounded annually) and simple interest for 3 years at the rate of 18% per annum is ₹25,758. What is the principal lent?

- A. ₹3,50,000
- B. ₹3,00,000
- C. ₹4,00,000
- D. ₹2,50,000



Q2 Age in Ratio Form

The ratio of the ages of Riya to Suman is 2:3. After 6 years from now, the ratio becomes 4:5. What is Riya's present age?

- A. 6 years
- B. 10 years
- C. 8 years
- D. 4 years



Q3 Annual Compounding

The compound interest on a sum of ₹10000 for 2 years is ₹2544, when the interest is compounded annually. If the rate of interest per annum is halved and the time duration is doubled, then the compound interest (in ₹, correct to nearest paise) will be:

- A. 2742.67
- B. 2642.77
- C. 2724.67
- D. 2624.77



Q4 Arithmetic Mean

If the mean of three values $3x$, $2x+6$ and $2x+1$ is 7, then find x .

- A. 2
- B. 6
- C. 4
- D. 8



Q5 Basic TSD

Kaushal travelled for 2 hours 45 minutes at the speed of 32 km/h. At what speed (in km/h) should he travel to cover the same distance in 4 hours?

- A. 22
- B. 24
- C. 21
- D. 19



Q6 Direct Proportion

If 5 notebooks cost ₹125, what will be the cost of 8 such notebooks?

- A. ₹150
- B. ₹120
- C. ₹200
- D. ₹180



Q7 Find SI

What would be the annual interest (in ₹) accrued on a deposit of ₹20,000 in a bank that pays a 5% per annum rate of simple interest?

- A. 1500
- B. 1800
- C. 1200
- D. 1000



Q8 Median

The mean and the mode of a set of data are 15.7 and 17, respectively. Find the median of the data, using the empirical formula. (Round off to one decimal place)

- A. 15.9
- B. 16.1
- C. 15
- D. 16.4



Q9 Multiple Pipes

Pipe A can fill a tank in 3 hours, pipe B can fill the same tank in 15 hours and pipe C can fill the same tank in 10 hours. The time taken (in hours) by them to fill half of the same tank if they operate together is:

A. 3

B. 1



C. 4

D. 2

Q10 Percentage Increase/Decrease

The income of Raman is ₹43,800. He saves 20% of his income. If his income increases by 36% and expenditure increases by 40%, then his savings will:

A. increase by ₹1,757

B. increase by ₹1,752



C. decrease by ₹1,748

D. decrease by ₹1,753

Q11 Profit/Loss Percentage

A residential plot is purchased for ₹6,28,200 and sold for ₹7,09,866. What is the profit percentage?

A. 13%



B. 17%

C. 11%

D. 19%

Q12 Rules for 2,3,4,5,6

The 7-digit number 84A614B is divisible by 3. What is the minimum value of (A + B)?

A. 5

B. 1



C. 4

D. 2

Q13 Rules for 2,3,4,5,6

What is the least value that must be assigned to A so that the 8-digit number 456A3264 is divisible by 12?

A. 3

B. 4

C. 0



D. 6

Q14 Slant Height

60% of the canvas used to make a closed cylinder with a radius of 5 cm and a height of 15 cm is reused to make a conical hat with a radius of 8 cm. What is the slant height (in cm) of the conical hat?

A. 17

B. 25

C. 15



D. 13

Q15 Successive Discount

The marked price of a cooker is same at four shops I, II, III and IV. Shop I allows two successive discounts of 12% and 79%, shop II allows successive discounts of 33% and 19%, shop III allows successive discounts of 38% and 39% and shop IV allows successive discounts of 55%, 79%, and 34% on the marked price of the cooker. Which shop is selling the cooker at the lowest price?

A. I

B. IV



C. II

D. III

Q16 Trapezium

The area of a trapezium is $2,220 \text{ cm}^2$. Its parallel sides are 29 cm and 31 cm. If the distance between parallel sides is x cm, find the value of x.

A. 56

B. 74



C. 37

D. 62

Q17 Two Successive Changes

An officer spends 10% of his salary on house rent. From the remaining amount, he spends 50% on conveyance. He is left with ₹20,556. What was his total salary?

A. ₹47,680

B. ₹48,680

C. ₹45,680



D. ₹46,680



Q18 Ungrouped Data Median

Find the median of the data set: 10, 13, 14, 17, 18.

A. 10

B. 17

C. 13

D. 14

**Q19 0, 30, 45, 60, 90 degrees**

What is the value of $\left(\frac{\cos \gamma \cot \gamma}{1 - \sin \gamma} \right)$ at $\gamma = 30^\circ$?

A. $\frac{3}{2}$

B. 1

C. 0

D. 3

**Q20 Algebraic Identities**

Expand $(a - p + m)^2$

A. $a^2 - p^2 + m^2 - 2ap - 2pm + 2am$

B. $a^2 + p^2 - m^2 - 2ap - 2pm + 2am$

C. $a^2 - p^2 - m^2 - 2ap - 2pm + 2am$

D. $a^2 + p^2 + m^2 - 2ap - 2pm + 2am$

**Q21 Average Speed**

A bus covers $\frac{1}{10}$ of a distance from one place to another at a speed of 25 km/hr, $\frac{1}{5}$ of the distance at the speed of 8 km/hr. At what speed would it be supposed to cover the remaining distance to have an average speed of 15.625 km/hr?

A. 25 km/hr

B. 8 km/hr

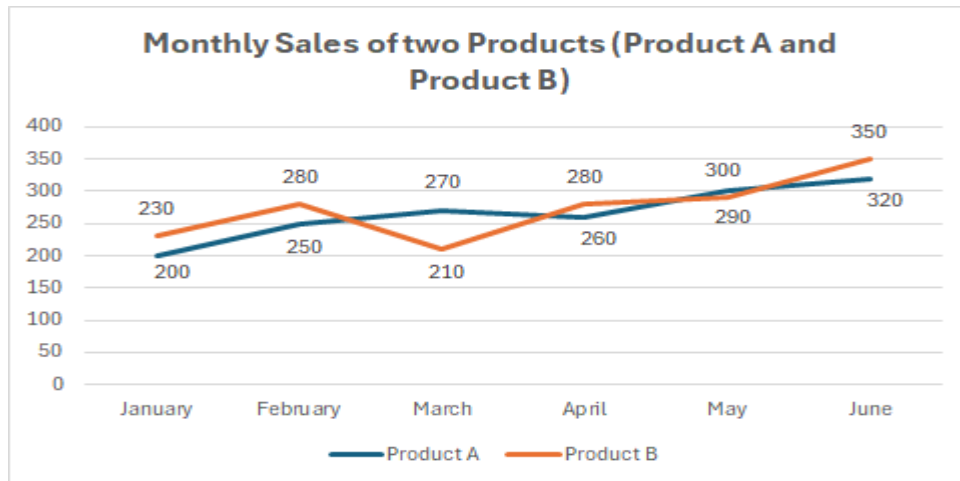
C. 20 km/hr

D. 10 km/hr



Q22 Comparative Trend

The line graph shows the monthly sales of two products (Product A and Product B) in units during the first six months of 2024.



In which month did Product B's sales exceed Product A's sales by the largest percentage?

A. May

B. April

C. June

D. January

**Q23** Simplification

Simplify: $3^3 \times 3^2$.

A. 3^6

B. 3^5

C. 3^1

D. 3^8

**Q24** Total Surface Area

A cylindrical tank has radius 7 m and height 21 m. The inside surface (curved plus base) is fully painted. On the outside, the curved surface is painted except for a horizontal strip of width 1 m along the top rim; the outside base is also painted. Use $\pi = \frac{22}{7}$. The inside is painted at ₹5 per m^2 and the outside at ₹7 per m^2 . What is the total painting cost?

A. ₹12,628

B. ₹12,716

C. ₹12,760

D. ₹12,672



Q25 $\sin^2 + \cos^2 = 1$

Simplify: $\frac{3\sin^2 A + 5\cos A - 5}{\sin^2 A}$

A. $\frac{3\cos A + 2}{1 - \cos A}$

B. $\frac{3\cos A - 2}{1 + \cos A}$ ✓

C. $\frac{1 - \cos A}{3\cos A + 2}$

D. $\frac{1 + \cos A}{3\cos A - 2}$



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Mathematics

25 Questions • Answer Key

Q1 Annual Compounding

Pravin has ₹1,701, which he divides between his two sons, Rishi and Shan. He asks them to invest their respective shares at a compound interest rate of 10% per annum, compounded annually. It is observed that Rishi's investment after 17 years equals Shan's investment after 18 years. Find the amount (in ₹) that Pravin gave to Rishi.

A. 910

B. 891

C. 741

D. 810

Q2 Basic TSD

A car moving at a uniform speed covers a certain distance in 5 hours. If the speed had been 10 km/hr more, it would have taken 1 hour less. Find the actual speed of the car.

A. 42 km/hr

B. 45 km/hr

C. 37 km/hr

D. 40 km/hr

Q3 Cost with Overhead Expenses

Arvind bought an article for ₹x. He sold it to Biru at a loss of 5%. Biru spent ₹152 on its transportation and sold it to Minu at a profit of 56%. If Minu bought it for ₹1,482, then what is the value of x?

A. 820

B. 880

C. 840

D. 860

Q4 Find Principal

A sum of money amounts to ₹56,000 in 5 years at 20% simple interest per annum. The sum (in ₹) is:

A. 28,000

B. 31,000

C. 35,000

D. 25,000

Q5 Finding HCF

Find the HCF of 6, 33, 42, 114, 210.

A. 1

B. 7

C. 2

D. 3

Q6 HCF/LCM Word Problems

The HCF and LCM of two numbers are 16 and 96, respectively. If one of the numbers is 48, then the other number is:

A. 28

B. 34

C. 30

D. 32

Q7 Half-Yearly Compounding

Find the compound interest on ₹81,250 in one and half years at 8% per annum, the interest being compounded half-yearly.

A. ₹10,345.40

B. ₹10,145.20

C. ₹10,245.30

D. ₹10,045.10

Q8 Laws of Indices

Given that $39^{0.66} = x$, $39^{0.23} = y$ and $x^z = y^2$, then the value of z is close to:

A. 0.64

B. 0.69

C. 1.62

D. 0.12



Q9 Mean of Grouped Data

The marks obtained by 30 students of tenth class in a school in mathematics paper consisting of 100 marks are presented in the following table. Find the arithmetic mean of the data.

Class interval	No. of students
10 – 25	2
25 – 40	3
40 – 55	7
55 – 70	6
70 – 85	6
85 – 100	6

A. 76

B. 65

C. 72

D. 62

Q10 Melting & Recasting

Three metal cubes with edges 3 cm, 4 cm, and 5 cm, respectively, are melted to form a single large cube. This new cube is then cut into two identical cuboids by a plane parallel to one of its faces. What is the ratio of the total surface area of the three original cubes to the total surface area of the two new cuboids?

A. 24 : 25

B. 25 : 24

C. 5 : 4

D. 50 : 49

Q11 Multiple Pipes

Pipe A can fill a tank in 3 hours, pipe B can fill the same tank in 18 hours and pipe C can fill the same tank in 9 hours. The time taken (in hours) by them to fill half of the same tank if they operate together is:

A. 1

B. 2

C. 4

D. 3

Q12 Population Based Problems

What is the percentage increase in the population of a town that increases from 70,000 to 71,435 in a year?

A. 2.15%

B. 2.05%

C. 2.0%

D. 2.25%

Q13 Proportion

If 15, 45, 24 are the first three terms of a proportion, find the fourth term.

A. 72

B. 68

C. 75

D. 74

Q14 Proportion

Find the value of x if 1.2, 1.8, 2.7 and x are in proportion.

A. 3.55

B. 4.55

C. 4.05

D. 3.05

Q15 Successive Discount

The marked price of a cooker is same at four shops I, II, III and IV. Shop I allows two successive discounts of 13% and 60%, shop II allows successive discounts of 56% and 12%, shop III allows successive discounts of 60% and 28% and shop IV allows successive discounts of 33%, 16%, and 89% on the marked price of the cooker. Which shop is selling the cooker at the lowest price?

A. III

B. IV

C. I

D. II

Q16 Surface Area (TSA/LSA)

The length and breadth of a cuboid are equal and its height is 32 cm. If the volume of the cuboid is 2048 cm^3 , the surface area (in cm^2) of the cuboid is:

A. 1152

B. 1225

C. 1296

D. 1024

Q17 Two Persons Age Relation

Eight years hence, Rajeev's age will be twice the age of Sumit. Four years ago, he was six times as old as Sumit. Find Sumit's age 10 years from now.

A. 16 years

B. 17 years

C. 19 years

D. 21 years



Q18 Two Successive Changes

A store raises the price of a jacket from ₹1,200 to ₹1,440, then offers a discount that reduces the price to ₹1,296. What is the overall percentage change from the original price to the final price?

- A. 10% increase
- B. 8% increase ✓
- C. 10% decrease
- D. 8% decrease

Q19 Two Trains Crossing

A train, 320 m in length, running at a speed of 62 km/hr takes 16 seconds to cross another train running at a speed of 46 km/hr in the opposite direction on parallel lines. Find the length (in m) of the second train.

- A. 200
- B. 220
- C. 180
- D. 160 ✓

Q21 Building/Tower Problems

A building stands on level ground and a vertical flagstaff is fixed at the top of the building. From a point on the ground that is 30 m away from the foot of the building, the angle of elevation of the top of the building is 30° , while the angle of elevation of the top of the flagstaff is 60° . Find the height (in m) of the flagstaff.

- A. $\frac{40}{\sqrt{3}}$
- B. $40\sqrt{3}$
- C. $20\sqrt{3}$ ✓
- D. $60\sqrt{3}$

Q22 Mean of Grouped Data

What is the value of $(5x + 3y)$, if the mean of the following distribution is 66?

Class	0-20	20-40	40-60	60-80	80-100	Total
Frequency	7	20	x	8	y	85

- A. 166
- B. 159
- C. 141
- D. 156 ✓

Q20 Water-Milk Problems

A container contains 26 litres of milk. From this container, 13 litres of milk was taken out and replaced by water. The process was further repeated one time. How much milk is now there in the container?

- A. 5.5 litres
- B. 3.5 litres
- C. 4.5 litres
- D. 6.5 litres ✓



Q23 Parallel Lines & Transversal

AA' and BB' are two parallel straight lines. CC' is a transversal line intersecting AA' and BB' at the
If $\angle B'EC' = 127^\circ$ and $\angle CDA' = (7x - 3)^\circ$, then what is the value of x ?

A. 6

B. 5

C. 8

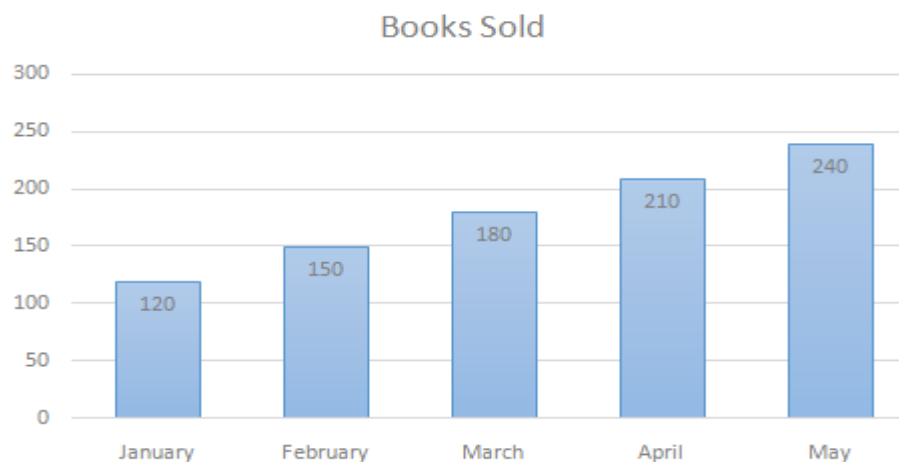
D. 7

**Q24** Pythagorean Identities

If $\cot A = \frac{P}{Q}$ and A is an acute angle, find the value of $\frac{1}{2}(P \sec A + Q \operatorname{cosec} A)^2$.

A. $\sqrt{P^2 + Q^2}$ B. $(P^2 + Q^2)$ C. $\frac{(P^2 + Q^2)}{2}$ D. $2(P^2 + Q^2)$ **Q25** Single Parameter

The given bar graph data shows the number of books sold by a store in different months. What is the increase in the number of books sold from January to May?



A. 140

B. 130

C. 120

D. 125



Mathematics

25 Questions • Answer Key

Q1 Annual Compounding

If the population of a city was 42,500 and it grew at a rate of 2% per annum compounded annually, what would the population be after 2 years?

A. 40,400

B. 44,217 ✓

C. 40,800

D. 41,616

Q2 Basic CI Calculation

A certain sum amounts to ₹31,944 at a compound interest rate of 15% per annum in 2 years, with interest compounded every 8 months. What will be the amount payable (in ₹) on the same sum at the same rate and for the same time, if the interest is compounded yearly?

A. 31,740 ✓

B. 32,113

C. 33,001

D. 32,510

Q3 Basic TSD

A man travels from P to Q at v km/h and returns at $(v + 10)$ km/h. If the total time for the round trip is 9 hours and the distance between P and Q is 200 km, find v .

A. 45 km/h

B. 30 km/h

C. 35 km/h

D. 40 km/h ✓

Q4 Basic TSD

Kaushal travelled for 12 hours 55 minutes at the speed of 24 km/h. At what speed (in km/h) should he travel to cover the same distance in 5 hours?

A. 62 ✓

B. 65

C. 60

D. 61

Q5 Combined Work Rate

A and B together can complete a work in 2 days. If A works for 1 day and B works for 4 days, the work is completed. How long would B alone take to complete the work?

A. 10 days

B. 6 days ✓

C. 4 days

D. 8 days

Q6 Composite 3D Shapes

From a solid cube of side 24 cm, a cuboidal cavity of square cross-section of side 9 cm is hollowed along one surface from one edge to the opposite edge. What is the volume (in cm^3) of the remaining solid?

A. 12055

B. 8640

C. 11880 ✓

D. 13095

Q7 Cost with Overhead Expenses

Arvind bought an article for ₹ x . He sold it to Biru at a loss of 30%. Biru spent ₹130 on its transportation and sold it to Minu at a profit of 50%. If Minu bought it for ₹1,287, then what is the value of x ?

A. 1,040 ✓

B. 1,022

C. 1,044

D. 1,072

Q8 Divisibility Rules

What is the value that must be assigned to A so that the 8-digit number 378A6070 is divisible by 18?

A. 6

B. 5 ✓

C. 8

D. 3



Q9 Find SI

Find the simple interest (in ₹) on a sum of ₹500 borrowed for 3.5 years at a rate of interest of 16% per annum.

- A. 260
- B. 280
- C. 380
- D. 330

**Q10 Finding Value from Percentage**

In an election, Candidate A received 60% of the total votes while Candidate B received the remaining votes. If the total votes were 5,000, how many votes did Candidate B receive?

- A. 3,000
- B. 1,500
- C. 2,000
- D. 2,400

**Q11 HCF/LCM Word Problems**

The product of two natural numbers is 1421. Their HCF is 7. Find the ratio of the LCM and HCF of the numbers.

- A. 27:1
- B. 23:7
- C. 29:7
- D. 29:1

**Q12 Percentage Increase/Decrease**

The income of Raman is ₹12,000. He saves 27% of his income. If his income increases by 20% and expenditure increases by 15%, then his savings will:

- A. increase by ₹1,086
- B. decrease by ₹1,085
- C. increase by ₹1,088
- D. decrease by ₹1,089

**Q13 Rules for 2,3,4,5,6**

Find the smallest number that should be added to 97306 to make it divisible by 6.

- A. 3
- B. 1
- C. 2
- D. 0

**Q14 Simple Ratio Partnership**

Rohit, Pallavi, and Simran invest ₹56,800, ₹36,200 and ₹48,600 in a garment business. If the total profit at the end of the year is ₹5,60,028, find Rohit's share of profit.

- A. ₹2,24,800
- B. ₹2,24,500
- C. ₹2,18,644
- D. ₹2,24,644

**Q15 Successive Discount**

The marked price of a cooker is same at four shops I, II, III and IV. Shop I allows two successive discounts of 23% and 92%, shop II allows successive discounts of 88% and 47%, shop III allows successive discounts of 11% and 28% and shop IV allows successive discounts of 63%, 76% and 86% on the marked price of the cooker. Which shop is selling the cooker at the lowest price?

- A. III
- B. I
- C. IV
- D. II

**Q16 Surface Area (TSA/LSA)**

The volume of a cube is equal to the volume of a cuboid whose length, breadth and height are in the ratio of 9:5:2. If the volume of the cube is $11,250 \text{ cm}^3$, find the total surface area of the cuboid.

- A. 3780 cm^2
- B. 3650 cm^2
- C. 3430 cm^2
- D. 3520 cm^2

**Q17 Ungrouped Data Mode**

Find the mode of the following data: 2, 4, 4, 6, 7, 8, 4, 6, 7, 4, 4, 5, 6

- A. 4
- B. 6
- C. 7
- D. 2



Q18 Weighted Average

The average age of 90 students in a class is 21 years. The average age of 30 of them is 23 years, and that of another 30 is 25 years. What is the average age of the remaining students?

A. 15 years



B. 18 years

C. 17 years

D. 14 years

Q19 $a^2 - b^2$

Simplify: $(2x + 3y)(2x - 3y)$

A. $4x^2 - 9y^2$



B. $4x^2 + 9y^2$

C. $4x^2 - 6xy - 9y^2$

D. $4x^2 + 6xy - 9y^2$

Q20 Basic Ratio

Two numbers are in the ratio 4:7. If the larger number is decreased by 10 and the smaller number is increased by 10, the numbers become equal. What is the original larger number?

A. $48\frac{3}{5}$

B. $46\frac{2}{3}$



C. $42\frac{1}{3}$

D. $44\frac{2}{5}$

Q21 Building/Tower Problems

A man standing at a point on level ground observes the top of a vertical tower at an angle of elevation of 30° . He then walks straight towards the tower and finds that the angle of elevation of the top becomes 60° . If the height of the tower is 45 m, find the distance walked by the man.

A. $30\sqrt{3}$ m



B. 30 m

C. $60\sqrt{3}$ m

D. 60 m

Q22 Congruence & Similarity

$\triangle ABC \sim \triangle PQR$ and $AB:PQ = 7:9$, then find the ratio of area of $\triangle ABC$ to the area of $\triangle PQR$.

A. 49:27

B. 45:18

C. 49:81



D. 49:18



Q23 Mean of Grouped Data

What is the value of $(6x + 9y)$, if the mean of the following distribution is 54?

Class	0-20	20-40	40-60	60-80	80-100	Total
Frequency	2	18	x	6	y	70

A. 309



B. 311

C. 313

D. 301

Q24 Year-on-Year Comparison

The given pie-charts show the population of villages A, B, C and D (in percentage) in year 2021 and 2022. Total population in 2021 and 2022 is 2,80,000 and 2,75,000 respectively.

Population in 2021



Population in 2022



Find the ratio between the total population in village B and C together in 2021 to the total population in village C and D in 2022.

A. 11:9

B. 43:41

C. 56:55



D. 27:23



Q25 $\sin^2 + \cos^2 = 1$

If $\sin A = \frac{3}{5}$, and A is an acute angle, then the value of $\cos A$ is:

A. $\frac{1}{5}$

B. $\frac{4}{5}$



C. 1

D. $\frac{2}{5}$



Mathematics

25 Questions • Answer Key

Q1 Annual Compounding

Pravin has ₹1,701, which he divides between his two sons, Rishi and Shan. He asks them to invest their respective shares at a compound interest rate of 10% per annum, compounded annually. It is observed that Rishi's investment after 18 years equals Shan's investment after 19 years. Find the amount (in ₹) that Pravin gave to Rishi.

A. 910

B. 741

C. 810

D. 891



Q2 Annual Compounding

The compound interest earned on a sum of money for 2 years at 8% per annum, compounded annually, is ₹166.40. Find the sum (in ₹).

A. 1,100

B. 1,000



C. 1,500

D. 1,200

Q3 CP-SP Relation

Ramesh bought two identical washing machines. He sold one at a profit of 20% and the other at a loss of 10%. If the total selling price of both machines was ₹33,600, what was the cost price of each washing machine?

A. ₹16,000



B. ₹16,800

C. ₹18,000

D. ₹15,800

Q4 Dividing Quantity in Ratio

The expenses of three friends, A, B, and C, are in the ratio 2 : 3 : 5. If total expenses are ₹2,000, find B's share.

A. ₹550

B. ₹600



C. ₹500

D. ₹700

Q5 Find SI

Find the simple interest (in ₹) on a sum of ₹500 borrowed for 3.5 years at the rate of 8% per annum.

A. 240

B. 140



C. 120

D. 190

Q6 Laws of Indices

Given that $43^{0.92} = x$, $43^{0.69} = y$ and $x^z = y^6$, then the value of z is:

A. 4.5



B. 6.5

C. 3.5

D. 5.5

Q7 Measures of Central Tendency

The mean and the mode of a set of data are 40.3 and 74.9, respectively. Find the median of the data, using the empirical formula. (Round off to one decimal place)

A. 51.8



B. 52.9

C. 52.8

D. 51.2

Q8 Measures of Central Tendency

The mean and the median of a dataset are in the ratio 9:8. Using the empirical formula for moderately skewed distributions, determine the ratio of the median to the mode.

A. 3 : 2

B. 4 : 3



C. 2 : 3

D. 1 : 3



Q9 Multiple Pipes

Pipe A can fill a tank in 3 hours, pipe B can fill the same tank in 12 hours and pipe C can fill the same tank in 12 hours. The time taken (in hours) by them to fill half of the same tank if they operate together is:

A. 4

B. 2

C. 3

D. 1

**Q10 Percentage Increase/Decrease**

The income of Raman is ₹83,000. He saves 16% of his income. If his income increases by 22% and expenditure increases by 25%, then his savings will:

A. decrease by ₹828

B. increase by ₹830



C. decrease by ₹833

D. increase by ₹827

Q11 Prime & Composite Numbers

Which of the following statements is always true?

A. Two prime numbers are never coprime.

B. Two even numbers are always coprime.

C. Multiples of the same number are always coprime.

D. Two consecutive integers are always coprime.

**Q12 Proportion**

If 12.8, 6.4, x and 1.6 are in proportion, what is the value of x?

A. 3.2



B. 2.4

C. 2.8

D. 3.6

Q13 Round Trip

A boat can travel 48 km downstream in 3 hours and can come back the same distance upstream in 4 hours. At these speeds if the boat goes 15 km downstream, then rests for 30 mins, and returns 15 km upstream, find the total time (including the resting time) taken by the boat to complete this round trip.

A. 2 h 11 min 15 s

B. 2 h 41 min 15 s



C. 3 h 11 min 15 s

D. 2 h 56 min 15 s

Q14 Rules for 2,3,4,5,6

The 7-digit number 22A675B is divisible by 3. What is the minimum value of (A + B)?

A. 2



B. 4

C. 7

D. 6

Q15 Single Right Triangle

A tree standing on level ground is broken by a storm. The broken part bends and touches the ground, making an angle of 30° with the ground. The distance between the foot of the tree and the point where the top of the tree touches the ground is 12 m. Find the original height of the tree.

A. $12\sqrt{2}$ mB. $18\sqrt{2}$ mC. $12\sqrt{3}$ mD. $18\sqrt{3}$ m**Q16 Successive Discount**

The marked price of a cooker is same at four shops I, II, III and IV. Shop I allows two successive discounts of 19% and 59%, shop II allows successive discounts of 11% and 94%, shop III allows successive discounts of 25% and 70% and shop IV allows successive discounts of 96%, 44% and 25% on the marked price of the cooker. Which shop is selling the cooker at the lowest price?

A. II

B. I

C. III

D. IV

**Q17 Successive Percentage Change**

The price of fuel decreases successively by 10%, 20%, and 15% over three consecutive months. In the fourth month, the price increases by 40%. Find the overall percentage decrease in the price of fuel at the end of the fourth month compared to its original price.

A. 13.42%

B. 12.65%

C. 15.33%

D. 14.32%



Q18 Two Trains Crossing

Two trains, 240 m and 280 m in length, respectively, are running towards each other on parallel lines, one at the speed of 70 km/hr and another at 74 km/hr. Find the time (in seconds) they will take to cross each other.

A. 16

B. 12

C. 13



D. 14

Q19 Weighted Average

The average age of A, B, C, D, and E is 55 years. The average age of A and B is 45 years, and the average age of C and D is 57 years. The age of E is:

A. 68 years

B. 76 years

C. 66 years

D. 71 years

**Q20 $a^3 + b^3$, $a^3 - b^3$**

If $a - b = 9$ and $ab = 13$, then the value of $a^3 - b^3$ is:

A. 1,080



B. 1,020

C. 1,040

D. 1,060

Q21 Basic Circle Properties

AB is the diameter of a circle with centre O. From a point X on its circumference, a perpendicular XY is dropped on AB such that it intersects AB at Y. If $BY = 5$ cm and $XY = 7$ cm, what is the circumference (in cm) of the circle?

A. $\frac{67}{7}\pi$ B. $\frac{37}{5}\pi$ C. $\frac{74}{5}\pi$ D. $\frac{47}{8}\pi$ **Q22 Cylinder**

The curved surface area of a closed cylinder is 440 cm^2 , and its total surface area is 748 cm^2 . Find the height of the cylinder.

$$\left(\text{Use } \pi = \frac{22}{7} \right)$$

A. 10 cm



B. 12 cm

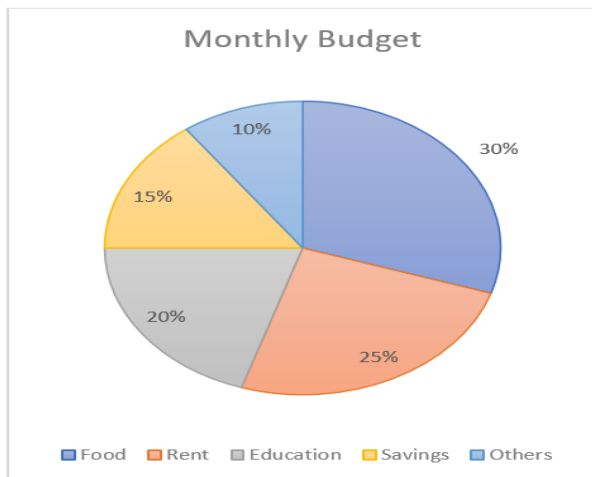
C. 8 cm

D. 5 cm



Q23 Percentage Based

The monthly budget of ₹48,000 for a family is distributed as follows: Food, Rent, Education, Savings, and Others. If they want to increase their savings to 20% next month without changing the total budget, what is the amount of the extra savings needed in next month compared to current month?



A. ₹2,400



B. ₹2,000

C. ₹2,800

D. ₹3,000

Q24 Standard Angle Values

If $\cot^2(2\eta) = 3$, 2η is an acute angle, then what is the value of 5η ?

A. 75°



B. 15°

C. 50°

D. 30°

Q25 Volume

A conical glass with a radius of 6 cm and height of 14 cm is filled with water up to the brim. A small conical stone with radius of 3 cm and height 7 cm is dropped into the glass, causing some water to overflow. What is the volume of water that remains in the glass?

(Take $\pi = \frac{22}{7}$)

A. 0.512 litres

B. 0.653 litres

C. 0.462 litres



D. 0.708 litres



Mathematics

25 Questions • Answer Key

Q1 2-Year Difference

The difference between compound interest, compounded annually and simple interest at the same rate of interest $R\%$ per annum on an amount of ₹20,000 for 2 years is ₹162. What is the value of R ?

A. 8

B. 6

C. 7

D. 9 ✓

Q2 Average Speed

A marathon runner covers one-third of a 42 km race at a speed of 12 km/h, and the remaining two-thirds at a speed of 10.5 km/h. What is the average speed of the runner for the entire race? (Round off to two decimal places.)

A. 11.86 km/h

B. 10.86 km/h

C. 11.96 km/h

D. 10.96 km/h ✓

Q3 Basic Ratio

The ratio of two numbers is 2 : 9. If 4 is added to the smaller number and 3 is added to the greater number, the ratio becomes 1 : 4. Find the original greater number.

A. 127

B. 120

C. 115

D. 117 ✓

Q4 Common Tangents

The distance between the centres of two circles having radii 5 cm and 25 cm is 29 cm. Find the length (in cm) of the direct common tangent.

A. 21 ✓

B. 27

C. 28

D. 13

Q5 Dividing Quantity in Ratio

A chemist needs to prepare 250 ml of a solution by mixing two liquids in the ratio 5 : 3. How much (in ml) of the second liquid should be used?

A. 125.25

B. 93.75 ✓

C. 62.25

D. 156.25

Q6 Divisibility Rules

What is the value that must be assigned to A so that the 8-digit number 753A3228 is divisible by 18?

A. 2

B. 6 ✓

C. 9

D. 5

Q7 Find Principal

What sum (in ₹) will earn a simple interest of ₹960 in 4 years at 12% per year rate of interest?

A. 1000

B. 2000 ✓

C. 6000

D. 4000

Q8 Half-Yearly Compounding

What is the compound interest (in ₹) on a sum of ₹1,50,000 at 20% per annum for 2 years, when the interest is compounded semi-annually?

A. 69651

B. 66951

C. 66915

D. 69615 ✓



Q9 Multiple Pipes

Pipe A can fill a tank in 3 hours, pipe B can fill the same tank in 10 hours and pipe C can fill the same tank in 15 hours. The time taken (in hours) by them to fill half of the same tank if they operate together is:

A. 2

B. 3

C. 1



D. 4

Q10 Profit/Loss Percentage

A shopkeeper buys some pencils at 6 for ₹35 and sells them at 10 for ₹65. His profit percentage (rounded off to 2 decimal places) is %.

A. 13.14

B. 13.41

C. 11.34

D. 11.43

**Q11 Replacement of Mixture**

A vessel contains liquids A and B in a ratio of 5 : 3. If 16 litres of the mixture is removed and the same quantity of liquid B is added, the ratio becomes 3 : 5. What quantity does the vessel hold?

A. 47 liters

B. 44 liters

C. 40 liters



D. 33 liters

Q12 Single Change

The monthly income of a person is ₹9,770. If his income is increased by 27%, then what will be his new monthly income?

A. ₹12,507.50

B. ₹12,407.90



C. ₹12,307.50

D. ₹12,207.90

Q13 Successive Discount

The marked price of a cooker is same at four shops I, II, III and IV. Shop I allows two successive discounts of 58% and 36%, shop II allows successive discounts of 73% and 91%, shop III allows successive discounts of 76% and 88% and shop IV allows successive discounts of 79%, 68% and 96% on the marked price of the cooker. Which shop is selling the cooker at the lowest price?

A. I

B. IV



C. II

D. III

Q14 Surface Area (TSA/LSA)

If the volumes of two cubes are in the ratio 27 : 64, then the ratio of their total surface area is:

A. 4 : 9

B. 9 : 16



C. 4 : 25

D. 9 : 25

Q15 Two Successive Changes

The price of a commodity is increased by 30% and later decreased by 30%. What is the overall percentage change in the price of the commodity?

A. 18% decrease

B. Neither increase nor decrease

C. 9% decrease



D. 9% increase

Q16 Two Trains Crossing

Two trains, 310 m and 320 m long, run on parallel tracks in opposite directions. The first runs at 67 km/h and the second at 59 km/h. How long will they take to cross each other?

A. 12 seconds

B. 16 seconds

C. 14 seconds

D. 18 seconds



Q17 Bracket Simplification

Simplify the following expression: $[18 - \{6 + (4 \times 2)\} + 3^2] \div 3$

A. $4\frac{1}{3}$



B. $2\frac{1}{3}$

C. $3\frac{1}{4}$

D. $4\frac{2}{3}$

Q18 Curved & Total Surface Area

A tent is shaped like a cone with a height of 84 m and a base radius of 13 m. If the fabric costs ₹40 per square meter, and the total cost of the fabric used for the tent is ₹E, then find the value of $\sqrt{\frac{E}{2041}} - 4$. (Use $\pi = 3.14$)

A. 4

B. 2

C. 8



D. 6

Q19 Finding Present Age

X's age is 20% more than Y's age. If the sum of their ages is 20 more than the difference of their ages, find their respective ages (in years).

A. 12 , 10



B. 10 , 14

C. 12 , 14

D. 10 , 13

Q20 Laws of Indices

Simplify: $(5^2)^3 \times (5)^{-2}$

A. 125

B. 3125

C. 625



D. 25



Q21 Mean of Grouped Data

Find the arithmetic mean of the following data (rounded off to two places of decimal).

Class interval	0-12	12-24	24-36	36-48	48-60
Frequency	6	8	10	9	12

A. 32.46

B. 31.48

C. 33.47



D. 34.48

Q22 Mean of Grouped Data

If the mean of the following data is 50, then what is the value of x?

Class	10-20	20-30	30-40	40-50	50-60
Frequency	17	33	25	43	x

A. 391

B. 425

C. 402



D. 411

Q23 Pythagorean IdentitiesSimplify: $\frac{\sin A}{1 + \cos A} + \frac{1 + \cos A}{\sin A}$ A. $2\operatorname{cosec}A$ B. $2\sec A$ C. $\tan A$

D. 1

Q24 Pythagorean IdentitiesEvaluate: $\frac{2\sin A}{(1 + \cos A + \sin A)} \times \frac{(1 + \sin A)}{(1 - \cos A + \sin A)}$

A. 2

B. 3

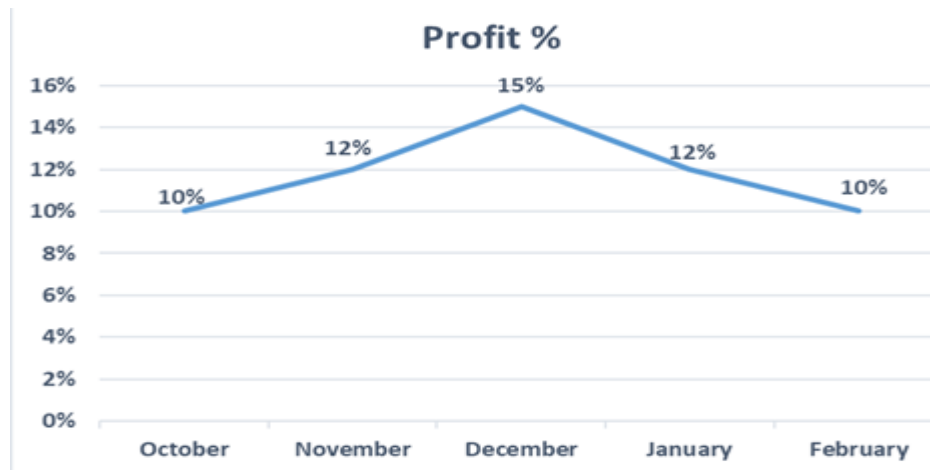
C. 0

D. 1



Q25 Single Line Graph

A shopkeeper sells heater rods, each having a cost price of ₹3,760. The profit margin varies depending on the demand, as shown in the given graph. If the total revenue on selling one rod every month from October to March end is ₹24,966.40, find the profit (in %) made in the month of March.



A. 7%

B. 6%

C. 5%



D. 10%



Mathematics

25 Questions • Answer Key

Q1 Annual Compounding

Find the amount obtained on ₹2,000 after 2 years at 12% per annum compound interest, compounded annually.

A. ₹2,508.80 ✓

B. ₹2,450.80

C. ₹2,520.80

D. ₹2,608.80

Q2 Annual Compounding

Sachin deposited a sum of ₹14,525 at 20% rate of interest per annum, compounded annually. The total amount received by Sachin after 2 years is:

A. ₹21,073

B. ₹20,720

C. ₹20,916 ✓

D. ₹20,910

Q3 Average Speed

A car covers a total distance of 360 km. It covers the first 120 km at 40 km/h. Of the remaining distance, it then covers one-third at 60 km/h and the rest at a constant speed v . If the car's overall average speed for the whole trip is 60 km/h, what is the value of v ?

A. 100 km/h

B. 85 km/h

C. 96 km/h ✓

D. 90 km/h

Q4 Basic Ratio

If $x : y = 3 : 5$ and $y : z = 2 : 3$, find the value of $x : y : z$.

A. 3 : 5 : 7

B. 6 : 10 : 15 ✓

C. 3 : 7 : 5

D. 1 : 2 : 3

Q5 Basic TSD

Kaushal travelled for 5 hours 52 minutes at the speed of 45 km/h. At what speed (in km/h) should he travel to cover the same distance in 24 hours?

A. 11 ✓

B. 12

C. 9

D. 8

Q6 Chord Properties

The length of the diameter of a circle is 26 cm and the length of a chord of the circle is 10 cm. Find the distance (in cm) of the chord from the centre of the circle.

A. 16

B. 18

C. 12 ✓

D. 14

Q7 Cube & Cuboid

A cuboid measures 30 cm × 24 cm × 18 cm. It is painted on all its outer surfaces and then cut into small cubes of side 2 cm. How many of the small cubes have paint on exactly two faces?

A. 128

B. 120 ✓

C. 124

D. 132

Q8 Dividing Quantity in Ratio

A paint mixture is made by mixing blue and white paint in the ratio 7 : 2. If a painter uses 315 liters of blue paint, how much total paint mixture will be prepared?

A. 350 liters

B. 405 liters ✓

C. 420 liters

D. 490 liters



Q9 Find SI

Find the simple interest (in ₹) on a sum of ₹500 borrowed for 4.5 years at a rate of interest of 12% per annum.

- A. 320
- B. 250
- C. 270
- D. 370

**Q10 Finding Value from Percentage**

There are only two candidates contesting the election. A person who got 25% votes lost by 500 votes. Assuming that there were no invalid votes, the total number of votes casted are:

- A. 4000
- B. 2000
- C. 3000
- D. 1000

**Q11 Laws of Indices**

Given that $86^{0.2} = x$, $86^{0.35} = y$ and $x^z = y^9$, then the value of z is:

- A. 16.25
- B. 14.75
- C. 17.25
- D. 15.75

**Q12 Multiple Pipes**

Pipe A can fill a tank in 3 hours, pipe B can fill the same tank in 8 hours and pipe C can fill the same tank in 24 hours. The time taken (in hours) by them to fill half of the same tank if they operate together is:

- A. 4
- B. 2
- C. 3
- D. 1

**Q13 Percentage Increase/Decrease**

The cost of a washing machine is 50% less than the cost of a TV. If the cost of the washing machine increases by 76% and that of the TV decreases by 37%, then what is the percentage change in the total cost of 4 washing machines and 3 TVs?

- A. Decrease by 5%
- B. Increase by 8.2%
- C. Increase by 13%
- D. Decrease by 16%

**Q14 Profit/Loss Percentage**

Mukesh, a trader, buys a certain number of pens at ₹5 per pen. He sells two-thirds of the pens at a 25% profit and the remaining pens at a 10% loss. If the overall profit made by Mukesh is ₹360, how many pens did he buy?

- A. 530
- B. 580
- C. 550
- D. 540

**Q15 Successive Discount**

The marked price of a cooker is same at four shops I, II, III and IV. Shop I allows two successive discounts of 66% and 88%, shop II allows successive discounts of 78% and 70%, shop III allows successive discounts of 89% and 35% and shop IV allows successive discounts of 27%, 65% and 59% on the marked price of the cooker. Which shop is selling the cooker at the lowest price?

- A. III
- B. IV
- C. II
- D. I

**Q16 Weighted Average**

The average monthly expenditure of a family is ₹3,200 during the first three months, ₹3,550 during the next four months, and ₹4,120 during the last five months of the year. If the total savings during the year was ₹2,265, what is the average monthly income?

- A. ₹4,380
- B. ₹4,234.60
- C. ₹3,880
- D. ₹3,888.75



Q17 $a^3 + b^3 + c^3 - 3abc$

If $a + b + c = 6$, $abc = -60$ and $a^3 + b^3 + c^3 = 162$, find the value of $ab + bc + ca$.

A. -21

B. -7



C. 11

D. 14

Q18 Fraction Operations

Simplify: $\left(\frac{7}{8} \div \frac{7}{16}\right)$.

A. 1

B. 3

C. 2



D. 4

Q19 Mean of Grouped Data

What is the value of $(6x + 3y)$, if mean of the following distribution is 62?

Class	0-20	20-40	40-60	60-80	80-100	Total
Frequency	2	16	x	8	y	50

A. 65

B. 71

C. 77

D. 81

**Q20** Median

Find the median from the following data.

Age in years	20-30	30-40	40-50	50-60	60-70	70-80	80-90
No. of patients	21	25	13	11	10	37	23

A. 79

B. 60



C. 48

D. 72



Q21 Pythagorean Identities

If $\frac{\tan\theta - 1 + \sec\theta}{\tan\theta + 1 - \sec\theta} = N \cdot \frac{1 + \sin\theta}{\cos\theta}$, then the value of $\frac{1}{N}$ is:

A. ∞ B. $\tan\theta$

C. 1

D. $\operatorname{cosec}\theta$ **Q22** Pythagorean Identities

If $\sin(\theta) = \frac{3}{5}$, where θ is an acute angle, find the value of $\cos(\theta)$.

A. $\frac{5}{4}$ B. $\frac{3}{4}$ C. $\frac{3}{5}$ D. $\frac{4}{5}$ **Q23** Sector Area & Arc Length

The radius of a circle is 9 cm. Find the area (in cm^2) of the sector whose central angle is 72° .

(Use $\pi = \frac{22}{7}$ and round off your answer to 2 decimal places.)

A. 72.36

B. 56.82

C. 48.23

D. 50.91

**Q24** Surds

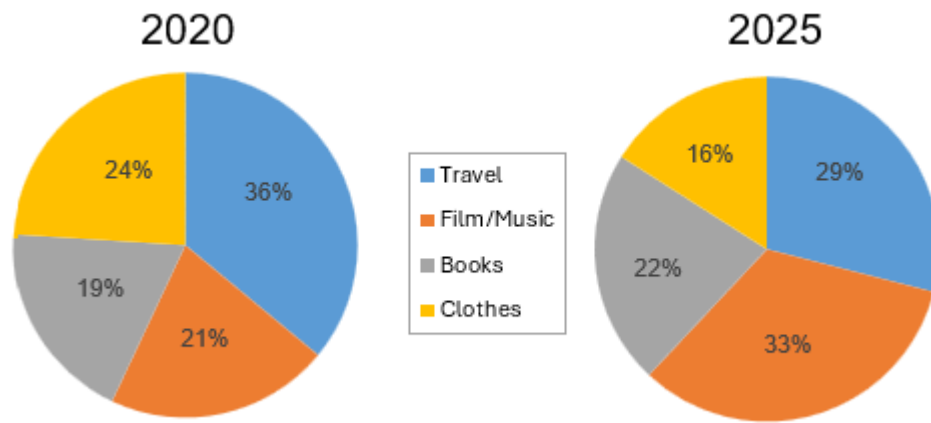
Simplify:

$$(3\sqrt{5} + 2\sqrt{3})^2 - (3\sqrt{5} - 2\sqrt{3})^2.$$

A. $36\sqrt{3}$ B. $30\sqrt{15}$ C. $18\sqrt{5}$ D. $24\sqrt{15}$ 

Q25 Year-on-Year Comparison

The pie charts illustrate the distribution of online sales (with the total amount remaining the same (in ₹) for both years) across various retail sectors in New Zealand for 2020 and 2025.



By how many percentage points did the share of Film & Music change from 2020 to 2025?

A. 16%

B. 22%

C. 12%



D. 17%



Mathematics

25 Questions • Answer Key

Q1 Annual Compounding

Find the compound interest on ₹8,324 at 5% per annum for 2 years, compounded annually.

A. ₹853.21



B. ₹841.11

C. ₹865.31

D. ₹875.41

Q2 Annual Compounding

Naresh deposited a sum of ₹58,000 at 20% rate of interest per annum, compounded annually. The total amount received by Naresh after 2 years is:

A. ₹83,119

B. ₹83,159

C. ₹83,229

D. ₹83,520



Q3 Combined Work Rate

A factory has two machines, X and Y. Machine X can produce 200 units in 5 hours, and machine Y can produce 180 units in 6 hours. If both machines work together for 3 hours and then only machine X works for 2 more hours, how many units are produced in total?

A. 350 units

B. 310 units

C. 290 units



D. 280 units

Q4 Common Tangents

Two circles with centres C_1 and C_2 have radii r_1 and r_2 , respectively. If the distance between their centres is equal to $r_2 - r_1$, then how many common tangents can be drawn to the two circles?

A. 2

B. 3

C. 1



D. 0

Q5 Cost with Overhead Expenses

Arvind bought an article for ₹x. He sold it to Biru at a loss of 11%. Biru spent ₹180 on its transportation and sold it to Minu at a profit of 60%. If Minu bought it for ₹1,000, then what is the value of x?

A. 452

B. 500



C. 494

D. 503

Q6 Find SI

Find the simple interest (in ₹) on a sum of ₹550 borrowed for 2.5 years at a rate of interest of 4% per annum.

A. 155

B. 55



C. 105

D. 35

Q7 Finding Ratio

Three types of milk, A, B, and C, have concentrations of 12%, 18%, and 24%, respectively. If they are mixed in the ratio 2 : 4 : p to create a mixture with a 20% concentration, what is the value of p?

A. 3

B. 4

C. 2

D. 6



Q8 Laws of Indices

Given that $140^{0.86} = x$, $140^{0.74} = y$ and $x^z = y^7$, then the value of z is close to:

A. 4.38

B. 5.94

C. 8.01

D. 6.02



Q9 Linear Race

In a 1 km race, A beats B by 50 m. In 800 m race, B beats C by 40 m. In a 200 m race, by what distance (in m) does A beat C?

A. 22.5

B. 25

C. 18

D. 19.5

**Q10 Mean Proportional**

If $(2x + 5)$, $(3x + 7)$ and $(4x + 9)$ are in continued proportion, find the values of x .

A. $x = 2, -2$

B. $x = 3, -3$

C. $x = 2, 2$

D. $x = -2, -2$

**Q11 Melting & Recasting**

A solid metal sphere of radius 6 cm is melted and cast into small solid cones, each having radius 3 cm and height 4 cm. How many complete cones can be formed?

A. 36

B. 30

C. 18

D. 24

**Q12 Mode**

The median of a moderately skewed distribution is 32 and the mean is 30. Find the mode of the data.

A. 35

B. 40

C. 36



D. 32

Q13 Percentage Increase/Decrease

The income of Raman is ₹49,000. He saves 27.5% of his income. If his income increases by 34% and expenditure increases by 20%, then his savings will:

A. increase by ₹9,555



B. increase by ₹9,559

C. decrease by ₹9,556

D. decrease by ₹9,550

Q14 Prime & Composite Numbers

The sum of three prime numbers is 112. If one number exceeds the other by 36, what is the product of these numbers?

A. 5678

B. 4516

C. 4826

D. 5402

**Q15 Successive Discount**

The marked price of a cooker is same at four shops I, II, III and IV. Shop I allows two successive discounts of 85% and 27%, shop II allows successive discounts of 78% and 19%, shop III allows successive discounts of 24% and 27% and shop IV allows successive discounts of 24%, 94% and 74% on the marked price of the cooker. Which shop is selling the cooker at the lowest price?

A. I

B. II

C. IV



D. III

Q16 Total Surface Area

The sum of the radius of the base and the height of a cylinder is 48 cm. If the ratio of the curved surface area to the total surface area of the cylinder is 5:8, find the difference between the total surface area and the curved surface area of the cylinder. (Use $\pi = 3.14$)

A. 2,186.59 cm²

B. 2,034.72 cm²



C. 2,058.63 cm²

D. 2,108.38 cm²

Q17 Two Persons Age Relation

The ratio of the present ages of Anil and Rohit is 7 : 9. After 8 years, the ratio will become 9 : 11. What is Anil's present age?

A. 42

B. 28



C. 21

D. 35



Q18 Two Successive Changes

A number is first increased by 20% and then decreased by 12%. Find the net percentage increase or decrease in the number.

- A. 4.8% decrease
- B. 5.2% increase
- C. 5.6% increase
- D. 4.3% decrease

Q19 Two Trains Crossing

A train, 150 m in length, running at a speed of 72 km/hr crosses another train thrice as fast as this train and running in the same direction on parallel lines in 10 seconds. Find the length (in m) of the second train.

- A. 300
- B. 250
- C. 280
- D. 320

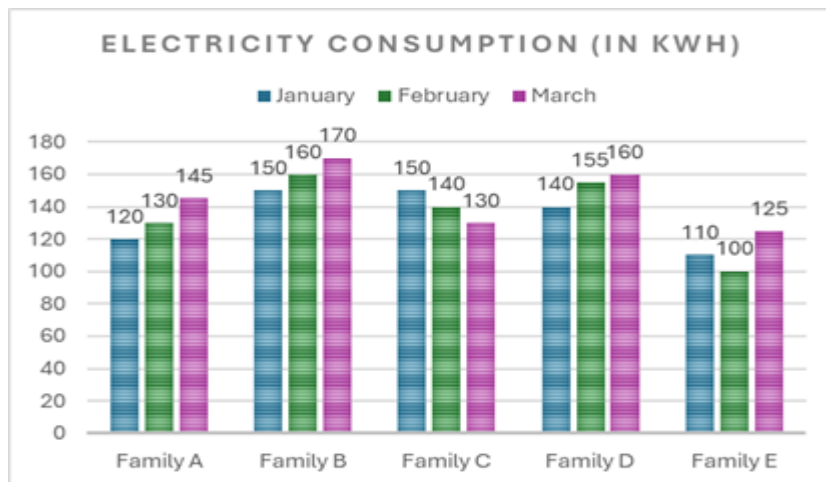
Q20 $a^3 + b^3$, $a^3 - b^3$

If $a + b = 9$ and $ab = 13$, then the value of $a^3 + b^3$ is:

- A. 348
- B. 398
- C. 328
- D. 378

Q21 Comparative Analysis

The given bar graph shows electricity consumption (in kWh) for five households (Family A, B, C, D, E) over a period of three months (January to March).



Which family is with the highest electricity consumption and determine how much more they consumed (in kWh) compared to the family with the lowest usage over the three-month period?

- A. C, and 142
- B. A, and 145
- C. E, and 146
- D. B, and 145



Q22 Laws of Indices

Find the value of $(2^3)^4 \div 2^5$.

A. 2^2

B. 2^5

C. 2^7



D. 2^{12}

Q23 Mean of Grouped Data

If the mean of the following data is 47, then what is the value of x?

Class	10-20	20-30	30-40	40-50	50-60
Frequency	36	18	29	20	x

A. 242



B. 227

C. 243

D. 270

Q24 Two Triangle Problems

An observer on the top of a cliff, 249 m above the sea-level, observes the angles of depression of two ships to be 30° and 60° , respectively. What is the distance (in m) between the ships if they are on opposite sides of the cliff?

A. $249\sqrt{3}$

B. $249\sqrt{2}$

C. $332\sqrt{3}$



D. $332\sqrt{2}$

Q25 $\sec^2 - \tan^2 = 1$

Which of the following identities is correct?

A. $\sec^2\theta - \tan^2\theta = 1$



B. $\operatorname{cosec}^2\theta + \cot^2\theta = 1$

C. $\sec^2\theta + \tan^2\theta = 1$

D. $\sin^2\theta - \cos^2\theta = 1$



Mathematics

25 Questions • Answer Key

Q1 AA, SAS, SSS Similarity

Raghu is 140 cm tall. He is standing 180 cm away from a lamp post. His shadow from the light is 70 cm long. Find the height of the lamp post.

A. 500 cm



B. 250 cm

C. 300 cm

D. 350 cm

Q2 Age in Ratio Form

The present ages of two brothers are in the ratio 3 : 5. After 12 years from now, their ages will be in the ratio 9 : 11. What is the current age of the younger brother?

A. 6 years



B. 10 years

C. 18 years

D. 12 years

Q3 Area/Volume Error

If the height and base radius of a cylinder are increased by 10% and by 5% respectively, then by what percent will its volume increase? (rounded off to 1 decimal place)

A. 20.3%

B. 22.2%

C. 21.3%



D. 24.2%

Q4 Average Speed

A car travels at a constant speed of 40 km/hr for 30 minutes, followed by a constant speed of 60 km/h for the next 40 minutes. What is the car's average speed (in km/hr) over the entire journey, rounded off to two decimal places?

A. 51.43



B. 54.67

C. 53.72

D. 50.34

Q5 CP-SP Relation

On selling a laptop at a 10% loss and a desktop at a 15% gain, Rita gains ₹8,000 in total. If she sells the laptop at a 10% gain and the desktop at a 20% gain, she gains ₹20,000 in total. Find the cost price (in ₹) of the laptop.

A. 36,000

B. 60,000

C. 40,000



D. 80,000

Q6 Even/Odd Number Series

The average of 4 consecutive odd numbers is 36. The sum of the largest and smallest numbers among them is:

A. 66

B. 68

C. 72



D. 74

Q7 Find SI

Find the simple interest (in ₹) on a sum of ₹500 borrowed for 3.5 years at a rate of interest of 29% per annum.

A. 450

B. 400

C. 330

D. 350



Q8 Given Three Vertices

Find the area of a triangle whose vertices are A(3,2), B(11,6), and C(7,14).

A. 32 unit²B. 36 unit²C. 40 unit²D. 42 unit²

Q9 Half-Yearly Compounding

A bank offers 4.5% compound interest per annum calculated on a half-yearly basis. A customer deposits ₹8,138 each on 1 January and 1 July of a year. At the end of the year, the interest is: (correct to two decimal places)

- A. ₹540.05
- B. ₹553.43
- C. ₹538.12
- D. ₹562.53

Q10 Median

The mean and the mode of a set of data are 62.4 and 36.8, respectively. Find the median of the data, using the empirical formula. (Round off to one decimal place)

- A. 55.8
- B. 55.5
- C. 54.2
- D. 53.9

Q11 Multiple Pipes

Pipe A can fill a tank in 3 hours, pipe B can fill the same tank in 9 hours and pipe C can fill the same tank in 18 hours. The time taken (in hours) by them to fill half of the same tank if they operate together is:

- A. 4
- B. 2
- C. 3
- D. 1

Q12 Percentage Increase/Decrease

The income of Raman is ₹70,900. He saves 12% of his income. If his income increases by 39% and expenditure increases by 50%, then his savings will:

- A. decrease by ₹3,550
- B. increase by ₹3,548
- C. decrease by ₹3,545
- D. increase by ₹3,546

Q13 Population Based Problems

A town's population increases by 25% every year. If the current population is 16,000, what will be the population after 3 years?

- A. 30,250
- B. 32,000
- C. 28,800
- D. 31,250

Q14 Relative Speed

Two trains are running towards each other from station A and station B at speeds of 70 km/h and 80 km/h, respectively. When they meet each other, it is noticed that the second train covers 150 km more than the first train. What is the distance between the two stations?

- A. 2240 km
- B. 2230 km
- C. 2250 km
- D. 2260 km

Q15 Rules for 2,3,4,5,6

What is the least value that must be assigned to A so that the number 717A0280 is divisible by 3?

- A. 2
- B. 8
- C. 5
- D. 1

Q16 Rules for 2,3,4,5,6

The 7-digit number 45A216B is divisible by 3. What is the minimum value of (A + B)?

- A. 3
- B. 2
- C. 0
- D. 5

Q17 Rules for 7,8,9,11

Which of the following numbers is divisible by 9?

- A. 4,317
- B. 5,328
- C. 3,624
- D. 6,018

Q18 Simple Ratio Partnership

A and B jointly start a business. The investment of A is equal to three times the investment of B. Find the share of A in the annual profit of ₹5,524.

- A. ₹4,143
- B. ₹4,113
- C. ₹4,123
- D. ₹4,133



Q19 Successive Discount

The marked price of a cooker is same at four shops I, II, III and IV. Shop I allows two successive discounts of 54% and 61%, shop II allows successive discounts of 17% and 49%, shop III allows successive discounts of 25% and 36% and shop IV allows successive discounts of 95%, 20% and 68% on the marked price of the cooker. Which shop is selling the cooker at the lowest price?

A. IV



B. III

C. I

D. II

Q20 Weighted Average

The mean marks obtained by 350 students in a subject are 75. The mean of top 100 students was found to be 85 and the mean of last 100 students was found to be 65. The mean marks of the remaining 150 students are:

A. 65

B. 75



C. 85

D. 55

Q21 Finding Value from Percentage

A man spends ₹3654 per month and saves $12\frac{1}{2}\%$ of his income. His monthly income is

A. ₹4176



B. ₹4186

C. ₹4196

D. ₹4166

Q22 Pythagorean Identities

Simplify: $\frac{\cot A + \operatorname{cosec} A - 1}{\cot A + 1 - \operatorname{cosec} A} - \frac{1}{\sin A} - \cot A$

A. 0

B. $\sec A$

C. 1

D. $\sin A$ **Q23 Pythagorean Identities**

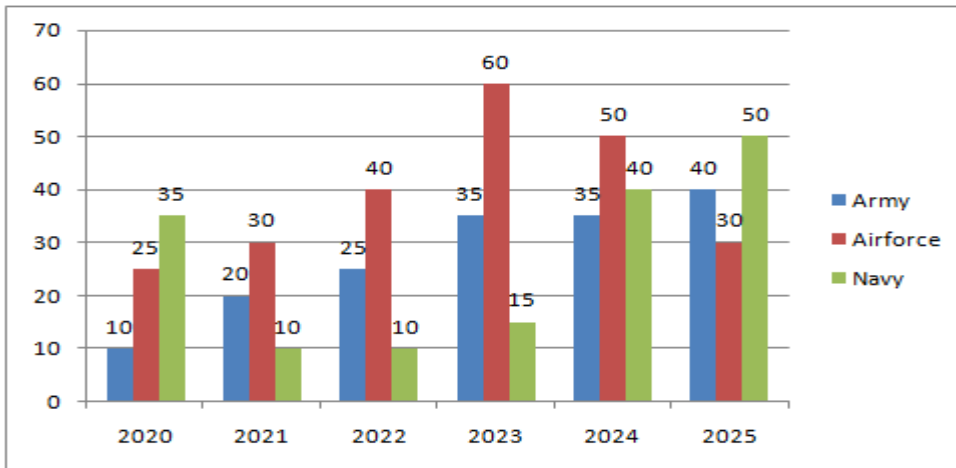
If $\cos A = \frac{5}{13}$, and A is an acute angle, then the value of $\frac{\sin A}{\cos A}$ is:

A. $\frac{13}{5}$ B. $\frac{12}{13}$ C. $\frac{5}{12}$ D. $\frac{12}{5}$ 

Q24 Simple Bar Chart

The following bar graph shows the number of soldiers recruited (in thousands) in three different forces in six different years. Study the following graph carefully to answer the question that follows.

What was the percentage increase in the number of soldiers recruited in Airforce in the year 2022 as compared to the previous year?



A. $31\frac{1}{3}\%$

B. $30\frac{1}{3}\%$

C. $32\frac{1}{3}\%$

D. $33\frac{1}{3}\%$

**Q25 Two Persons Age Relation**

A man is 24 years older than his son. In two years from now, his age will be twice the age of his son. The present age of his son is

A. 26 years

B. 22 years

C. 21 years

D. 25 years



Mathematics

25 Questions • Answer Key

Q1 3-Year Difference

A person finds that the compound interest on a sum at 5% per annum for three years is greater than the simple interest by ₹61. What is the sum?

- A. ₹8,200
- B. ₹7,890
- C. ₹9,400
- D. ₹8,000



Q2 AA, SAS, SSS Similarity

In triangle ABC, $\angle A = 30^\circ$, $\angle B = 60^\circ$ and $\angle C = 90^\circ$. In triangle DEF, $\angle D = 30^\circ$, $\angle E = 60^\circ$ and $\angle F = 90^\circ$. If $AB:DE = 2:3$, what is the ratio of the areas of the two triangles?

- A. 4:9
- B. 2:1
- C. 3:5
- D. 1:2



Q3 Annual Compounding

Krish has ₹1681 with him. He divided it amongst his sons Veer and Nitin and asked them to invest it at 5% rate of compound interest per annum, compounded annually. It was seen that Veer and Nitin got same amount after 12 and 13 years respectively. How much (in ₹) did Krish give to Veer?

- A. 861
- B. 711
- C. 920
- D. 820



Q4 Average Speed

Ramesh travels with the speed of 60 km per hour for the first 2 hours. For the next two hours, he travels with a speed of 50 km per hour. Find the average speed (in km per hour) of his entire journey.

- A. 65
- B. 50
- C. 60
- D. 55



Q5 Basic TSD

With an average speed of 60 kmph, a bus reaches its destination on time. If it goes at an average speed of 55 kmph, then it is late by 10 minutes. The total distance of the journey is:

- A. 110 km
- B. 120 km
- C. 100 km
- D. 70 km



Q6 Dividing Quantity in Ratio

Some laddoos are packed in four boxes, A, B, C, and D, in the ratio 5:6:8:3. If box C has 225 more laddoos than box A, how many laddoos are there in box D?

- A. 375
- B. 300
- C. 275
- D. 225



Q7 Family Age Problems

5 years ago, the age of a mother was 12 years more than thrice her daughter's age. After how many years from now, will she be thrice her daughter's age?

- A. 1 year
- B. 4 years
- C. 2 years
- D. 3 years



Q8 Find Principal

Padmini borrowed a certain amount for 5 years at the simple interest rate of 10% per annum. If the total amount to be paid after 5 years is ₹24,000, then find the principal amount.

- A. ₹15,800
- B. ₹18,000
- C. ₹17,400
- D. ₹16,000



Q9 Order of Operations

Evaluate: $16 - 5 \times 4 + 5$

A. 1



B. 3

C. 0

D. -1

Q10 Percentage Increase/Decrease

The income of Raman is ₹10,200. He saves 30% of his income. If his income increases by 14% and expenditure increases by 40%, then his savings will:

A. increase by ₹1,429

B. decrease by ₹1,428



C. decrease by ₹1,427

D. increase by ₹1,430

Q11 Proportion

Four numbers a, b, c, d are in proportion. If $a = 32$, $b = 72$, and $c = 180$, what is the value of d?

A. 405



B. 400

C. 415

D. 410

Q12 Rules for 2,3,4,5,6

The 7-digit number 39A122B is divisible by 3. What is the minimum value of $(A + B)$?

A. 3

B. 6

C. 1



D. 2

Q13 Rules for 7,8,9,11

If a 7-digit number 29009A6 is completely divisible by 7, what is the least value of A?

A. 1

B. 5

C. 2



D. 9

Q14 Single Change

The salary of an employee decreased from ₹50,000 to ₹45,000. Find the percentage decrease in salary.

A. 8%

B. 15%

C. 12%

D. 10%

**Q15 Successive Discount**

The marked price of a cooker is same at four shops I, II, III and IV.

Shop I allows two successive discounts of 90% and 61%, shop II allows successive discounts of 15% and 98%, shop III allows successive discounts of 28% and 99%, and shop IV allows successive discounts of 91%, 37%, and 95% on the marked price of the cooker.

Which shop is selling the cooker at the lowest price?

A. II

B. III

C. I

D. IV

**Q16 Ungrouped Data Mode**

The sizes of bags sold in a store during a day are given below:

10, 4, 6, 8, 7, 4, 8, 2, 9, 5, 4, 6, 9

Find the mode of the data.

A. 5

B. 2

C. 4



D. 1

Q17 Weighted Average

In a survey, 4 people rated a product 5 and 6 people rated it 3. What is the weighted average rating?

A. 3.5

B. 3.8



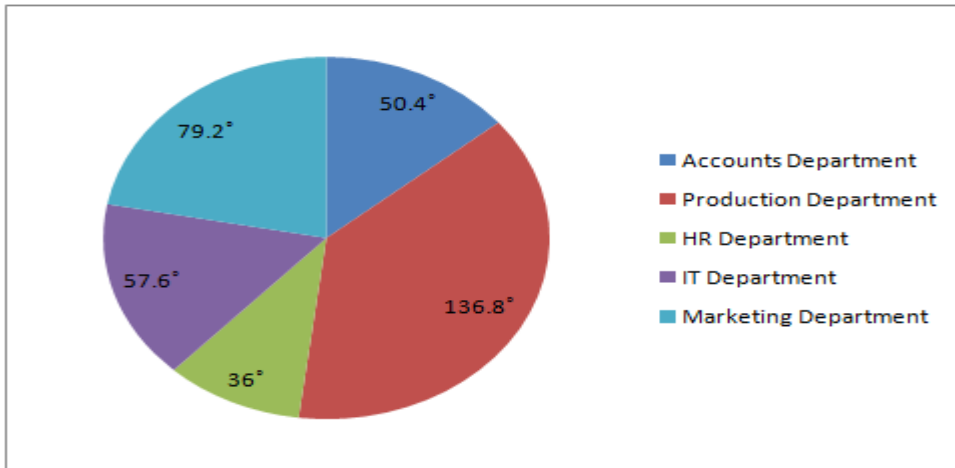
C. 4.2

D. 4.0



Q18 Degree Based

The following pie chart shows the degree-wise distribution of 4800 employees working in various departments of an organization, and the ratio of number of men to number of women is 3:5. What is the number of men working in the HR department?



A. 194

B. 196

C. 180



D. 198

Q19 Diagonal of Cube/Cuboid

The dimensions of a cuboid are in the ratio 1 : 2 : 3. If the length of the space diagonal of the cuboid is $\sqrt{56}$ cm, find the volume of the cuboid.

A. 46 cm³

B. 48 cm³



C. 45 cm³

D. 84 cm³

Q20 Leaving Midway

A can complete a piece of work alone in 10 days, and B can complete it alone in 30 days. They work together for 6 days. Then A leaves, and B works alone for 4 more days. What fraction of the work still remains unfinished?

A. $\frac{1}{5}$

B. $\frac{1}{15}$



C. $\frac{2}{15}$

D. $\frac{1}{10}$



Q21 Mean of Grouped Data

If the mean of the following data is 46, then what is the value of x?

Class	10-20	20-30	30-40	40-50	50-60
Frequency	36	20	29	26	x

A. 210

B. 190

C. 209



D. 206

Q22 Profit/Loss Percentage

A merchant buys 10 identical items at a total cost of ₹6,000. He sells 6 of them at a 15% profit and the remaining 4 at a 10% loss. Find the overall profit or loss percentage.

A. 10% loss

B. 5% profit



C. 5% loss

D. 10% profit

Q23 Sphere & Hemisphere

If 64 identical small spheres are made out of a big sphere of diameter 16 cm, then what will be the surface area of all small spheres?

A. $16\pi\text{cm}^2$ B. $14\pi\text{cm}^2$ C. $2\pi\text{cm}^2$ D. $12\pi\text{cm}^2$ **Q24** Standard Angle Values

Find the value of $\sin^2 10^\circ + \sin^2 80^\circ + \tan^2 45^\circ + \sec^2 60^\circ + \sin^2 30^\circ$.

A. $\frac{15}{2}$ B. $\frac{20}{3}$ C. $\frac{25}{4}$ D. $\frac{25}{3}$ 

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Q25 $\sin^2 + \cos^2 = 1$

If $\sin A + \cos A = m$, then what is the value of $\sin^4 A + \cos^4 A$?

A. $1 - \frac{(1-m^2)^2}{2}$



B. $1 + \frac{(1-m^2)}{2}$

C. $1 - \frac{(1-m^2)}{2}$

D. $1 + \frac{(1-m^2)^2}{2}$



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Mathematics

25 Questions • Answer Key

Q1 3-Year Difference

The difference between compound interest (compounded annually) and simple interest for 3 years at the rate of 20% per annum is ₹624. What is the principal lent?

A. ₹3,775

B. ₹5,975

C. ₹4,875



D. ₹6,075

Q2 Cost with Overhead Expenses

Arvind bought an article for ₹x. He sold it to Biru at a loss of 15%. Biru spent ₹101 on its transportation and sold it to Minu at a profit of 50%. If Minu bought it for ₹1,554, then what is the value of x?

A. 1,068

B. 1,100



C. 1,126

D. 1,087

Q3 Divisibility Rules

What is the least value that must be assigned to A so that the number 456A2384 is divisible by 16?

A. 0



B. 5

C. 4

D. 2

Q4 Find SI

Find the simple interest (in ₹) on a sum of ₹550 borrowed for 2.5 years at a rate of interest of 12% per annum.

A. 155

B. 165



C. 150

D. 145

Q5 HCF/LCM Word Problems

Find the greatest number of 4 digits which is divisible by 12, 24, 45 and 60.

A. 9,450

B. 9,720



C. 9,600

D. 9,256

Q6 Half-Yearly Compounding

A sum of money earns interest at a rate of 20% per annum, compounded half-yearly. An amount of ₹8,500 is invested on 1 January and another ₹8,500 is invested on 1 July of the same year. Find the total interest earned at the end of the year.

A. ₹2,635



B. ₹2,525

C. ₹2,540

D. ₹2,680

Q7 Mean Proportional

The width of a rectangle is 16 cm. If the length is the mean proportional between 9 cm and 16 cm, find the length of the rectangle.

A. 16 cm

B. 18 cm

C. 12 cm



D. 9 cm

Q8 Multiple Pipes

Pipe A can fill a tank in 3 hours, pipe B can fill the same tank in 7 hours and pipe C can fill the same tank in 42 hours. The time taken (in hours) by them to fill half of the same tank if they operate together is:

A. 1



B. 3

C. 4

D. 2



Q9 Percentage Increase/Decrease

The cost of a washing machine is 50% less than the cost of a TV. If the cost of the washing machine increases by 83% and that of the TV decreases by 38%, then what is the percentage change in the total cost of 8 washing machines and 4 TVs?

- A. Decrease by 19%
- B. Decrease by 27%
- C. Increase by 26%
- D. Increase by 22.5%

**Q10 Relative Speed**

Two stations S1 and S2 are 766 km apart. One train starts from S1 at 5:20 a.m. and travels towards S2 at 74 kmph. Another train starts from S2 at 7:50 a.m. and travels towards S1 on parallel tracks at a speed of 92 kmph. At what time will they meet?

- A. 9:55 am
- B. 11:20 am
- C. 10:05 am
- D. 9:50 am

**Q11 Successive Discount**

The marked price of a cooker is same at four shops I, II, III and IV. Shop I allows two successive discounts of 57% and 29%, shop II allows successive discounts of 76% and 35%, shop III allows successive discounts of 53% and 86% and shop IV allows successive discounts of 58%, 13% and 12% on the marked price of the cooker. Which shop is selling the cooker at the lowest price?

- A. III
- B. II
- C. IV
- D. I

**Q12 Surface Area**

Two solid spheres are made of the same material. The weight of the larger sphere is 8 times that of the smaller sphere. If the radius of the smaller sphere is 7 cm, find the difference between the surface areas of both spheres. (Use $\pi = 22/7$)

- A. 1828 cm²
- B. 1888 cm²
- C. 1848 cm²
- D. 1868 cm²

**Q13 Trapezium Properties**

In a trapezium ABCD, $AB \parallel CD$ and $AB = 16$ cm, $CD = 8$ cm. What is the ratio of the areas of $\triangle ABC$ and $\triangle ACD$?

- A. 4:3
- B. 1:2
- C. 2:1
- D. 3:5

**Q14 Two Persons Age Relation**

The ratio of Manushi's and Nanina's present ages is 4 : 9. After 6 years, the ratio of their ages will be 6 : 11. What is Nanina's present age?

- A. 24 years
- B. 26 years
- C. 27 years
- D. 25 years

**Q15 Two Successive Changes**

An item undergoes two successive price increases of 12% each. Find the single equivalent percentage increase in the price of the item.

- A. 24%
- B. 25.44%
- C. 22%
- D. 24.44%

**Q16 Two Trains Crossing**

Two trains, 210 m and 150 m long, are running in the same direction. The faster train, moving at 60 km/h, overtakes the slower train in 30 seconds. Find the speed of the slower train.

- A. 17.2 km/h
- B. 15.6 km/h
- C. 20 km/h
- D. 16.8 km/h

**Q17 Volume**

The radius and height of the cylinder are equal. If the radius of the cylinder increased by 20% and the height of the cylinder is increased by 10%, then find the net increase in the volume of the cylinder.

- A. 58.4%
- B. 62.5%
- C. 55.5%
- D. 66.6%



Q18 Weighted Average

A library has an average number of 612 visitors on Sundays and 240 on other days. The average number of visitors per day in a month of 30 days beginning with a Sunday is:

A. 310

B. 298

C. 315

D. 302

**Q19** $(a+b)^3, (a-b)^3$

If $x + \frac{1}{x} = \sqrt{20}$, find the value of $x^3 - \frac{1}{x^3}$, where $x > 1$.

A. 58

B. 82

C. 64

D. 76

**Q20** Bracket Simplification

Simplify the following expression:

$$\frac{(36-6)^2}{3 \times 2} + 4 \times (5-3)^3$$

A. 172

B. 184

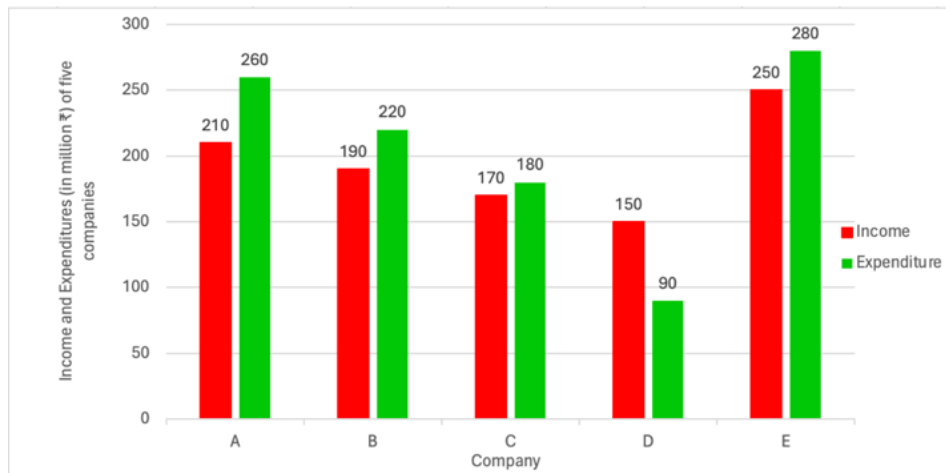
C. 176

D. 182



Q21 Comparative Analysis

The following bar graph shows the Income and Expenditure (in million ₹) of five companies, A, B, C, D, and E, in the year 2016. The profit or loss of a company is given by 'Profit or Loss = (Income – Expenditure)'.



What is the ratio of the combined profit or loss of companies B and C to that of A and E?

A. 1 : 2



B. 3 : 4

C. 1 : 3

D. 2 : 3

Q22 Mean of Grouped Data

What is the value of $(4x + 2y)$, if the mean of the following distribution is 50?

Class	0-20	20-40	40-60	60-80	80-100	Total
Frequency	9	13	x	5	y	45

A. 34

B. 46



C. 29

D. 44

Q23 Mean of Grouped Data

Find the arithmetic mean of the following data.

Class interval	0-8	8-16	16-24	24-32	32-40
Frequency	8	10	6	4	12

A. 20.4



B. 19.6

C. 22.8

D. 21.2



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Q24 Pythagorean Identities

Find the value of $\frac{\sin\theta}{(\sec\theta - 1)} + \frac{\sin\theta}{(\sec\theta + 1)}$.

A. $\tan\theta$

B. $2 \cot\theta$



C. $\cot\theta$

D. $2 \tan\theta$

Q25 Pythagorean Identities

Simplify $\frac{\cos \emptyset}{1 + \sin \emptyset} + \tan \emptyset$.

A. $\cos \emptyset$

B. $\sin \emptyset$

C. $\operatorname{cosec} \emptyset$

D. $\sec \emptyset$



Mathematics

25 Questions • Answer Key

Q1 AA, SAS, SSS Similarity

PQR is a triangle and D is a point on side QR. If $QR=16$ cm, $QD=12$ cm and $\angle QPR = \angle PDR$, then find the length of PR.

- A. 64 cm
- B. 4 cm
- C. 8 cm
- D. 28 cm



Q2 Annual Compounding

Jaspreet deposited a sum of ₹64,750 at 20% rate of interest per annum, compounded annually. The total amount received by Jaspreet after 2 years is:

- A. ₹92,875
- B. ₹93,080
- C. ₹93,240
- D. ₹93,349



Q3 Average Speed

A motor bike travels at the speed of 54 km/hr for 2 hours, then it travels 70 km/hr for 3 hours, and finally travels 60 km/hr for 3 hours. What is the average speed of the motor bike for the entire trip?

- A. 64.18 km/hr
- B. 59.28 km/hr
- C. 56.83 km/hr
- D. 62.25 km/hr



Q4 Basic Ratio

The ratio of two numbers is 6 : 11. If the smaller number is 18, find the larger number.

- A. 27
- B. 30
- C. 33
- D. 22



Q5 Cost with Overhead Expenses

Arvind bought an article for ₹x. He sold it to Biru at a loss of 16%. Biru spent ₹147 on its transportation and sold it to Minu at a profit of 40%. If Minu bought it for ₹1,617, then what is the value of x?

- A. 1,186
- B. 1,227
- C. 1,204
- D. 1,200



Q6 Find SI

Find the simple interest (in ₹) if a sum of ₹550 is borrowed for 2.5 years at 20% per annum rate of interest.

- A. 375
- B. 255
- C. 275
- D. 325



Q7 Half-Yearly Compounding

A sum of ₹5,000 is invested for 1 year at 10% per annum compound interest, compounded half-yearly. Find the compound interest earned (in ₹).

- A. 512.50
- B. 575.50
- C. 505.50
- D. 530.50



Q8 Laws of Indices

Given that $109^{0.71} = x$, $109^{0.47} = y$ and $x^z = y^{10}$, then the value of z is close to:

- A. 6.62
- B. 6.04
- C. 5.77
- D. 9.19



Q9 Median

The mean and the mode of a set of data are 23.9 and 50.9, respectively. Find the median of the data, using the empirical formula.

- A. 33.8
- B. 34
- C. 32.6
- D. 32.9

**Q10 Outer Path around Field**

A rectangular playground is 20 m longer than it is wide. A walking track of uniform width 2 m is laid all around the playground. The area of the walking track is 176 m^2 . What is the perimeter of the playground (excluding the track)?

- A. 84 m
- B. 80 m
- C. 94 m
- D. 90 m

**Q11 Percentage Increase/Decrease**

Vikram saves $r\%$ of his earnings. If his earnings increase by 22% and his expenditure increases by 16%, his savings grow by 40%. What is the value of r ?

- A. 22
- B. 16
- C. 25
- D. 27

**Q12 Percentage Increase/Decrease**

The income of Raman is ₹91,700. He saves 20% of his income. If his income increases by 19% and expenditure increases by 35%, then his savings will:

- A. increase by ₹8,249
- B. decrease by ₹8,253
- C. increase by ₹8,255
- D. decrease by ₹8,252

**Q13 Successive Discount**

The marked price of a cooker is same at four shops I, II, III and IV. Shop I allows two successive discounts of 14% and 87%, shop II allows successive discounts of 96% and 76%, shop III allows successive discounts of 22% and 92% and shop IV allows successive discounts of 16%, 89% and 57% on the marked price of the cooker. Which shop is selling the cooker at the lowest price?

- A. II



B. I

C. III

D. IV

Q14 Upstream/Downstream

The ratio of the speed of a boat to the speed of the current of water is 36 : 5. The boat goes a certain distance downstream in 5 hours 10 minutes. How much time will it take to come back against the stream?

- A. 6 hours 50 minutes



B. 6 hours 20 minutes

C. 6 hours 30 minutes

D. 5 hours 50 minutes

Q15 Weighted Average

The numbers 4, 8, and 10 are assigned weights 2, 3, and 5, respectively. Find their weighted arithmetic mean.

A. 6.5

B. 7.4

C. 8.2



D. 9.1



Q16 Calculation Based

Read the given table carefully to answer the question that follows.

Amount earned (in lacs) by five persons, A, B, C, D and E, in six different years

Person

Year	A	B	C	D	E
2005	2.24	4.33	5.64	3.73	1.69
2006	1.44	3.34	6.93	5.52	5.52
2007	4.63	2.79	7.52	5.68	4.28
2008	6.65	6.63	5.83	6.74	6.83
2009	5.34	4.5	5.94	8.42	5.53
2010	7.38	5.36	7.84	9.45	9.94

What was the respective ratio between the amount earned by Person-B in the year 2007 and Person-D in the year 2010?

A. 37:109

B. 31:105



C. 37:107

D. 32:105

Q17 Compound Angle Formulas

Find the value of $\frac{\tan 75^\circ - \tan 15^\circ}{1 + \tan 75^\circ \tan 15^\circ}$.

A. $\sqrt{3}$



B. $\frac{1}{\sqrt{3}}$

C. $\sqrt{2}$

D. $\frac{2}{\sqrt{3}}$

Q18 Cone

A solid cone of radius R and height H is melted and recast into 8 identical solid cones, each of radius $\frac{R}{3}$. The height of each new cone is:

A. $\frac{27H}{8}$

B. $\frac{9H}{8}$



C. $\frac{H}{8}$

D. $\frac{3H}{8}$



Q19 Efficiency Ratio

A can do a piece of work in 16 days. B is 60% more efficient than A. How much time will A and B together take to finish the work?

A. $3\frac{2}{7}$ days

B. $4\frac{3}{13}$ days

C. $5\frac{4}{7}$ days

D. $6\frac{2}{13}$ days

**Q20 Fraction Operations**

Simplify: $\frac{3}{5} + \frac{2}{3}$

A. $\frac{19}{25}$

B. $\frac{19}{15}$

C. $\frac{23}{25}$

D. $\frac{23}{15}$

**Q21 Surds**

In a science project, the power from two machines are being compared. Machine A's power is measured as $2 \times 8 \times \sqrt{y}$ and machine B's power is measured as $2 \times 8 \times \sqrt{y}$. If both the machines produce same power, what is the value of y?

A. 8

B. 16

C. 2

D. 4

**Q22 Time-based Partnership**

A, B, and C started a business, each investing ₹10000. After 4 months, A withdraws ₹3000, B withdraws ₹4000, and C invests ₹3000 more. At the end of the one year, a total profit was ₹65600. Find the share of C at the end of the year.

A. ₹24600

B. ₹22700

C. ₹28800

D. ₹29800



Q23 Weighted Average

If the average temperature of the first 3 days of a week is 38.5°C and the average temperature of the last 4 days is 39.2°C , find the average temperature of the entire week.

A. 38.8°C

B. 38.9°C ✓

C. 38.6°C

D. 39°C

Q24 $a^2 - b^2$

If $49a^2 - b = \left(7a + \frac{1}{2}\right)\left(7a - \frac{1}{2}\right)$, then the value of b is:

A. $\frac{1}{4}$ ✓

B. 4

C. $\frac{1}{16}$

D. $-\frac{1}{4}$

Q25 $\sec^2 - \tan^2 = 1$

Simplify $\frac{(1 - \tan A)^2}{(1 - \cot A)^2} + 1$.

A. $\tan^2 A$

B. $\sec^2 A$ ✓

C. $\cot^2 A$

D. $\tan A$



Mathematics

25 Questions • Answer Key

Q1 Annual Compounding

What will be the compound interest on a sum of ₹7,625 after 3 years at the rate of 20% per annum, interest being compounded annually?

A. ₹5,551



B. ₹5,571

C. ₹5,561

D. ₹5,581

Q2 Annual Compounding

Saurav deposited a certain sum of money at the rate of 20% per annum, compounded annually. At the end of 2 years, the total amount received was ₹70,164. What was the sum of money deposited by Saurav?

A. ₹48,606

B. ₹48,931

C. ₹48,407

D. ₹48,725



Q3 Area/Volume Error

If the height of a triangle is increased by 40% and its base is decreased by 25%, what will be the effect on its area?

A. Decreases by 5%

B. Increases by 5%



C. Increases by 2%

D. Decreases by 2%

Q4 Average Speed

A car travels a total distance of 180 km, divided equally into three parts of 60 km each. On the first part, it moves at a speed of 60 km/h; on the second, it slows down to 40 km/h. On the third part, its speed increases again so that the overall average speed for the entire journey becomes 54 km/h. Find the speed of the car on the third part.

A. 75 km/h

B. 78 km/h

C. 90 km/h

D. 72 km/h



Q5 Basic Ratio

A recipe requires flour and sugar in the ratio 3 : 2. If a baker uses 600 grams of flour, how much quantity (in grams) of sugar is needed?

A. 450

B. 500

C. 400



D. 360

Q6 Basic Ratio

Three numbers are in the ratio 2:3:4. If the sum of their cubes is 2673, then the largest number is:

A. 15

B. 9

C. 12



D. 6

Q7 Basic TSD

Kaushal travelled for 22 hours 3 minutes at the speed of 20 km/h. At what speed (in km/h) should he travel to cover the same distance in 21 hours?

A. 19

B. 20

C. 21



D. 18

Q8 Basic TSD

A car travels 240 km in 4 hours. How far will it travel in 7 hours at the same speed?

A. 360 km

B. 400 km

C. 480 km

D. 420 km



Q9 Combined Work Rate

Working alone, X takes 12 days, Y takes 15 days, and Z takes 20 days to complete a task. How many days will be required to complete the task if they work together?

- A. 6 days
- B. 4 days
- C. 8 days
- D. 5 days

**Q10 Find SI**

Find the simple interest (in ₹) if a sum of ₹550 is borrowed for 3.5 years at 4% per annum rate of interest.

- A. 77
- B. 177
- C. 127
- D. 57

**Q11 Finding LCM**

The ratio of two numbers is 21:5 and their HCF is 50. What will be their LCM?

- A. 5260
- B. 5220
- C. 5240
- D. 5250

**Q12 Finding Ratio**

In what ratio should coffee costing ₹3800/kg be mixed with coffee costing ₹2750/kg so that the cost of the mixture is ₹3050/kg?

- A. 3:7
- B. 2:3
- C. 2:5
- D. 3:5

**Q13 Finding Value from Percentage**

In an election between two candidates, one candidate received 28% of the total votes but lost the election by a margin of 649 votes. If all the votes cast were valid, find the total number of votes cast.

- A. 1495
- B. 1465
- C. 1485
- D. 1475

**Q14 Laws of Indices**

Given that $122^{0.86} = x$, $122^{0.22} = y$ and $x^z = y^7$, then the value of z is close to:

- A. 1.79
- B. 2.11
- C. 4.46
- D. 0.56

**Q15 Mode**

In a dataset, the mean is 65 and the median is 70. Find the mode of the data.

- A. 80
- B. 60
- C. 55
- D. 75

**Q16 Percentage Increase/Decrease**

The income of Raman is ₹43,500. He saves 17% of his income. If his income increases by 18% and expenditure increases by 20%, then his savings will:

- A. increase by ₹606
- B. decrease by ₹604
- C. increase by ₹609
- D. decrease by ₹608

**Q17 Profit/Loss Percentage**

A manufacturer fixes his selling price at 70% above the cost of production. If the cost of production increases by 10% and the manufacturer increases his selling price by 10%, what is the new profit percentage?

- A. 73%
- B. 72%
- C. 71%
- D. 70%



Q18 Successive Discount

The marked price of a cooker is same at four shops I, II, III and IV. Shop I allows two successive discounts of 18% and 51%, shop II allows successive discounts of 59% and 89%, shop III allows successive discounts of 57% and 40% and shop IV allows successive discounts of 68%, 69% and 27% on the marked price of the cooker. Which shop is selling the cooker at the lowest price?

A. III

B. I

C. IV

D. II

**Q19 Two Persons Age Relation**

In 8 years, Dhruv will be twice as old as Divya. Four years ago, he was four times as old as Divya. Find the present age of Dhruv.

A. 26 years

B. 20 years

C. 28 years



D. 30 years

Q20 Volume

A rectangular water tank measuring 80 cm × 60 cm × 50 cm contains water up to a height of 30 cm. A solid metal cube of edge 20 cm and a solid metal cuboid of dimensions 26 cm × 13 cm × 10 cm are dropped into the tank. Find the rise in the water level (rounded off to two decimal places).

A. 2.67 cm

B. 2.17 cm

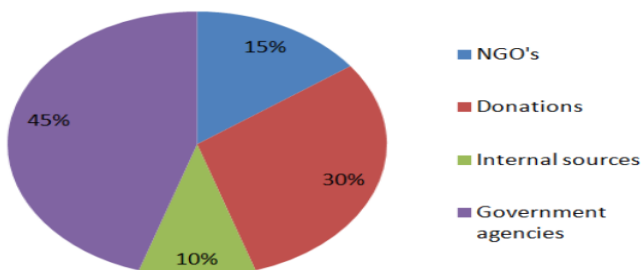
C. 2.97 cm

D. 2.37 cm

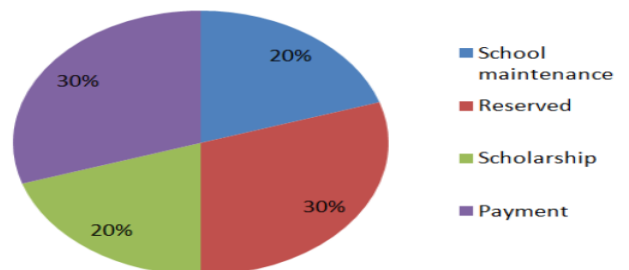
**Q21 Double Pie Chart**

Study the following pie charts carefully and answer the question given below it.
The entire fund that school gets from different sources is equal to ₹640 lakh.

Sources of funds in school



Uses of funds by school



If the school managed school maintenance from the government agencies fund only, how much fund from government agencies would still be left for other uses?

A. ₹180 lakh

B. ₹140 lakh

C. ₹160 lakh



D. ₹120 lakh



Q22 Mean of Grouped Data

If the mean of the following data is 45, then what is the value of x?

Class	20-30	30-40	40-50	50-60	60-70
Frequency	34	35	42	21	x

A. 27

B. 46

C. 42

D. 41

**Q23** Pythagorean Identities

Simplify: $2 + \frac{\sin A}{\cot A - \operatorname{cosec} A} - \frac{\sin^2 A}{\cos A + 1}$

A. $\sec^2 A$ B. $\tan A$ C. ∞

D. 0

**Q24** Regular Polygons

The difference between the measures of an interior angle and an exterior angle of a regular polygon is n and the ratio of the interior angle to the exterior angle is $p : r$, then $n + p + r$ is:

A. multiple of 6

B. multiple of 9

C. multiple of 7

D. multiple of 5

**Q25** Standard Angle Values

The value of $3(\sec^2 \theta + \operatorname{cosec}^2 \theta) - 10(\cot^2 \theta \times \cos^2 \theta)$, when $\theta = 45^\circ$, is:

A. -7

B. 10

C. 13

D. 7



Mathematics

25 Questions • Answer Key

Q1 Annual Compounding

Calculate the compound interest earned on ₹2,500 for 2 years at 6% per annum, compounded annually.

A. ₹300

B. ₹309



C. ₹306

D. ₹312

Q2 Basic Ratio

The ratio of two numbers is 3 : 5. If the first number is 24, what is the second number?

A. 36

B. 42

C. 38

D. 40



Q3 Basic TSD

Kaushal travelled for 1 hour 40 minutes at the speed of 114 km/h. At what speed (in km/h) should he travel to cover the same distance in 5 hours?

A. 41

B. 35

C. 38



D. 40

Q4 Calculation Based

The following table shows the number of laptops sold by a company in different cities along with the price per laptop.

City	Laptops Sold	Price per Laptop (₹)
Delhi	120	45,000
Mumbai	150	48,000
Chennai	100	42,000
Kolkata	130	46,000

Find the total revenue (in ₹) generated from laptop sales in Chennai and Kolkata.

A. 1,01,80,000



B. 1,04,80,000

C. 1,02,80,000

D. 1,03,80,000

Q5 Cost with Overhead Expenses

Arvind bought an article for ₹x. He sold it to Biru at a loss of 20%. Biru spent ₹140 on its transportation and sold it to Minu at a profit of 46%. If Minu bought it for ₹1,752, then what is the value of x?

A. 1,357

B. 1,344

C. 1,356

D. 1,325



Q6 Find SI

Find the simple interest (in ₹) if a sum of ₹550 is borrowed for 3.5 years at 16% per annum rate of interest.

A. 308



B. 408

C. 288

D. 358

Q7 Finding HCF

If the side (in cm) of a regular pentagon is equal to the HCF of 18 and 27, then what is the perimeter (in cm) of the pentagon?

A. 45



B. 27

C. 36

D. 54

Q8 Finding HCF

Which of the following pairs of numbers is co-prime with each other?

A. 24 and 51

B. 63 and 91

C. 96 and 111

D. 101 and 77



Q9 Finding Value from Percentage

In an election between two candidates, the candidate who got 59% of valid votes won by a majority of 450 votes. Find the total valid votes.

A. 2456

B. 2500



C. 2540

D. 2350

Q10 Half-Yearly Compounding

A sum of money earns interest at a rate of 20% per annum, compounded half-yearly. An amount of ₹4,000 is invested on 1 January and another of ₹5,500 is invested on 1 July of the same year. Find the total interest earned at the end of the year.

A. ₹1,390



B. ₹1,240

C. ₹1,280

D. ₹1,350

Q11 Laws of Indices

Given that $27^{0.48} = x$, $27^{0.86} = y$ and $x^z = y^{10}$, then the value of z is close to:

A. 20.86

B. 17.92



C. 18.65

D. 17.02

Q12 Leaving Midway

A can do the work in 6 days, B in 8 days and C in 24 days. If all three work together and C leaves after 3 days, in how many total days will the work be completed?

A. 2.5 days

B. 3 days



C. 2 days

D. 1.5 days

Q13 Mean

The mean of a dataset is 6 more than its mode. If the median is 24, then find the mean.

A. 24

B. 30

C. 26



D. 28

Q14 Melting & Recasting

A solid metallic right circular cone with a radius of 7 cm and a height of 28 cm is melted and recast into the shape of a sphere. Find the radius of the sphere formed.

A. 8 cm

B. 6 cm

C. 9 cm

D. 7 cm

**Q15 Percentage Increase/Decrease**

The income of Raman is ₹68,500. He saves 22.5% of his income. If his income increases by 14% and expenditure increases by 40%, then his savings will:

A. decrease by ₹11,647

B. increase by ₹11,647

C. increase by ₹11,642

D. decrease by ₹11,645

**Q16 Successive Discount**

The marked price of a cooker is same at four shops I, II, III and IV. Shop I allows two successive discounts of 28% and 93%, shop II allows successive discounts of 41% and 13%, shop III allows successive discounts of 19% and 67% and shop IV allows successive discounts of 31%, 59% and 25% on the marked price of the cooker. Which shop is selling the cooker at the lowest price?

A. II

B. I



C. IV

D. III

Q17 Time-based Partnership

X and Y start a partnership with investments of Rs. 70,000 and Rs 50,000, respectively. After 6 months, Y invests an additional Rs 20,000. If the total profit after a year is 58,500, what is Y's share?

A. Rs 24,000

B. Rs 29,000

C. Rs 25,000

D. Rs 27,000



Q18 Weighted Average

The average marks of 20 students is 60, and that of another 30 students is 80. What is the combined average marks obtained per student?

A. 68

B. 70

C. 72



D. 74

Q19 Compound Angle Formulas

Find the value of $\frac{\sqrt{1 + \sin 4\theta}}{\sqrt{1 - \sin 4\theta}}$.

A. $\sec 4\theta - \tan 4\theta$ B. $\tan 4\theta + \cot 4\theta$ C. $-\sec 4\theta + \tan 4\theta$ D. $\sec 4\theta + \tan 4\theta$ **Q20** Laws of Indices

Simplify: $2^3 \times 2^2 \div 2^4$

A. 8

B. 1

C. 4

D. 2

**Q21** Mean of Grouped Data

What is the value of $(4x + 9y)$, if mean of the following distribution is 50?

Class	0-20	20-40	40-60	60-80	80-100	Total
Frequency	5	17	x	7	y	41

A. 108

B. 98



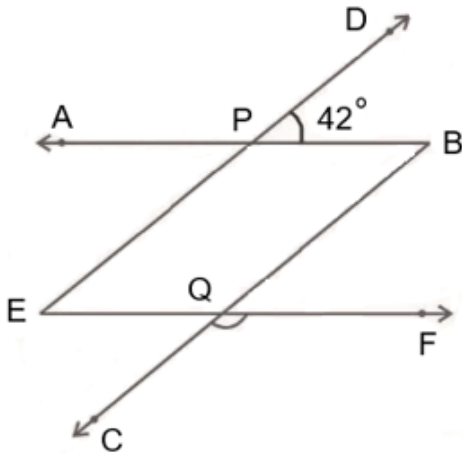
C. 103

D. 87



Q22 Parallel Lines & Transversal

In the given figure, $AB \parallel EF$, $ED \parallel CB$ and $\angle BPD$ is 42° . What is the measure of $\angle CQF$?

A. 38° B. 138° ✓C. 42° D. 142° **Q23** Pythagorean Identities

If $\frac{\sec\theta + \tan\theta}{\sec\theta - \tan\theta} = 5\frac{3}{13}$, then the value of $\sin\theta$ is:

A. $\frac{29}{81}$ B. $\frac{45}{81}$ C. $\frac{55}{81}$ ✓D. $\frac{23}{81}$ **Q24** Upstream/Downstream

A man can row at 8.5 km/h in still water. He finds it takes twice as long to row upstream as downstream for the same distance. Find the speed of the current.

A. $2\frac{5}{6}$ km/hr ✓B. $3\frac{5}{7}$ km/hrC. $1\frac{7}{8}$ km/hrD. $4\frac{3}{4}$ km/hr

Q25 $a^3 + b^3, a^3 - b^3$

If $x + y = 5$ and $\frac{1}{x} + \frac{1}{y} = \frac{20}{9}$, then the value of $x^3 + y^3$ is:

A. $\frac{367}{7}$

B. $\frac{356}{7}$

C. $\frac{365}{4}$



D. $\frac{365}{3}$



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Mathematics

25 Questions • Answer Key

Q1 $(a+b)^2, (a-b)^2$ What is the value of $(x + 2)^2 - (x - 2)^2$ when $x = 1$?

- A. 12
- B. 4
- C. 16
- D. 8



Q2 Annual Compounding

Mahesh deposited a certain sum of money at 20% rate of interest per annum, compounded annually. At the end of 2 years, Mahesh received a total amount of ₹26,316. What was the sum of money deposited by Mahesh?

- A. ₹18,539
- B. ₹18,607
- C. ₹18,275
- D. ₹17,872



Q3 Average Speed

Arjun travelled from place A to place B by car at a speed of 48 km/hr and returned back to place A at a speed of 60 km/hr. He then again went to place B at a speed of 72 km/hr. Find the average speed of the car for the whole journey (rounded off to two decimal places).

- A. 54.86 km/hr
- B. 50.53 km/hr
- C. 58.38 km/hr
- D. 48.31 km/hr



Q4 Basic Ratio

The ratio of men to women in a hall is 5 : 3. If 24 more women join and 12 men leave, the ratio becomes 3 : 2. Find the number of men originally present.

- A. 440
- B. 520
- C. 480
- D. 360



Q5 Curved & Total Surface Area

During a craft activity, a student creates a paper model in the shape of a right circular cone. The cone has a volume of $100\pi \text{ cm}^3$ and a height of 12 cm. Find the curved surface area (in cm^2) of the cone. Give your answer in terms of π .

- A. 60π
- B. 90π
- C. 65π
- D. 25π



Q6 Dividing Quantity in Ratio

The sum of three numbers is 455. The ratio of the first number to the second number is 2:3, and the ratio of the second number to the third number is 4:5. Find the first number

- A. 102
- B. 108
- C. 106
- D. 104



Q7 Efficiency Based

If 8 painters can paint 18 rooms in 9 days, then how many rooms can 4 painters paint in 12 days?

- A. 16 rooms
- B. 14 rooms
- C. 18 rooms
- D. 12 rooms



Q8 Find SI

Find the simple interest (in ₹) if a sum of ₹550 is borrowed for 3.5 years at 12% per annum rate of interest.

- A. 331
- B. 211
- C. 281
- D. 231



Q9 Finding Ratio

In a digital design company, there are only graphic designers and content writers. The average monthly salary of the graphic designers is ₹520, while those of the content writers is ₹420. If the average monthly salary of all employees is ₹500, then what percentage of the company's employees are graphic designers, and are content writers, respectively?

- A. 30% and 70%
- B. 80% and 20% ✓
- C. 70% and 30%
- D. 20% and 80%

Q10 Laws of Indices

Given that $106^{0.02} = x$, $106^{0.59} = y$ and $x^z = y^9$, then the value of z is:

- A. 263.5
- B. 265.5 ✓
- C. 266.5
- D. 264.5

Q11 Leaving Midway

Anshu can do a piece of work in 16 days, and Bijeta can do the same work in 24 days. They work together for 6 days, after which Anshu leaves. In how many days will Bijeta complete the remaining work?

- A. 7
- B. 6
- C. 8
- D. 9 ✓

Q12 Percentage Increase/Decrease

The cost of a washing machine is 50% less than the cost of a TV. If the cost of the washing machine increases by 60% and that of the TV decreases by 11%, then what is the percentage change in the total cost of 6 washing machines and 2 TVs?

- A. Decrease by 33%
- B. Decrease by 29%
- C. Increase by 31.6% ✓
- D. Increase by 26%

Q13 Population Based Problems

A city's population increases by 15% in the first year and by 20% in the second year. If the original population was 50,000, find the population after 2 years.

- A. 69,900
- B. 68,800
- C. 68,000
- D. 69,000 ✓

Q14 Profit/Loss Percentage

A manufacturer fixes his selling price at 25% over the cost of production. If the cost of production goes up by 50%, and the manufacturer raises his selling price by 68%, find the profit percentage.

- A. 39%
- B. 40% ✓
- C. 41%
- D. 45%

Q15 Relative Speed

Akshat and Shivam start simultaneously from point P towards point Q, which is 300 km away. Akshat travels at 70 km/h, while Shivam moves at 50 km/h. After reaching point Q, Akshat immediately turns back towards point P and eventually meets Shivam on the way. At what distance from point Q do they meet?

- A. 48 km
- B. 50 km ✓
- C. 51 km
- D. 49 km

Q16 Successive Discount

The marked price of a cooker is the same at four shops I, II, III and IV. Shop I allows two successive discounts of 87% and 66%, shop II allows successive discounts of 56% and 30%, shop III allows successive discounts of 23% and 69% and shop IV allows successive discounts of 97%, 45%, and 27% on the marked price of the cooker. Which shop is selling the cooker at the lowest price?

- A. III
- B. IV ✓
- C. I
- D. II



Q17 Successive Percentage Change

A number is first increased by 45%, then decreased by 20%, again increased by 10%, and then decreased by 25%. What is the overall increase/decrease percentage in the number?

A. 4.3% increase

B. 4.3% decrease



C. 4.1% decrease

D. 5.2% increase

Q18 Weighted Average

In an examination the weights assigned to the scores in Mathematics and Science are 2 and 3, respectively. A student scores 50 in Mathematics and 70 in Science. What is his weighted average score in the examination?

A. 60

B. 62



C. 64

D. 58

Q19 $\sin^2 \theta + \cos^2 \theta = 1$

If $\sin \theta + \cos \theta = \sqrt{2}$, find the value of $\tan \theta + \cot \theta$.

A. 2



B. 5

C. 4

D. 1

Q20 Mean of Grouped Data

If the mean of the following data is 42, then what is the value of x?

Class	10-20	20-30	30-40	40-50	50-60
Frequency	44	29	39	10	x

A. 172

B. 148



C. 175

D. 169

Q21 Regular Polygons

A regular hexagon is inscribed within a circle. If the area of the hexagon is $144\sqrt{3}$ square units, determine the ratio of the circumference of the circle to the perimeter of the hexagon.

A. $3:\pi$

B. $\pi:3$



C. $2:\pi$

D. $\pi:2$

Q22 Simplification

A rope of length 1120 meters is divided equally among a group of trekkers. If each trekker receives a share of $\frac{1}{8}$ of the rope and there are 80 trekkers, what is the value of a?

A. 196



B. 224

C. 140

D. 112



Q23 Volume

Find the volume of a cone, whose slant height is 25 cm and curved surface area is 942 cm^2 (rounded off to two places of decimal, use $\pi = 3.14$, and $\sqrt{481} = 21.93$).

A. 2156.33 cm³

B. 2438.56 cm³

C. 3305.29 cm³

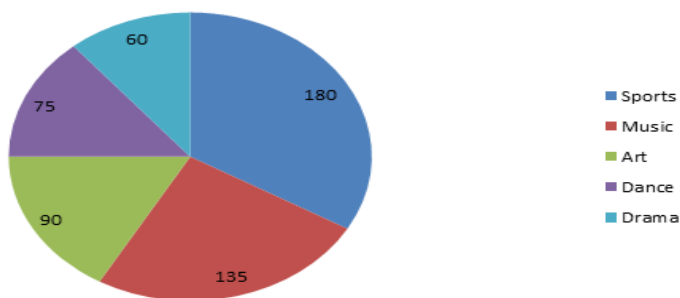


D. 2789.95 cm³

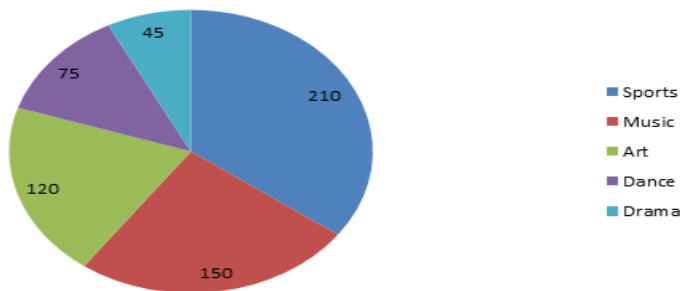
Q24 Year-on-Year Comparison

A school conducted a survey of co-curricular activities opted by students in 2023 and 2024. The results are shown in the two pie charts below:

Year 2023 (Total students = 540)



Year 2024 (Total students = 600)



By what percentage did the number of students choosing Art increase from 2023 to 2024? (Approximately)

A. 33.33%



B. 30%

C. 34.67%

D. 32.5%



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Q25 $\sin^2 + \cos^2 = 1$

If $\sin \theta + \cos \theta = \frac{7}{17}$, then find the positive value of $\sin \theta - \cos \theta$.

A. $\frac{21}{17}$

B. $\frac{27}{17}$

C. $\frac{25}{17}$

D. $\frac{23}{17}$



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Mathematics

25 Questions • Answer Key

Q1 Annual Compounding

What is the compound interest on ₹1,500 at 12% per annum (compounded annually) for 3 years? (Rounded off to the nearest integer)

- A. ₹605
- B. ₹612
- C. ₹610
- D. ₹607



Q2 Basic TSD

Kaushal travelled for 14 hours 28 minutes at the speed of 90 km/h. At what speed (in km/h) should he travel to cover the same distance in 7 hours?

- A. 186
- B. 184
- C. 187
- D. 185



Q3 Curved Surface Area

A building has 8 cylindrical pillars, each with a radius of 3 m and a height of 14 m. The curved surface of each pillar is to be painted at a cost of ₹25 per square metre. Find the total cost of painting all 8 pillars. (Use $\pi = 22/7$)

- A. ₹41,485
- B. ₹60,600
- C. ₹47,142
- D. ₹52,800



Q4 Diagonal of Cube/Cuboid

A room is 10 meters long, 8 meters broad, and 6 meters high. The length of the longest bamboo pole that can be placed in it is (approximately):

- A. 14.14 meters
- B. 16.16 meters
- C. 12.46 meters
- D. 10.12 meters



Q5 Dividing Quantity in Ratio

If the ratio of two numbers is 4 : 7 and their sum is 33, what is the smaller number?

- A. 16
- B. 24
- C. 20
- D. 12



Q6 Find SI

Find the simple interest (in ₹) if a sum of ₹550 is borrowed for 3.5 years at 20% per annum rate of interest.

- A. 365
- B. 385
- C. 435
- D. 485



Q7 Finding Ratio

A shopkeeper mixes two varieties of rice costing ₹40 per kg and ₹60 per kg to get a mixture worth ₹50 per kg. In what ratio did he mix the two varieties of rice?

- A. 1:1
- B. 1:2
- C. 2:1
- D. 3:2



Q8 HCF/LCM Word Problems

The HCF of two numbers is 18 and their LCM is 540. If one number is 90, find the other number.

- A. 108
- B. 96
- C. 54
- D. 120



Q9 HCF/LCM Word Problems

Three numbers are in the ratio 4 : 5 : 6 and their HCF is 13. Find their LCM.

- A. 686
- B. 1080
- C. 780
- D. 960



Q10 Half-Yearly Compounding

A bank offers 9.2% compound interest per annum, calculated on a half-yearly basis. A customer deposits ₹5449 each on 1 January and 1 July of a particular year. At the end of the year, the amount he would have gained by way of interest is _____.
(Round off the answer to the nearest paise.)

A. ₹763.49



B. ₹759.40

C. ₹755.50

D. ₹749.52

Q11 Mean Proportional

The mean proportional between two numbers is 42. If one of the numbers is 31, find the other number. (Round to the nearest whole number).

A. 57



B. 55

C. 56

D. 58

Q12 Multiple Pipes

Pipe A can fill a tank in 6 hours, pipe B can fill the same tank in 30 hours and pipe C can fill the same tank in 20 hours. The time taken (in hours) by them to fill one-fourth of the same tank if they operate together is:

A. 1



B. 3

C. 2

D. 4

Q13 Percentage Increase/Decrease

The cost of a washing machine is 40% less than the cost of a TV. If the cost of the washing machine increases by 80% and that of the TV decreases by 22%, then what is the percentage change in the total cost of 7 washing machines and 6 TVs?

A. Decrease by 18%

B. Increase by 24%

C. Decrease by 15%

D. Increase by 20%

**Q14 Profit/Loss Percentage**

A manufacturer fixes his selling price at 72% above the cost of production. If the cost of production increases by 50% and the manufacturer raises his selling price by 50%, find the new profit percentage.

A. 75%

B. 71%

C. 69%

D. 72%

**Q15 Rules for 7,8,9,11**

What is the value that must be assigned to A so that the 8-digit number 541A4888 is divisible by 9?

A. 9

B. 2

C. 7



D. 1

Q16 Sector Area & Arc Length

Find the area of the sector of a circle of radius 9 cm, if the corresponding arc length is 6.3 cm.

A. 28.35 cm²



B. 29.15 cm²

C. 27.95 cm²

D. 30.05 cm²

Q17 Single Change

The profit of a company is increased from ₹11,10,000 to ₹13,10,000 in one year. Calculate the percentage increase in the profit of the company (rounded off to two decimal places).

A. 18.26%

B. 18.02%



C. 18.12%

D. 18.47%



Q18 Successive Discount

The marked price of a cooker is same at four shops I, II, III and IV. Shop I allows two successive discounts of 68% and 24%, shop II allows successive discounts of 37% and 55%, shop III allows successive discounts of 89% and 10% and shop IV allows successive discounts of 41%, 90% and 48% on the marked price of the cooker. Which shop is selling the cooker at the lowest price?

A. I

B. IV



C. III

D. II

Q19 Train Problems

A 200-meter long train running at 72 km/hr crosses another 250-meter long train running in the opposite direction in 9 seconds. How long will the second train take to cross a 350-meter long platform?

A. 20 seconds



B. 15 seconds

C. 19 seconds

D. 18 seconds

Q20 Two Persons Age Relation

7 years ago, Saumya was twice as old as Isha. Five years from now, the sum of their ages will be 66. Find the present age of Isha.

A. 25 years

B. 20 years

C. 28 years

D. 21 years

**Q21 $\sin^2 \theta + \cos^2 \theta = 1$**

If $3\cos^2 \theta + 7\sin^2 \theta = 6$, then find the value of $\sec \theta$, given that θ is an acute angle.

A. 2



B. 0

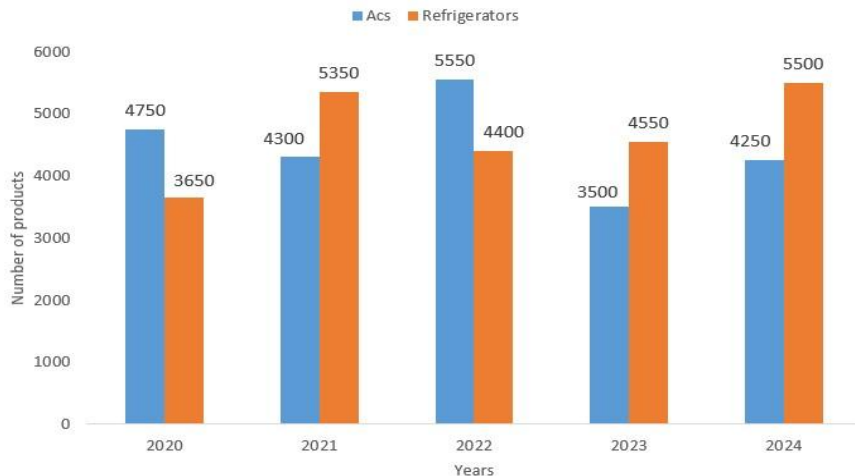
C. 1

D. 3

Q22 Comparative Analysis

Study the following bar diagram carefully and answer the following question.

The bar graph shows the production of electronic items (ACs and Refrigerators) in a factory during the period from 2020 to 2024.



The difference between averages of production of Refrigerators and ACs from 2021 to 2024 is:

A. 220

B. 440

C. 550



D. 330



Q23 Grouped Data Mode

Heights (in cm) of 50 children are shown in the table below. Find the mode (in cm) of the data.

Height	50-60	60-70	70-80	80-90
Number of children	12	20	8	10

A. 64



B. 58.5

C. 60

D. 67.5

Q24 Mean of Grouped Data

What is the value of $(9x + 2y)$, if the mean of the following distribution is 68?

Class	0-20	20-40	40-60	60-80	80-100	Total
Frequency	4	10	x	2	y	60

A. 138

B. 151



C. 137

D. 156

Q25 $\sec^2 - \tan^2 = 1$

Simplify: $\left(\frac{\tan A + \sec A - 1}{\tan A - \sec A + 1} \right)$

A. $\tan A + \operatorname{cosec} A$

B. $\tan A - \sec A$

C. $\tan A + \sec A$



D. $\tan A - \operatorname{cosec} A$



Mathematics

25 Questions • Answer Key

Q1 2-Year Difference

If the difference between compound interest (compounded annually) and simple interest for a sum at 5% per annum for 2 years is ₹5, what is the sum (in ₹)?

A. 2,500

B. 1,000

C. 2,000

D. 1,500

Q2 Basic Application

The hypotenuse of a right-angled triangle is 46 cm and the difference of other two sides is 26 cm. Then, the area of the triangle is:

A. 299 cm²B. 720 cm²C. 598 cm²D. 360 cm²

Q3 Cost with Overhead Expenses

Arvind bought an article for ₹x. He sold it to Biru at a loss of 25%. Biru spent ₹183 on its transportation and sold it to Minu at a profit of 45%. If Minu bought it for ₹1,479, then what is the value of x?

A. 1,116

B. 1,079

C. 1,092

D. 1,067

Q4 Family Age Problems

Three years ago, Mr. Sohan Lal was four times as old as his grandson. In eight years, his age will be thrice that of his grandson. Find the present age of Mr. Sohan Lal.

A. 95 years

B. 85 years

C. 78 years

D. 91 years

Q5 Find SI

Find the simple interest (in ₹) if a sum of ₹550 is borrowed for 3.5 years at 8% per annum rate of interest.

A. 154

B. 204

C. 134

D. 254

Q6 Half-Yearly Compounding

A sum of money earns interest at a rate of 20% per annum, compounded half-yearly. An amount of ₹8,000 is invested on 1 January and another of ₹4,500 is invested on 1 July of the same year. Find the total interest earned at the end of the year.

A. ₹2,280

B. ₹2,250

C. ₹2,130

D. ₹2,190

Q7 Mean Proportional

If the mean proportional between two numbers is 12 and one of the numbers is 8, what is the other number?

A. 18

B. 36

C. 9

D. 24

Q8 Median

The mean and the mode of a set of data are 62 and 43.6, respectively. Find the median of the data, using the empirical formula. (Round off to one decimal place)

A. 56.9

B. 55.4

C. 56.1

D. 55.9



Q9 Multiple Pipes

Pipe A can fill a tank in 6 hours, pipe B can fill the same tank in 48 hours and pipe C can fill the same tank in 16 hours. The time taken (in hours) by them to fill one-fourth of the same tank if they operate together is:

A. 3

B. 1

C. 4

D. 2

Q10 Percentage Increase/Decrease

Anita saves $y\%$ of her income. If her income increases by 30% and her expenditure increases by 20%, her savings increase by 40%. What is the value of y ?

A. 50

B. 43

C. 42

D. 48

Q11 Percentage Increase/Decrease

Raman's income is ₹50,400, and he saves 7.5% of it. If his income increases by 26% and his expenditure increases by 20%, then by how much percent will his savings increase?

A. 100%

B. 50%

C. 125%

D. 75%

Q12 Properties

In a parallelogram ABCD, the diagonals intersect at O. $\angle BCA = 38^\circ$ and $\angle CAB = 27^\circ$. Find $\angle AOD$ if $\angle ADO : \angle CDO = 2 : 3$.

A. 86° B. 102° C. 96° D. 92° **Q13 Replacement of Mixture**

A chemist has 90 liters of a solution with alcohol and water in the ratio 1:2. How much water must be removed and replaced with alcohol to make the ratio 2:3?

A. 6 liters

B. 9 liters

C. 7 liters

D. 5 liters

Q14 Rules for 2,3,4,5,6

What is the least value that must be assigned to A so that the 8-digit number 910A3076 is divisible by 6?

A. 1

B. 6

C. 5

D. 4

Q15 Simple Ratio Partnership

Three partners, A, B, and C, invest ₹25,000, ₹35,000, and ₹60,000, respectively. If the total profit is ₹66,000, what is the share of C?

A. ₹33,000

B. ₹37,000

C. ₹39,000

D. ₹35,000

Q16 Sphere & Hemisphere

If the surface areas of two spheres are in the ratio 900 : 1089, then the ratio of their volumes is ____.

A. 1000 : 1331

B. 1000 : 1223

C. 125 : 137

D. 125 : 591

Q17 Successive Discount

The marked price of a cooker is same at four shops I, II, III and IV. Shop I allows two successive discounts of 63% and 42%, shop II allows successive discounts of 43% and 88%, shop III allows successive discounts of 52% and 34% and shop IV allows successive discounts of 33%, 61% and 51% on the marked price of the cooker. Which shop is selling the cooker at the lowest price?

A. IV

B. I

C. III

D. II



Q18 Two Trains Crossing

Two trains are travelling in opposite directions at 108 km/h and 90 km/h. If the length of the faster train is 550 metres, then find the time taken by the faster train to cross a man standing in the slower train.

A. 15 seconds

B. 12 seconds

C. 10 seconds



D. 11 seconds

Q19 Two Trains Crossing

Two 80-m and 120-m long trains are running in opposite directions at the speeds of 50 km/hr and 30 km/hr, respectively. Calculate the time taken by the trains to cross each other.

A. 8 seconds

B. 12 seconds

C. 9 seconds



D. 10 seconds

Q20 0, 30, 45, 60, 90 degrees

If $\cos\theta = \frac{1}{2}$, then $7\sec^2\theta + 3\tan^2\theta - 9$ equals to:

A. 9

B. 14

C. 28

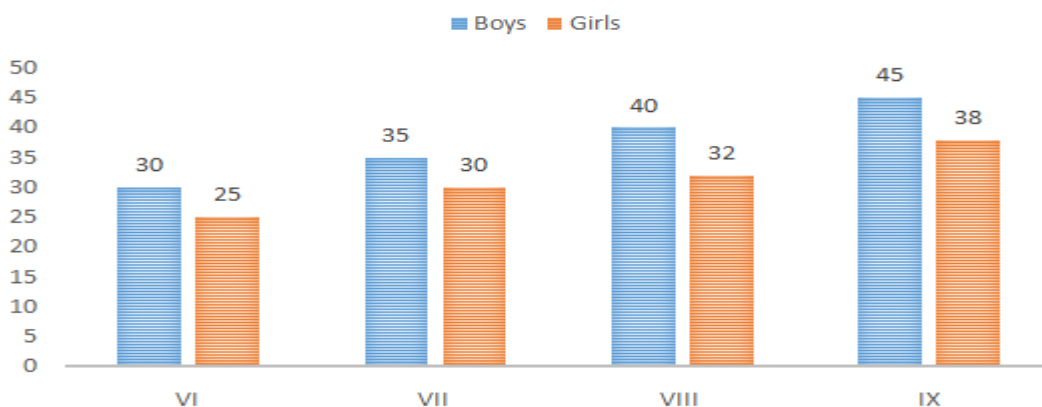


D. 31

Q21 Comparative Analysis

The given bar graph shows the number of boys and girls in different classes. If 20% of the boys and 25% of the girls from Class VIII participate in a competition, then how many students from Class VIII participate in the competition?

NUMBER OF BOYS AND GIRLS IN DIFFERENT CLASSES.



A. 16



B. 17

C. 14

D. 15



Q22 Grouped Data Median

Find the median of the following data.

Class interval	0-8	8-16	16-24	24-32	32-40	40-48
Frequency	5	7	12	8	10	13

A. 28.4

B. 26.2

C. 25.3

D. 27.5

**Q23** Index Simplification

Simplify: $\left(\frac{17a^5b^2c^4}{51a^3b^3c^4}\right) \times 9b^3$

A. $5a^2b$ B. $3a^2b^2$ C. $3ab$ D. $3ab^2$ **Q24** Reciprocal RelationsIf $\sin\theta + \operatorname{cosec}\theta = \sqrt{5}$, then find the value of $\sin^3\theta + \operatorname{cosec}^3\theta$.A. $\sqrt{5}$ B. $3\sqrt{5}$ C. $2\sqrt{5}$ D. $4\sqrt{5}$ **Q25** Surds

Simplify: $(\sqrt{50} + 2\sqrt{2})^2$

A. 98

B. $78\sqrt{2}$

C. 78

D. $98\sqrt{5}$ 

Mathematics

25 Questions • Answer Key

Q1 Annual Compounding

Yuvraj deposited a certain sum of money at 20% rate of interest per annum, compounded annually. At the end of 2 years, Yuvraj received a total amount of ₹34,668. What was the sum of money deposited by Yuvraj?

- A. ₹23,641
- B. ₹23,925
- C. ₹23,790
- D. ₹24,075



Q2 Annual Compounding

What will be the compound interest on a sum of ₹10,176 after 3 years at the rate of 25% per annum, interest being compounded annually?

- A. ₹9,699
- B. ₹9,999
- C. ₹9,799
- D. ₹9,899



Q3 Average Speed

A car travels from city A to city B at 30 km/hr and returns at 45 km/hr. Find the average speed for the entire trip.

- A. 36 km/hr
- B. 40 km/hr
- C. 35 km/hr
- D. 42 km/hr



Q4 Cost with Overhead Expenses

Arvind bought an article for ₹x. He sold it to Biru at a loss of 19%. Biru spent ₹166 on its transportation and sold it to Minu at a profit of 35%. If Minu bought it for ₹1,755, then what is the value of x?

- A. 1,400
- B. 1,350
- C. 1,500
- D. 1,450



Q5 Dividing Quantity in Ratio

If $x:(y+z)=3:8$, $y:(x+z)=4:11$, and $x+y+z=4950$, then find the value of $z-y$.

- A. 1080
- B. 720
- C. 840
- D. 960



Q6 Find SI

Find the simple interest (in ₹) on a sum of ₹600 borrowed for 2.5 years at a rate of interest of 4% per annum.

- A. 60
- B. 50
- C. 40
- D. 70



Q7 Finding Present Age

Six years ago, A's age was half of what his age will be six years from now. What is A's present age?

- A. 24 years
- B. 13 years
- C. 12 years
- D. 18 years



Q8 Finding Value from Percentage

In a town, 75% of the registered voters cast their votes in an election contested by candidates X and Y. Candidate X won the election by 840 votes. If candidate Y had received 50% more votes, the election would have resulted in a tie. Find the total number of registered voters in the town.

- A. 5230
- B. 4800
- C. 5600
- D. 5700



Q9 Laws of Indices

Given that $94^{0.8} = x$, $94^{0.03} = y$ and $x^z = y^2$, then the value of z is:

A. 0.075



B. 0.625

C. 1.225

D. 1.175

Q10 Multiple Pipes

Pipe A can fill a tank in 6 hours, pipe B can fill the same tank in 36 hours and pipe C can fill the same tank in 18 hours. The time taken (in hours) by them to fill one-fourth of the same tank if they operate together is:

A. 3

B. 2

C. 1



D. 4

Q11 Order of Operations

Simplify $32 - 5 \text{ of } (17 - 12) + 4 \times 7 - 6 \div 3$.

A. 33



B. 32

C. 31

D. 35

Q12 Percentage Increase/Decrease

The cost of a washing machine is 50% less than the cost of a TV. If the cost of the washing machine increases by 81% and that of the TV decreases by 47%, then what is the percentage change in the total cost of 4 washing machines and 3 TVs?

A. Decrease by 2.1%

B. Increase by 4.2%



C. Decrease by 5.4%

D. Increase by 3.2%

Q13 Primality Testing

The number of students in a class is a prime number greater than 50 but less than 58. How many students are there in the class?

A. 53



B. 52

C. 55

D. 57

Q14 Proportion

If x , 2.6, 5.2 and 10.4 are in proportion, what is the value of x ?

A. 1.3



B. 1.8

C. 1.2

D. 2.4

Q15 Relative Speed

The distance between two cities A and B is 120 km. A motorcycle rider starts from A towards B at 8 am at a speed of 21 km/h. Another motorcyclist starts from B towards A at 9 am at a speed of 34 km/h. At what time (in 12-hour clock format) will they cross each other?

A. 10:48 am



B. 11:20 am

C. 11:10 am

D. 10:15 am

Q16 Replacement of Mixture

A vessel contains a mixture of orange juice and water in the ratio 3:5. How many litres should be replaced with water so that the ratio becomes 2:5, given the total mix is 168 L?

A. 42 L

B. 45 L

C. 38 L

D. 40 L

**Q17 Successive Discount**

The marked price of a cooker is same at four shops I, II, III and IV. Shop I allows two successive discounts of 18% and 65%, shop II allows successive discounts of 56% and 86%, shop III allows successive discounts of 53% and 69% and shop IV allows successive discounts of 15%, 60% and 65% on the marked price of the cooker. Which shop is selling the cooker at the lowest price?

A. II



B. I

C. III

D. IV



Q18 Surface Area (TSA/LSA)

The company has two options to pack a certain item.

- Box A: Cubical box of side 5 cm
- Box B: Cuboidal box of $l = 6$ cm, $b = 4$ cm and $h = 3$ cm.

The cost of cardboard required to make boxes is ₹10/cm². However, box A uses 10% more cardboard while box B uses 15% more cardboard due to fold and turns.

Which box will the company prefer to minimise the total cost of cardboard and what is the cost of making it?

A. Box B: ₹1242



B. Box B: ₹1800

C. Box A: ₹1500

D. Box A: ₹1650

Q19 Ungrouped Data Median

From the following data, what is the value of the median?

18, 20, 21, 25, 26, 23, 29, 32, 41, 33, 39

A. 25

B. 29

C. 26



D. 32

Q20 Common Tangents

A common external tangent is drawn to two circles of radius r units each. The length of the common tangent is $2r$ units. The distance between the centres of the circles is _____ units.

A. $4r$

B. $3r$

C. r

D. $2r$

**Q21 Complementary Angle Values**

In $\triangle ABC$, $\angle C = 90^\circ$, and $\tan A = \sqrt{6}$, then find the value of $\sin A \times \cos B \times \operatorname{cosec}(A + B)$.

A. 1

B. $\frac{\sqrt{3}}{2}$

C. 0

D. $\frac{6}{7}$

**Q22 Mean of Grouped Data**

If the mean of the following data is 47, then what is the value of x ?

Class	20-30	30-40	40-50	50-60	60-70
Frequency	20	29	22	32	x

A. 30

B. 53

C. 36

D. 32



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Q23 Sphere & Hemisphere

The surface area of a sphere is numerically equal to the volume of another sphere. If the radius of the first sphere is 7 cm, find the radius (in cm) of the second sphere.

A. $\sqrt[3]{147}$



B. $\sqrt{147}$

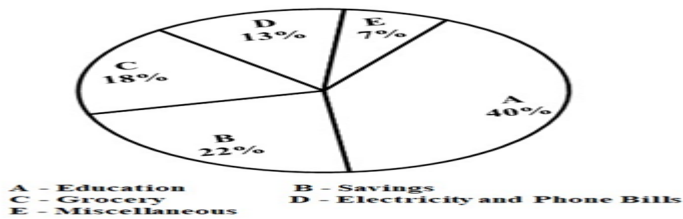
C. $\sqrt[3]{174}$

D. $\sqrt{174}$

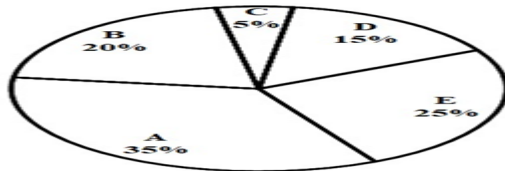
Q24 Year-on-Year Comparison

Study the two pie-charts given below and answer the question that follows.

MARCH MONTH'S SALARY: ₹ 34000



APRIL MONTH'S SALARY: ₹ 35000



Find the ratio of the amount spent for education from March's salary and that spent for grocery from April's salary.

A. 272:33

B. 271:33

C. 271:35

D. 272:35

**Q25** $\sin^2 + \cos^2 = 1$

The value of $\sin^2 42^\circ + \sin^2 48^\circ + \sec^2 30^\circ - \cot^2 45^\circ$ is:

A. $\frac{3}{4}$

B. $\frac{2}{3}$

C. 1

D. $\frac{4}{3}$



Mathematics

25 Questions • Answer Key

Q1 $(a+b)^2, (a-b)^2$

Simplify the following expression:

$$(2a + 3b + 4c)^2 + (2a - 3b - 4c)^2 - 8a^2 - 18b^2 - 32c^2$$

A. $12bc$ B. $48bc$ ✓C. $16ac$ D. $24ab$

Q2 2-Year Difference

A sum of ₹5,000 is invested for 2 years at 8% per annum. Find the difference between the compound interest and the simple interest (in ₹), if the interest is compounded annually.

A. ₹80

B. ₹32 ✓

C. ₹50

D. ₹20

Q3 Angles in Circle

Two chords AB and CD of a circle whose centre is O, meet at the point E. If angle AOC = 54° and angle BOD = 48° , then the value of angle BED is:

A. 51° ✓B. 50° C. 52° D. 53°

Q4 Average Speed

A man covered a total distance of 800 km on motor bike. For the first 12 hours, the speed was 50 km/hr and for the rest of the journey, it came down to 25 km/hr. The average speed (in km/hr) was:

A. 48

B. 40 ✓

C. 42

D. 36

Q5 Basic TSD

A bus leaves City A at 7:00 a.m. and travels at 48 km/h. At 10:00 a.m., the driver stops for a 30-minute break. Then he continues at 60 km/h. Find the time he reaches City B, which is 300 km from City A.

A. 12:56 pm

B. 1:30 pm

C. 1:10 pm

D. 1:06 pm ✓

Q6 Cost with Overhead Expenses

Arvind bought an article for ₹x. He sold it to Biru at a loss of 26%. Biru spent ₹102 on its transportation and sold it to Minu at a profit of 50%. If Minu bought it for ₹1,374, then what is the value of x?

A. 1,060

B. 1,100 ✓

C. 1,080

D. 1,120

Q7 Dividing Quantity in Ratio

In a local club election, the two candidates received votes in the ratio 7 : 5. If the total number of votes cast was 360, how many votes did the winning candidate receive?

A. 210 ✓

B. 180

C. 240

D. 200

Q8 Find SI

Find the simple interest (in ₹) on ₹1,200 at an interest rate of 6% per month in 10 months.

A. 60

B. 720 ✓

C. 80

D. 120



Q9 Half-Yearly Compounding

A bank offers 6.8% compound interest per annum calculated on a half-yearly basis. A customer deposits ₹3,485 each on 1 January and 1 July of a year. At the end of the year, the amount he would have gained by way of interest is: (round off to two decimal places)

- A. ₹352.50
- B. ₹348.50
- C. ₹359.50
- D. ₹376.50

Q10 Laws of Indices

Given that $116^{0.26} = x$, $116^{0.1} = y$ and $x^z = y^4$, then the value of z is close to:

- A. 1.54
- B. 2.42
- C. 0.58
- D. 3.39

Q11 Multiple Pipes

Pipe A can fill a tank in 6 hours, pipe B can fill the same tank in 28 hours and pipe C can fill the same tank in 21 hours. The time taken (in hours) by them to fill one-fourth of the same tank if they operate together is:

- A. 1
- B. 4
- C. 3
- D. 2

Q12 Order of Operations

Evaluate: $16 - 5 \times 3 + 19$

- A. 19
- B. 18
- C. 22
- D. 20

Q13 Percentage Increase/Decrease

The income of Raman is ₹43,000. He saves 26% of his income. If his income increases by 20% and expenditure increases by 40%, then his savings will:

- A. increase by ₹4,131
- B. decrease by ₹4,128
- C. increase by ₹4,133
- D. decrease by ₹4,133

Q14 Successive Discount

The marked price of a cooker is same at four shops I, II, III and IV. Shop I allows two successive discounts of 84% and 97%, shop II allows successive discounts of 42% and 94%, shop III allows successive discounts of 50% and 85% and shop IV allows successive discounts of 89%, 37% and 82% on the marked price of the cooker. Which shop is selling the cooker at the lowest price?

- A. I
- B. II
- C. III
- D. IV

Q15 Surface Area (TSA/LSA)

The total surface area of a cube having side 65 cm is:

- A. 25386 cm²
- B. 25350 cm²
- C. 25332 cm²
- D. 25320 cm²

Q16 Volume

A cylindrical tank of radius 2 m and height 7 m is completely filled with water. After 10% of the water leaks out, in a larger tank the remaining water is mixed with milk in the ratio 4 : 1. How many litres of milk is added to the water in the larger tank? (Use $\pi = 22/7$)

- A. 19400
- B. 19800
- C. 18400
- D. 17800

Q17 Weighted Average

A student scores 80 on an assignment that carries a weight of 40%, and 70 on a project that carries a weight of 60%. What is the weighted average score?

- A. 72
- B. 70
- C. 74
- D. 80



Q18 Weighted Average

The weights assigned to four subjects are 2, 3, 4 and 1, respectively. A student scores 60, 70, 80 and 90 in these subjects. What is the weighted mean of the marks?

A. 78

B. 64

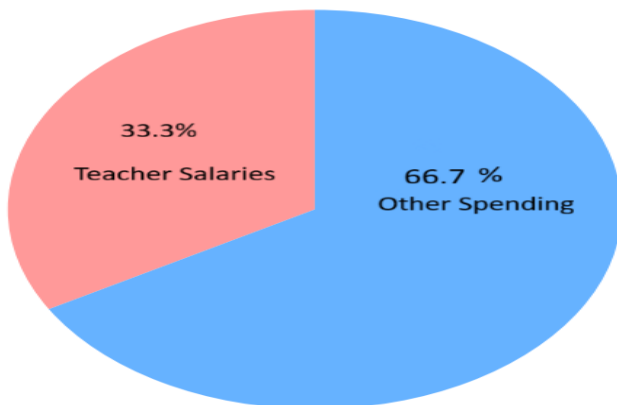
C. 68

D. 74

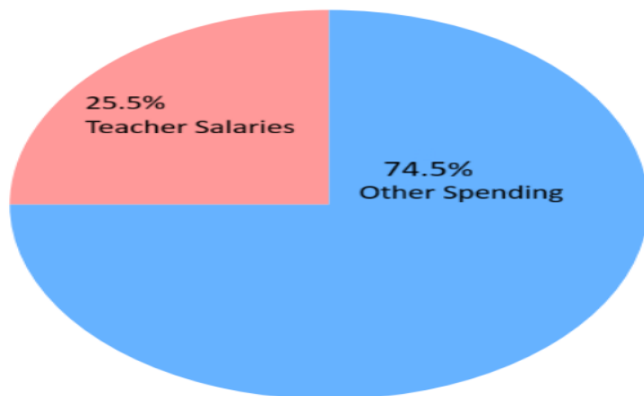
**Q19 Double Pie Chart**

As the multiple pie charts below depict, School A spends 33.3% of its budget on teacher salaries while School B spends 25.5% of its budget on the same. If both have equal total budgets of ₹36,00,000, how much more (in ₹) does School A spend on salaries than School B?

School A Budget



School B Budget



A. 5,00,000

B. 2,00,000

C. 4,00,000

D. 2,80,800



Q20 Mean Proportional

What is the mean proportional between $3 + \sqrt{2}$ and $12 - \sqrt{32}$?

A. $3\sqrt{6}$

B. $2\sqrt{7}$ ✓

C. $3\sqrt{7}$

D. $2\sqrt{6}$

Q21 Mean of Grouped Data

What is the value of $(9x + 2y)$, if mean of the following distribution is 64?

Class	0-20	20-40	40-60	60-80	80-100	Total
Frequency	8	20	x	6	y	80

A. 106

B. 94

C. 113 ✓

D. 99

Q22 Pythagorean Identities

What is the value of $[(1 + \cot^2 A) + (1 + \frac{1}{\cot^2 A})] \times \sin^2 A \cos^2 A$?

A. 5

B. 4

C. 1 ✓

D. 3

Q23 Ratio Comparison

Weight of Manoj is $\frac{5}{7}$ times of weight of Sanju. By what fraction weight of Sanju is more than the weight of Manoj?

A. $\frac{2}{5}$ ✓

B. $\frac{7}{5}$

C. $\frac{3}{7}$

D. $\frac{2}{7}$



Q24 Reciprocal Relations

$\cos A = \frac{9}{41}$, এবং A সূক্ষ্ম কোণ হলে, $\operatorname{cosec} A \cos A + \sec A \sin A$ এর মান নির্ণয় করুন।

A. $4\frac{241}{360}$

B. $3\frac{119}{180}$

C. $5\frac{317}{360}$ 

D. $2\frac{131}{180}$

Q25 Surds

$\frac{\sqrt{264} \times \sqrt{330} \times \sqrt{1125}}{\sqrt{1296} \times \sqrt{400}}$ का मान ज्ञात कीजिए।

A. $\frac{11}{2}$

B. $\frac{38}{3}$

C. $\frac{55}{4}$ 

D. $\frac{89}{6}$



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Mathematics

25 Questions • Answer Key

Q1 Annual Compounding

At what rate per cent per annum will a sum of money multiply itself by 46 times in 2 years, interest being compounded annually? (Give your answer correct to one decimal place)

A. 570.4

B. 588.5

C. 578.2



D. 582.2

Q2 Annual Compounding

A sum of ₹1,000 is invested for 2 years at 10% per annum compound interest, compounded annually. Find the compound interest earned at the end of 2 years (in ₹).

A. 200

B. 210



C. 220

D. 230

Q3 Average Speed

Anirudh travels 55 km at 11 km/h, 65 km at 13 km/h, and 120 km at 20 km/h. What is his average speed (in km/h)?

A. 14

B. 15



C. 16

D. 18

Q4 Basic TSD

Kaushal travelled for 7 hours 31 minutes at the speed of 120 km/h. At what speed (in km/h) should he travel to cover the same distance in 22 hours?

A. 38

B. 41



C. 43

D. 39

Q5 Basic Time & Work

16 typists working 8 hours a day can type 172 pages in 6 days. How many typists will be required to type 215 pages in 4 days if they work 6 hours a day?

A. 25

B. 35

C. 40



D. 20

Q6 CP-SP Relation

A shopkeeper sells 21 chocolates for ₹1 and makes a profit of 100%. How many chocolates did he purchase for ₹1?

A. 42



B. 43

C. 63

D. 69

Q7 Find SI

Find the simple interest (in ₹) if a sum of ₹600 is borrowed for 2.5 years at 12% per annum rate of interest.

A. 180



B. 280

C. 160

D. 230

Q8 Finding Present Age

A is 4 years older than B. After 5 years, the sum of their ages will be 50. Find B's present age.

A. 26 years

B. 8 years

C. 18 years



D. 16 years



Q9 Finding Value from Percentage

In an election between two candidates, 10% of the total votes were declared invalid, and all valid votes were cast in favour of either of the two candidates. If the winner secured 53% of the valid votes and won the election by 1,620 votes, find the total number of votes polled.

A. 27,000

B. 32,000

C. 28,000

D. 30,000 ☒**Q10 Grouped Data Median**

An insurance company obtained the following data for accident claims from a particular region. Obtain the median (in thousand rupees) from this data. (Round off to two decimal places)

Account of claim (in ₹ thousand)	Frequency
1-4	7
4-7	53
7-10	87
10-13	56
13-16	24
16-19	16
19-22	6
22-25	5

A. 4.21

B. 8.65

C. 6.11

D. 9.31 ☒**Q11 HCF/LCM Word Problems**

A school wants to distribute 60 pencils and 75 erasers to students, such that all of them get an equal number of pencils and an equal number of erasers with no items left over. What is the maximum number of students who can receive this gift?

A. 10

B. 15 ☒

C. 5

D. 25

Q12 Median

The mean and the mode of a set of data are 50.7 and 66.9, respectively. Find the median of the data, using the empirical formula.

A. 56.3

B. 56.7

C. 56.1 ☒

D. 57.6

Q13 Percentage Increase/Decrease

The cost of a washing machine is 44% less than the cost of a TV. If the cost of the washing machine increases by 78% and that of the TV decreases by 70%, then what is the percentage change in the total cost of 7 washing machines and 2 TVs?

A. Increase by 21%

B. Decrease by 30%

C. Decrease by 34%

D. Increase by 28% ☒**Q14 Rules for 2,3,4,5,6**

What is the least value that must be assigned to A so that the 8-digit number 796A6351 is divisible by 3?

A. 5

B. 1

C. 3

D. 2 ☒**Q15 Successive Discount**

The marked price of a cooker is the same at four shops I, II, III and IV. Shop I allows two successive discounts of 73% and 16%, shop II allows successive discounts of 59% and 18%, shop III allows successive discounts of 49% and 66% and shop IV allows successive discounts of 84%, 67%, and 94% on the marked price of the cooker. Which shop is selling the cooker at the lowest price?

A. II

B. III

C. IV ☒

D. I

Q16 Surface Area (TSA/LSA)

A cube has a total surface area of 294 cm^2 . A smaller cube is cut from one of its corners such that the edge of the smaller cube is one-third the edge of the original cube. Find the surface area of the remaining solid.

A. 282 cm^2 B. 294 cm^2 ☒C. 306 cm^2 D. 270 cm^2 

Q17 Time-based Partnership

Jatin and Kiran start a business by investing ₹1,20,000 and ₹80,000, respectively. After 8 months, Jatin withdraws ₹20,000. If the total profit at the end of the year is ₹29,000, find Kiran's share of the profit.

A. ₹14,000

B. ₹18,000

C. ₹12,000



D. ₹17,000

Q18 Weighted Average

The average weight of all the students of a class is 36.5 kg. The average weight of all the boys in the class is 40 kg and that of all the girls is 32.3 kg. The ratio of the number of boys to the number of girls in the class is:

A. 5 : 6

B. 5 : 7

C. 6 : 5



D. 7 : 5

Q19 Combined Work Rate

In a class, Bhanu can do a piece of homework in 4 days, Jaya can do this work in 12 days, and Mounica can do the same work in 8 days. Working together, how many days will they take to complete the work?

A. $2\frac{9}{11}$

B. $2\frac{1}{11}$

C. $2\frac{2}{11}$

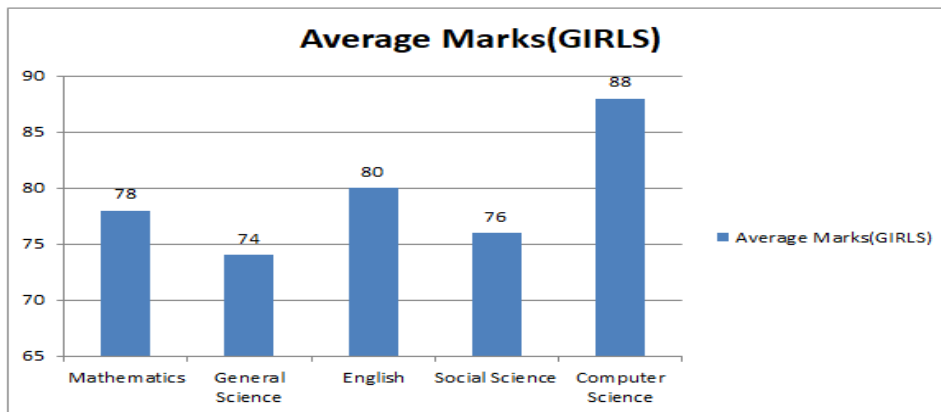
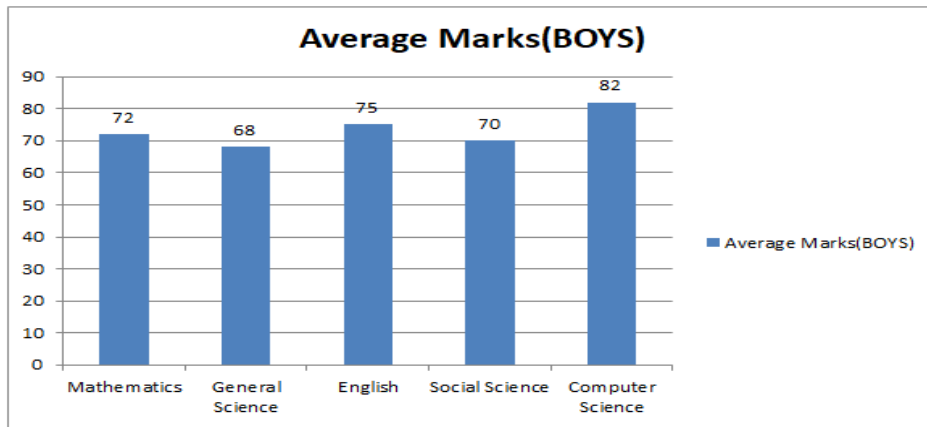


D. $2\frac{5}{11}$



Q20 Comparative Analysis

The following bar graphs show the average marks (out of 100) in five subjects obtained by Boys and Girls in Class 8 of a school.



Compute the difference between overall average score for Girls and Boys (to one decimal place).

A. 5.6

B. 5.8



C. 5.5

D. 5.4

Q21 Congruence & Similarity

In $\triangle ABC$, $DE \parallel AC$, where D and E are the points on sides AB and BC, respectively. If $BD = 5$ and $AD = 14$ cm, then what is the ratio of the area of $\triangle BDE$ to that of the trapezium ADEC?

A. 19 : 12

B. 336 : 25

C. 25 : 336



D. 21 : 23



Q22 Index Simplification

Simplify the following:

$$\left(\frac{3^4 \times 3^{-2}}{3^{-1}} \right)^2 \div 3^5$$

A. 1

B. $\frac{1}{3}$

C. 3

D. $\frac{2}{3}$ **Q23** Pythagorean Identities

What is the value of the following expression?

$$\tan A \left[\frac{\sec A + \tan A}{\operatorname{cosec} A - \cot A} \right]$$

A. $\frac{1 - \cos A}{1 + \sin A}$ B. $\frac{1 - \sin A}{1 + \cos A}$ C. $\frac{1 + \sin A}{1 - \cos A}$ D. $\frac{1 + \cos A}{1 - \sin A}$ **Q24** Surface Area (TSA/LSA)The area of four walls of a room is 336 m^2 . The length of the room is thrice its breadth. If the heightA. 139 m^2 B. 147 m^2 C. 150 m^2 D. 143 m^2 **Q25** Trigonometric IdentitiesIf $\sec^2 \alpha = \frac{4ab}{(a+b)^2}$, then:A. $a = b$ B. $a = -b$ C. $a = \frac{1}{b}$ D. $a = -\frac{1}{b}$ 

Mathematics

25 Questions • Answer Key

Q1 $(a+b)^2, (a-b)^2$ Simplify: $(a + b)^2 - (a - b)^2$ A. $4ab$ B. $2ab$ C. $a^2 - b^2$ D. $a^2 + b^2$

Q2 Annual Compounding

Maresh deposited a certain sum of money at 20% rate of interest per annum, compounded annually. At the end of 2 years, Maresh received a total amount of ₹18,000. What was the sum of money deposited by Maresh?

A. ₹12,129

B. ₹12,800

C. ₹12,996

D. ₹12,500



Q3 Arithmetic Mean

Calculate the mean from the following items.

163, 141, 155, 175, 186, 206

A. 172

B. 171



C. 173

D. 170

Q4 Average Speed

A bus travels from City A to City B, which are 210 km apart. For the last 90 km, the bus increases its speed by 5 km/h than the speed that it had been traveling. If the average speed of the journey is 42 km/h, find the total time (in hours) taken for the journey if the bus travels the whole distance at the speed at which it travelled the first part of the journey.

A. 5.62

B. 4.67

C. 4.75

D. 5.25



Q5 Base-Height Method

In triangle PQR, the sides PQ and PR are fixed with lengths 26 cm and 17 cm, respectively. Point S lies on side QR such that the ratio QS:SR = 3:5. The area of triangle PQS is 120 cm². Find the area of triangle PQR.

A. 308 cm²B. 320 cm²C. 322.5 cm²D. 315 cm²

Q6 Cost with Overhead Expenses

Arvind bought an article for ₹x. He sold it to Biru at a loss of 15%. Biru spent ₹157 on its transportation and sold it to Minu at a profit of 40%. If Minu bought it for ₹1,505, then what is the value of x?

A. 1,180

B. 1,060

C. 1,080



D. 1,160

Q7 Dividing Quantity in Ratio

The ratio of two numbers is 2 : 5. If their sum is 49, find the larger of the two numbers.

A. 42

B. 14

C. 25

D. 35



Q8 Find SI

Find the simple interest (in ₹) if a sum of ₹600 is borrowed for 2.5 years at 8% per annum rate of interest.

A. 170

B. 120



C. 100

D. 220



Q9 Finding Value from Percentage

A family with a monthly income of ₹60,000 spends 30% of this amount on food. What is the monetary value of this expenditure?

A. ₹15,000

B. ₹12,000

C. ₹18,000



D. ₹10,000

Q10 HCF/LCM Word Problems

Three ropes of lengths 12 m, 18 m, and 24 m are to be cut into pieces of equal length, with no rope left unused. What is the greatest possible length of each piece (in meters)?

A. 6



B. 3

C. 12

D. 9

Q11 Laws of Indices

Given that $52^{0.21} = x$, $52^{0.18} = y$ and $x^z = y^{10}$, then the value of z is close to:

A. 7.97

B. 6.58

C. 8.57



D. 9.66

Q12 Median

The mean and the mode of a set of data are 53.8 and 75.7, respectively. Find the median of the data, using the empirical formula.

A. 61.1



B. 60.8

C. 61.2

D. 60.5

Q13 Men, Women & Children

5 men and 15 women can complete a task in 10 days, while 15 men and 5 women can complete it in 20 days. In how many days will 40 women complete the task?

A. 10 days

B. 30 days

C. 4 days



D. 15 days

Q14 Percentage Increase/Decrease

The income of Raman is ₹68,800. He saves 18.5% of his income. If his income increases by 17% and expenditure increases by 25%, then his savings will:

A. decrease by ₹2,325

B. decrease by ₹2,322



C. increase by ₹2,325

D. increase by ₹2,319

Q15 Rules for 2,3,4,5,6

The 7-digit number 86A238B is divisible by 3. What is the minimum value of $(A + B)$?

A. 0



B. 3

C. 5

D. 4

Q16 SSS, SAS, ASA, AAS, RHS

Two triangles LMN and OPQ are congruent. If the area of $\triangle LMN$ is 74 cm^2 , then the area of $\triangle OPQ$ will be:

A. 74 cm^2



B. 37 cm^2

C. 148 cm^2

D. 18.5 cm^2

Q17 Simple Ratio Partnership

P, Q, and R start a business together, investing amounts in the ratio 4:5:6. If the total profit is divided among them in the same ratio and Q receives ₹15,000, what is the total profit?

A. ₹51,000

B. ₹54,000

C. ₹60,000

D. ₹45,000



Q18 Successive Discount

The marked price of a cooker is the same at four shops I, II, III and IV. Shop I allows two successive discounts of 17% and 35%, shop II allows successive discounts of 99% and 23%, shop III allows successive discounts of 31% and 98% and shop IV allows successive discounts of 66%, 30%, and 37% on the marked price of the cooker. Which shop is selling the cooker at the lowest price?

A. II



B. I

C. III

D. IV

Q19 Three Successive Changes

A city has a population of 80,000. The population increases by 10% in the first year, decreases by 5% in the second year, and again increases by 20% in the third year. What is the final population?

A. 1,00,320



B. 1,07,320

C. 1,01,320

D. 1,10,320

Q20 Total Surface Area

The ratio of the total surface area to the lateral surface area of a cylinder whose radius is 20 cm and height 60 cm is:

A. 4:3



B. 2:3

C. 3:2

D. 3:4

Q21 Average Speed

Sumanth covers a certain distance by car, driving at 29 km/hr, and he returns to the starting point riding on a scooter with a speed of 28 km/hr. Find the average speed for the whole journey.

A. $26\frac{28}{57}$ km/hrB. $27\frac{28}{57}$ km/hrC. $28\frac{28}{57}$ km/hrD. $29\frac{28}{57}$ km/hr**Q22 Calculation Based**

The following table shows the number of books sold by a bookstore in four categories over three months, along with the average selling price per book.

Month	Fiction	Non-Fiction	Children's Books	Academic	Avg. Selling Price per Book (₹)
Jan	1,200	900	1,500	800	250
Feb	1,400	1,000	1,600	900	260
Mar	1,300	1,200	1,700	1,000	270

In which month was the ratio of Children's Books to Academic Books sold the highest?

A. March

B. Same in all months

C. January



D. February



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Q23 Complementary Angle Values

The value of $\left[\frac{\sin^2 25^\circ + \sin^2 65^\circ}{\cos^2 25^\circ + \cos^2 65^\circ} + \sin^2 57^\circ + \cos 57^\circ \sin 33^\circ \right]$ is:

A. 0

B. 1

C. 2



D. -1

Q24 Reciprocal Relations

If $\sin A = \frac{4}{5}$, A is an acute angle, then find the value of $\sec A \times \sin A - \operatorname{cosec} A \times \cos A$.

A. $\frac{5}{6}$ B. $\frac{7}{12}$ 

C. 0

D. $\frac{3}{8}$ **Q25** Weighted Average

Ravi buys 2 kg of apples at ₹100 per kg and 3 kg of bananas at ₹60 per kg.
What is the average price per kg of the fruits he bought?

A. ₹76



B. ₹80

C. ₹70

D. ₹72



Mathematics

25 Questions • Answer Key

Q1 Average Speed

A cyclist covers 60 km at a speed of 20 km/h, 90 km at a speed of 30 km/h and 150 km at a speed of 25 km/h. Find the average speed of the cyclist for the entire journey.

- A. 24 km/h
- B. 25 km/h
- C. 26 km/h
- D. 27 km/h



Q2 Basic Algebra

If $x = 3$, what is the value of the expression $x^2 + 2x + 1$?

- A. 18
- B. 14
- C. 12
- D. 16



Q3 Basic TSD

A covered a distance of 84 km in 8 hours. He walked part of the distance at a speed of 6 km/hr and rode a cycle for the rest at 12 km/hr. How far did he walk?

- A. 12 km
- B. 11 km
- C. 15 km
- D. 10 km



Q4 CP-SP Relation

A vendor sells 22 chocolates for ₹1 and makes a profit of 50%. How many chocolates did he buy for ₹1?

- A. 35
- B. 44
- C. 33
- D. 39



Q5 Chord Properties

Find the length of the chord which is at a distance of 4 cm from the centre of a circle whose radius is 5 cm.

- A. 10 cm
- B. 3 cm
- C. 8 cm
- D. 6 cm



Q6 Combined Work Rate

Rishi can prepare one wooden wardrobe in 2 days, and Shan can prepare the same wardrobe in 4 days. If they work together, in how many days will they prepare 126 wardrobes of the same kind?

- A. 164
- B. 170
- C. 172
- D. 168



Q7 Discount

A shopkeeper offers the following discount schemes on toys, all having the same marked price:

- (A) Successive discounts of 45% and 6% on any number of toys purchased.
- (B) Successive discounts of 17%, 49%, and 6% on any number of toys purchased.
- (C) A discount of 47% on the first 8 toys and a discount of 25% on each toy thereafter.
- (D) Buy 9 toys and get 8 toys free of cost.

A customer wants to buy 9 toys. Which of the above schemes is least beneficial to her?

- A. D
- B. A
- C. C
- D. B



Q8 Find SI

Two banks, A and B, offered loans at 3.5% and 8.5% per annum, respectively. Tushar borrowed an amount of ₹4,60,000 from each bank. Find the positive difference between the amounts (in ₹) of simple interest paid to the two banks by Tushar after 4 years.

- A. 91,500
- B. 93,000
- C. 92,000
- D. 93,500



Q9 Finding LCM

If the ratio of two numbers is 4 : 9, and their HCF is 34, then their LCM is:

- A. 1214
- B. 1224
- C. 1227
- D. 1250



Q10 Finding Ratio

A milkman mixes water costing ₹0/litre with milk costing ₹20/litre. If the mixture is sold at ₹16/litre and there is neither gain accrued nor loss incurred in the transaction, find the ratio of milk to water in the mixture.

A. 4 : 1



B. 5 : 1

C. 1 : 1

D. 3 : 1

Q11 Finding Value from Percentage

A man spends 45% of his monthly salary on the household, 20% of the remaining on transport and saves the remaining amount of ₹88,000. What is his monthly salary (in ₹)?

A. 2,40,000

B. 2,50,000

C. 2,00,000



D. 2,22,500

Q12 Half-Yearly Compounding

A sum of ₹30,000 is invested at a rate of 20% per annum. Find the difference in the final amount after 2 years if the interest is compounded annually and compounded half-yearly.

A. ₹723



B. ₹733

C. ₹720

D. ₹713

Q13 Mode

The mean and median of 150 observations are 70 and 74, respectively. The value of the largest observation is 125. It was later found that it is 200 and not 125. What is the true value of mode?

A. 92

B. 78

C. 81



D. 84

Q14 Order of Operations

Simplify: $272 \div 17 \times 1.5 + 13 - 5$

A. 32



B. 29

C. 33

D. 28

Q15 Percentage Increase/Decrease

The cost of a washing machine is 23% less than the cost of a TV. If the cost of the washing machine increases by 73% and that of the TV decreases by 54%, then what is the percentage change in the total cost of 6 washing machines and 3 TVs?

A. Increase by 23%



B. Decrease by 22%

C. Decrease by 26%

D. Increase by 20%

Q16 Pythagorean Identities

The value of $(1 + \sec 15^\circ + \cot 75^\circ)(1 - \operatorname{cosec} 15^\circ + \tan 75^\circ)$ is equal to:

A. 0

B. 1

C. 2



D. -1

Q17 Quarterly Compounding

The compound interest earned in 1 year on ₹2,50,000 at the rate of 40% per annum, compounded quarterly, is:

A. ₹1,16,025



B. ₹1,16,033

C. ₹1,15,931

D. ₹1,16,416

Q18 Replacement in Group

In a classroom survey, the average weight of 36 students was recorded as 50 kg. Later, it was found that one student's weight had been wrongly entered as 73 kg instead of 37 kg. What is the correct average weight of the class?

A. 50 kg

B. 49 kg



C. 48 kg

D. 47 kg

Q19 Surface Area (TSA/LSA)

The total surface area of a cube having side 36 cm is:

A. 7734 cm²

B. 7868 cm²

C. 7826 cm²

D. 7776 cm²



Q20 Time-based Partnership

Deepak and Esha invest ₹40,000 and ₹60,000 in a partnership, respectively. Deepak withdraws all his money after 6 months, while Esha keeps her money invested for the entire year. If the total profit at the end of the year is ₹22,000, find Deepak's share of the profit.

A. ₹6,500

B. ₹7,200

C. ₹8,000

D. ₹5,500

**Q21 Basic Ratio**

If $A:B = 4:5$ and $B:C = 7:6$, find the value of $(2A + 3C):(4A - 3C)$.

A. 73:11



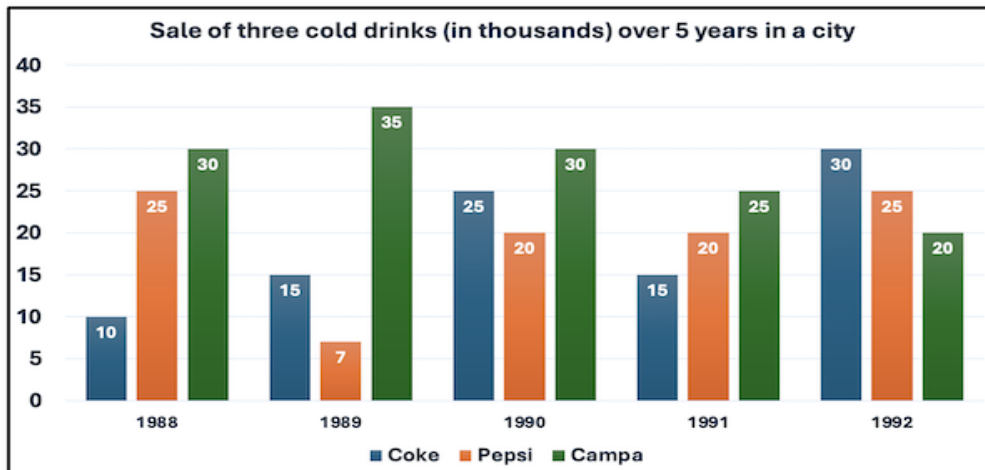
B. 15:7

C. 63:10

D. 48:13

Q22 Comparative Analysis

The following bar graph shows the sale of three cold drinks (in thousands) over a period of 5 years. Study the graph carefully and answer the question that follows.



Find the maximum average annual sale of any cold drink in the given period.

A. 32,000

B. 26,000

C. 24,000

D. 28,000



Q23 Surds

What is the value of x if

$$\sqrt{\sqrt{x+3}} = 2$$

A. 8

B. 13

C. 14

D. 9

**Q24** Trapezium

The area of a field in the shape of a trapezium measure 2937.6 m^2 . The perpendicular distance between its parallel sides is 14.4 m. If the ratio of the parallel sides is $\frac{7}{12} : \frac{4}{15}$, the length of the longer parallel side is:

A. 280 m

B. 175 m

C. 315 m

D. 140 m

**Q25** $\text{cosec}^2 - \cot^2 = 1$

If $\text{cosec} \alpha + \cot \alpha = 4$, then the value of $\cos \alpha$ is:

A. $\frac{15}{17}$

B. $\frac{8}{17}$

C. $\frac{4}{17}$

D. $\frac{12}{17}$



Mathematics

25 Questions • Answer Key

Q1 $(a+b)^2, (a-b)^2$ $(x + 3)^2$ is equal to:

A. $x^2 + 6x + 3$

B. $x^2 + 6x + 9$ ✓

C. $x^2 + 3x + 9$

D. $x^2 + 9x + 6$

Q2 3-Year Difference

A sum of ₹2,000 is invested for 3 years at 5% per annum. Find the difference between the compound interest and the simple interest (in ₹), if the interest is compounded annually.

A. 5.25

B. 20.25

C. 15.25 ✓

D. 10.25

Q3 Basic Time & Work

30 students can complete a task in 10 days working for 4 hours a day. In how many days will 80 students working 3 hours a day will complete the work?

A. 5 days ✓

B. 4 days

C. 6 days

D. 8 days

Q4 Building/Tower Problems

From the top of a vertical tower of height 75 m, the angle of depression of the foot of a building is 60° , and the angle of depression of the top of the building is 30° . If the average of the heights of the tower and the building equals the height of a pole, what is the height of the pole?

A. 65 m

B. 62.5 m ✓

C. 60 m

D. 55.5 m

Q5 Divisibility Rules

What is the least value that must be assigned to A so that the 8-digit number 109A7760 is divisible by 16?

A. 4

B. 0 ✓

C. 2

D. 5

Q6 Find SI

Find the simple interest (in ₹) on ₹1,200 at an interest rate of 6% per month in 12 months.

A. 864 ✓

B. 144

C. 92

D. 72

Q7 Finding Value from Percentage

If 36 is subtracted from a number, it reduces to 90% of the original number. What is the number?

A. 480

B. 360 ✓

C. 840

D. 630

Q8 HCF/LCM Word Problems

Two bells ring at intervals of 9 minutes and 10 minutes, respectively. If they ring together at 8:00 AM, after how many minutes will they next ring together again?

A. 90 minutes ✓

B. 60 minutes

C. 45 minutes

D. 100 minutes



Q9 Half-Yearly Compounding

What will be the amount after 1 year, if ₹1800 is invested at 20% compound interest per annum, compounded half-yearly?

A. ₹2178



B. ₹1974

C. ₹3012

D. ₹2659

Q10 Heron's Formula

What is the area of a triangle with side lengths of 13 cm, 14 cm, and 15 cm?

A. 114 cm²

B. 84 cm²



C. 94 cm²

D. 104 cm²

Q11 MP with Discount and Profit

A shopkeeper marks an article 20% above the cost price and then allows a 15% discount on the marked price. What is the overall profit or loss percentage?

A. 4% loss

B. 4% profit

C. 1% loss

D. 2% profit

**Q12 Median**

The mean and the mode of a set of data are 44.4 and 49.7, respectively. Find the median of the data, using the empirical formula. (Round off to one decimal place)

A. 46.2



B. 47.8

C. 47.4

D. 47.7

Q13 Percentage Increase/Decrease

The expenditure of Sudha is 100% more than her savings. If her expenditure decreases by 2% and savings increase by 22%, then by what percentage does her income increase?

A. 2%

B. 6%



C. 1%

D. 3%

Q14 Relative Speed

Buses leave a depot every 15 minutes and run along a straight highway at a constant speed of 16 km/h. A cyclist is riding towards the depot from the opposite direction on the same highway. He observes that buses cross him at regular intervals of 12 minutes. Assuming both maintain uniform speeds, what is the speed (in km/h) of the cyclist?

A. 6

B. 4



C. 5

D. 7

Q15 Simple Mean

The average temperature of first 3 days in a week was 36° C and the average temperature of this week was 35° C. Then the average temperature of last 4 days in this week was:

A. 34°C

B. 35°C

C. 34.25°C



D. 35.5°C

Q16 Simple Ratio Partnership

At the start of the year, A invested ₹12,000 and B invested ₹18,000 in a business. At the end of the year, the profit is ₹15,000. What is B's share (in ₹) in the profit?

A. 6,000

B. 9,000



C. 7,000

D. 8,000

Q17 Simultaneous Fill & Empty

A tap can fill a cistern in 10 hours and another tap can empty it in 20 hours. If both taps are opened, the time (in hours) taken to fill the tank will be:

A. 15 hours

B. 30 hours

C. 18 hours

D. 20 hours



Q18 Successive Discount

The marked price of a cooker is same at four shops I, II, III and IV. Shop I allows two successive discounts of 85% and 18%, shop II allows successive discounts of 84% and 34%, shop III allows successive discounts of 52% and 11% and shop IV allows successive discounts of 84%, 31% and 94% on the marked price of the cooker. Which shop is selling the cooker at the lowest price?

A. IV



B. I

C. III

D. II

Q19 Two Trains Crossing

Two trains are travelling toward each other on parallel tracks. The first train is 430 metres long and travels at a speed of 120 km/h. The second train is 570 metres long and travels at a speed of 85 km/h. The distance between the two trains when they start is 20 km. Find out how much time it will take for the two trains to completely pass each other (rounded off to the nearest second).

A. 393 seconds

B. 389 seconds

C. 369 seconds



D. 343 seconds

Q20 Ungrouped Data Median

The following scores were recorded in a test: 70, 85, 90, 90, 95, 100. If the highest score (100) is removed, what is the new median?

A. 85

B. 70

C. 95

D. 90

**Q21 Building/Tower Problems**

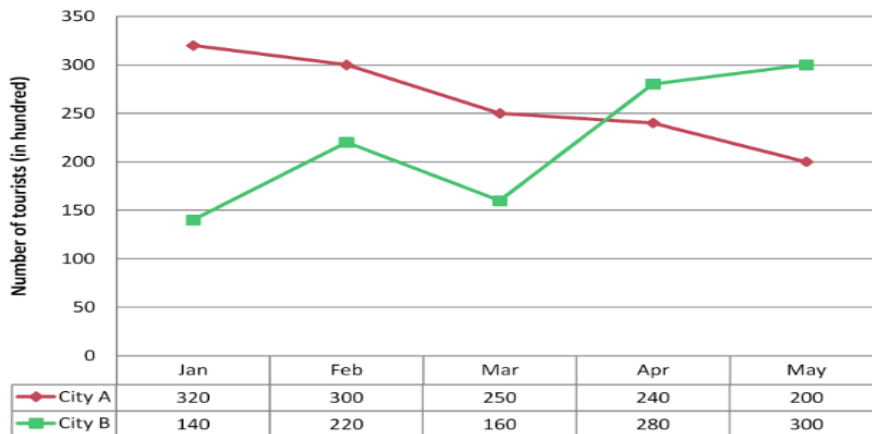
The angle of elevation of the top of a tower from two points on opposite sides of the tower are 30° and 60° . If the distance between the two points is 54 m, find the height of the tower.

A. $12.4\sqrt{3}$ mB. $15.8\sqrt{3}$ mC. $13.5\sqrt{3}$ mD. $14.6\sqrt{3}$ m

Q22 Comparative Trend

The given line graph shows the number of tourists (in hundreds) in two different cities, A and B, over five different months of the year 2018.

Study the line graph and answer the question that follows.



What is the ratio of the total number of tourists in City A in February and March to the total number of tourists in City B in the same months?

A. 55 : 38



B. 59 : 65

C. 71 : 80

D. 38 : 47

Q23 Proportion

The fourth proportional to three numbers is 36. The first two numbers are 8 and 12. Find the third number.

A. 18

B. 24



C. 21

D. 28

Q24 Sector Area & Arc Length

The radius and area of the sector of a circle are 54 cm and $405\pi \text{ cm}^2$, respectively.

What is the length of the corresponding arc of the sector?

A. $15\pi \text{ cm}$



B. $810\pi \text{ cm}$

C. $745\pi \text{ cm}$

D. $876\pi \text{ cm}$



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7600 bricks, each measuring $P \text{ cm} \times 12.5 \text{ cm} \times 7.5 \text{ cm}$, are required to construct a wall 6 m long, 5 m high and 0.25 m thick.

If the cement and sand mixture occupies $\frac{1}{20}$ of the volume of the wall, then the value of P is:

A. 20



B. 27.5

C. 22.5

D. 25



Mathematics

25 Questions • Answer Key

Q1 $(a+b)^2, (a-b)^2$ Simplify the expression: $(x + 3)^2 - x^2 - 9 - 6x$ A. $6x$ B. $3x$

C. 0



D. 9

Q2 Annual Compounding

Radhika invested ₹5,800 at compound interest, compounded annually, for 2 years. If the compound interest earned at the end of 2 years is ₹594.50, find the annual rate of interest.

A. 4%

B. 5%



C. 6.3%

D. 5.6%

Q3 Arithmetic Mean

Calculate the mean from the following items.

163, 141, 155, 175, 186

A. 160

B. 162

C. 164



D. 166

Q4 Crossing Bridge/Platform

A train running at 63 km/h takes 30 sec to pass a platform. Next it takes 18 sec to pass a man cycling at 9 km/h in the same direction in which the train is going. The ratio of the length of the train to the length of the platform is:

A. 18 : 17



B. 10 : 9

C. 8 : 7

D. 21 : 19

Q5 Dividing Quantity in Ratio

A long-distance train has passengers in first class, second class, and sleeper class in the ratio 2 : 3 : 5. The ticket fares for these three classes are in the ratio 8 : 7 : 3. If the total revenue collected from ticket sales is ₹96,200, find the amount of revenue generated from second-class tickets.

A. ₹38,850



B. ₹42,000

C. ₹39,800

D. ₹42,600

Q6 Find SI

Find the simple interest (in ₹) on ₹1,200 at an interest rate of 6% per month in 11 months.

A. 792



B. 86

C. 132

D. 66

Q7 Half-Yearly Compounding

A bank offers 6.9% compound interest per annum calculated on a half-yearly basis. A customer deposits ₹9,688 each on 1 January and 1 July of a year. At the end of the year, the amount he would have gained by way of interest is _____.

(Round your answer to the nearest paise.)

A. ₹1,025.70

B. ₹1,014.24



C. ₹1,021.44

D. ₹1,022.06

Q8 Laws of Indices

Given that $81^{0.4} = x$, $81^{0.78} = y$ and $x^z = y^2$, then the value of z is:

A. 3.9



B. 4.9

C. 1.9

D. 2.9



Q9 Multiple Pipes

Pipe A can fill a tank in 6 hours, pipe B can fill the same tank in 24 hours and pipe C can fill the same tank in 24 hours. The time taken (in hours) by them to fill one-fourth of the same tank if they operate together is:

A. 2

B. 3

C. 4

D. 1

**Q10 Percentage Increase/Decrease**

The expenditure of Sudha is 150% more than her savings. If her expenditure decreases by 7% and savings increase by 21%, then by what percent does her income increase?

A. 6%

B. 3%

C. 1%



D. 5%

Q11 Population Based Problems

The population of a city is increased from 64,000 to 93,500 in a year. Calculate the percentage increase in the population (rounded off to two decimal places).

A. 46.64%

B. 46.09%



C. 46.39%

D. 46.56%

Q12 Prime & Composite Numbers

Which of the following pairs of numbers are co-prime?

A. 49, 217

B. 119, 239



C. 30, 201

D. 48, 111

Q13 Profit/Loss Percentage

A vendor sold 20 chocolates for one rupee and made a profit of 100%. How many chocolates did he originally purchase for one rupee?

A. 46

B. 40



C. 44

D. 42

Q14 Simple Ratio Partnership

Three friends, Amit, Sumit, and Rohit, invested ₹4,000, ₹6,000, and ₹8,000, respectively, to start a business. At the end of the year, they made a profit of ₹9,000. What is Sumit's share in the profit?

A. ₹2,000

B. ₹4,500

C. ₹4,000

D. ₹3,000

**Q15 Still Water Speed**

A boat travels a certain distance. The ratio of the time taken by the boat to travel downstream to the time taken to travel upstream is 5:7. If the downstream speed is 21 km/h, find the speed of the boat in still water.

A. 13 km/h

B. 9 km/h

C. 18 km/h



D. 12 km/h

Q16 Successive Discount

The marked price of a cooker is the same at four shops I, II, III and IV. Shop I allows two successive discounts of 73% and 79%, shop II allows successive discounts of 49% and 32%, shop III allows successive discounts of 14% and 92% and shop IV allows successive discounts of 76%, 49%, and 55% on the marked price of the cooker. Which shop is selling the cooker at the lowest price?

A. I

B. II

C. IV



D. III

Q17 Surface Area

Four litres of paint was required to paint the surface of a solid sphere. If 4 identical pieces were made of this solid sphere, then how many litres of paint would be required to paint all the surfaces of these 4 pieces?

A. 16

B. 6

C. 8



D. 12



Q18 Two Items Mixing

A mixture of chemicals contains chemical X and chemical Y. If 3 L of chemical Y is added, chemical X becomes 40%. If 3 L of chemical X is added instead, chemical X becomes 50%. Find the initial quantity of the mixture.

A. 21 L

B. 22 L

C. 27 L



D. 25 L

Q19 $\sin^2 + \cos^2 = 1$

if $\sin A + \cos A = \sqrt{2}$, then the value of $\sin A - \cos A$ is:

A. 0



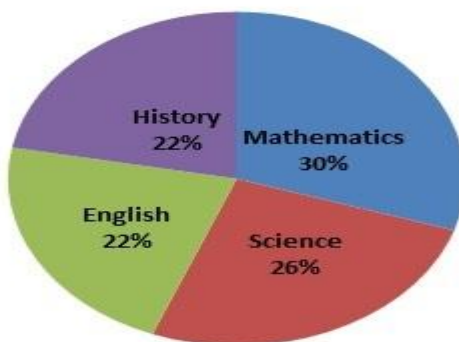
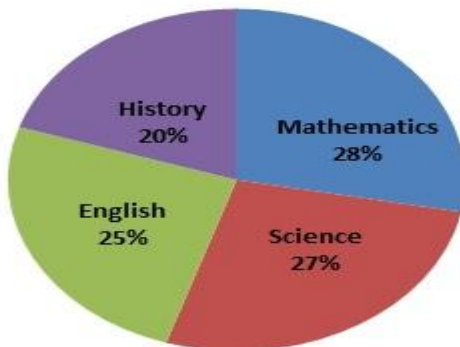
B. -0.6

C. 0.75

D. -0.75

Q20 Double Pie Chart

The given pie charts show details of two schools A and B, which have 300 students and 200 students, respectively, and the percentage wise distribution of the favourite subjects of the students. Study the charts carefully and answer the question that follows.

School -A**School -B**

Find the difference between the total number of students of school A whose favourite subjects are Mathematics or English, and the total number of students of school B whose favourite subjects are Science or English.

A. 43

B. 49

C. 38

D. 52



Q21 Mean of Grouped Data

If the mean of the following data is 49, then what is the value of x?

Class	10-20	20-30	30-40	40-50	50-60
Frequency	50	42	37	41	x

A. 565



B. 587

C. 559

D. 547

Q22 Pythagorean Identities

If A is an acute angle, what is the value of the following expression?

$$\frac{1 + \cos A}{1 - \cos A} - 2 \cot A \operatorname{cosec} A$$

A. $\operatorname{cosec}^2 A$ B. $\cot^2 A$ C. $\operatorname{cosec}^2 A - \cot^2 A$ D. $\operatorname{cosec}^2 A + \cot^2 A$ **Q23** Sector & Segment Area

If the length of the arc of a circle whose diameter is 14 cm is $3\frac{2}{3}$ cm, then twice the area of the sector is

A. $\frac{77}{3}$ B. $\frac{77}{5}$ C. $\frac{77}{2}$ D. $\frac{77}{9}$ **Q24** Surds

If $\sqrt{x^2 - 21^2} - \sqrt{7.29} = 17.3$, find the positive value of x.

A. 19

B. 29



C. 27

D. 21



Q25 Volume

The radius of a cylinder is increased by $33\frac{1}{3}\%$ and its height is decreased by $x\%$ such that the volume of the cylinder remains unchanged. Find x .

A. 41.25

B. 42.5

C. 43.75



D. 44.15



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Mathematics

25 Questions • Answer Key

Q1 Angle of Elevation

A 5G telecom tower is installed in a smart city zone. From a point on the ground 20 m away from the base of the tower, the angle of elevation of the top of the tower is 45° . Find the height of the tower (in meters).

- A. 18 m
- B. 25 m
- C. 20 m
- D. 22 m



Q2 Basic Ratio

Two numbers are in the ratio 7:9. If 21 is added to each number, the ratio becomes 3:4. Find the numbers.

- A. -147, -189
- B. -98, -126
- C. -84, -108
- D. -91, -117



Q3 Basic TSD

Jeeps leave a forest checkpoint every 10 minutes and travel at a constant speed of 24 km/h along the same trail. What is the distance (in km) between any two jeeps already on the trail?

- A. 6
- B. 5
- C. 4
- D. 3



Q4 Corresponding Angles

Two parallel lines are cut by a transversal. If one angle is $(3x + 10)^\circ$, and its corresponding angle is $(5x - 30)^\circ$, find the value of x .

- A. 20
- B. 25
- C. 18
- D. 15



Q5 Find SI

Two banks, A and B, offered loans at 3.5% and 8.5% per annum, respectively. David borrowed an amount of ₹4,80,000 from each bank. Find the positive difference between the amounts (in ₹) of simple interest paid to the two banks by David after 3 years.

- A. 73,000
- B. 73,500
- C. 71,500
- D. 72,000



Q6 Finding HCF

What is the HCF of 432 and the LCM of 120 and 150?

- A. 24
- B. 12
- C. 8
- D. 16



Q7 Finding Present Age

The sum of the ages of a father and his son is 50. If the father is 4 times the son's age, find the son's age.

- A. 14 years
- B. 10 years
- C. 12 years
- D. 16 years



Q8 HCF/LCM Word Problems

Two security lights flash at regular intervals, one every 36 minutes and the other every 54 minutes. If both lights flash together at 8:00 AM, when will they flash together again?

- A. 9:08 AM
- B. 9:38 AM
- C. 9:28 AM
- D. 9:48 AM



Q9 Half-Yearly Compounding

If a sum of ₹6,20,000 is invested for a year at 2% per annum compounded half-yearly, then find the compound interest.

A. ₹13,795

B. ₹10,682

C. ₹12,462



D. ₹11,667

Q10 Heron's Formula

Calculate the area of a triangle whose sides are 14 cm, 21 cm and 29 cm (rounded off to two decimal places).

A. 137.08 cm²

B. 137.87 cm²



C. 137.42 cm²

D. 137.71 cm²

Q11 Percentage Increase/Decrease

The expenditure of Sudha is 100% more than her savings. If her expenditure decreases by 4% and savings increase by 35%, then by what percent does her income increase?

A. 14%

B. 12%

C. 11%

D. 9%

**Q12 Profit/Loss Percentage**

By selling 24 articles, a shopkeeper gains the selling price of 12 articles. What is his gain percentage?

A. 100%



B. 150%

C. 50%

D. 200%

Q13 Replacement of Mixture

A container holds a mixture of milk and water in the ratio 7:3. After 2 litres of the mixture are replaced with 2 litres of pure water, the new ratio of milk to water becomes 7:5. What was the initial quantity of milk present in the mixture?

A. 9.1 liters

B. 6.3 liters

C. 8.4 liters



D. 5.6 liters

Q14 Successive Discount

The marked price of a cooker is same at four shops I, II, III and IV. Shop I allows two successive discounts of 99% and 40%, shop II allows successive discounts of 53% and 52%, shop III allows successive discounts of 52% and 10% and shop IV allows successive discounts of 51%, 85% and 68% on the marked price of the cooker. Which shop is selling the cooker at the lowest price?

A. II

B. IV

C. III

D. I

**Q15 Two Items Mixing**

A shopkeeper buys 5 kg of rice at ₹40 per kg and 15 kg of rice at ₹60 per kg. What is the average cost per kg of the mixture?

A. ₹52

B. ₹50

C. ₹45

D. ₹55

**Q16 Two Successive Changes**

A number is first increased by 30%, and then decreased by 20%. What is the overall percentage change in the number?

A. Decrease of 4%

B. Increase of 10%

C. Decrease of 8%

D. Increase of 4%

**Q17 Two Trains Crossing**

Two trains are moving in opposite directions at the speeds of 80 kmph and 70 kmph. Their lengths are 1.20 km and 0.8 km, respectively. The time taken by the slower train to cross the faster train (in seconds) is:

A. 50

B. 40

C. 48



D. 42



Q18 Value Decrease Over Time

A company car loses 20% of its value each year. Three years later, the car is worth ₹32,768. What was the initial value of the car?

- A. ₹59,800
- B. ₹67,800
- C. ₹61,200
- D. ₹64,000

**Q19 Weighted Average**

A school has four grades. The average marks scored in Grade 9, Grade 10, Grade 11, and Grade 12 are 65, 70, 70, and 74, respectively. The number of students in each corresponding grade are 40, 45, 35, and 50. What is the weighted arithmetic mean marks for all students across the grades?

- A. 73
- B. 70
- C. 69
- D. 68

**Q20 Combined Work Rate**

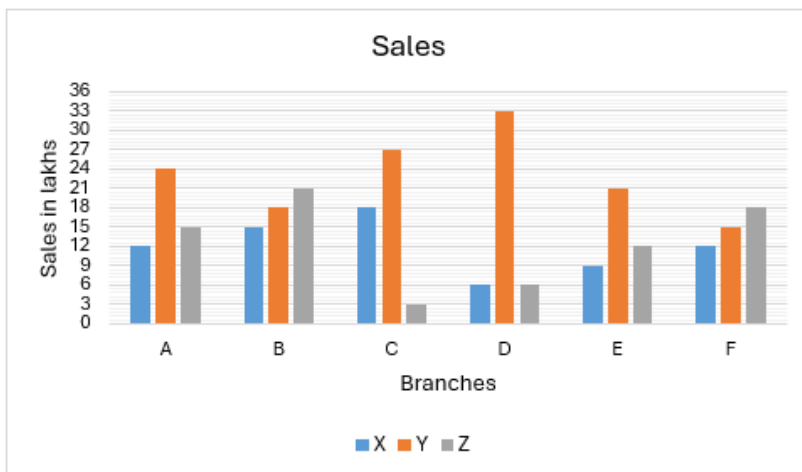
A and B together can do a piece of work in 15.5 days and A alone can do it in 21 days. In how much time could B alone do it?

- A. $79\frac{2}{11}$ days
- B. $69\frac{2}{11}$ days
- C. $59\frac{2}{11}$ days
- D. $89\frac{2}{11}$ days

**Q21 Comparative Analysis**

The given graph shows the sales (in lakhs) of mobile phones of three brands, X, Y and Z, from six branches (A, B, C, D, E and F) of a company.

Study the graph and answer the question that follows.



What is the ratio of the total sales of Branch A to that of Branch D?

- A. 13 : 15
- B. 15 : 13
- C. 15 : 17
- D. 17 : 15



Q22 Laws of Indices

Simplify:

$$\frac{(p^2q^{-3})^3(p^{-5}q^4)^2}{p^{-1}q^{-2}}.$$

A. $\frac{p^2}{q^5}$

B. $\frac{q}{p^3}$ ✓

C. $\frac{p}{q^3}$

D. $\frac{q^2}{p^5}$

Q23 Mean of Grouped Data

If the mean of the following data is 44, then what is the value of x?

Class	10-20	20-30	30-40	40-50	50-60
Frequency	36	37	26	34	x

A. 159

B. 160

C. 161

D. 177 ✓

Q24 Volume

The cost of painting the outer surface of a closed cuboidal box is ₹4,340 at the rate of ₹10 per square cm. The sum of the length and the breadth of the box is 23 cm. If the height of the box is 5 cm, then the quantity of air in the box is:

A. 440 cm^3

B. 484 cm^3

C. 500 cm^3

D. 510 cm^3 ✓

Q25 $\sec^2 - \tan^2 = 1$ If $\operatorname{msec} \alpha = 8$, $\operatorname{mtan} \alpha = 4$, then the value of $\operatorname{m}^2 \operatorname{cosec} \alpha$ is:

A. 48

B. 2

C. 96 ✓

D. 24



Mathematics

25 Questions • Answer Key

Q1 Annual Compounding

What will be the compound interest on a sum of ₹10,124 after 2 years at the rate of 25% per annum, interest being compounded annually?

A. ₹5,894.75

B. ₹5,994.75

C. ₹5,794.75

D. ₹5,694.75 ✓

Q2 Annual Compounding

At what rate per cent per annum will a sum of money multiply itself by 20 times in 2 years, interest being compounded annually? (Give your answer correct to one decimal place)

A. 345.6

B. 347.2 ✓

C. 340.3

D. 353.1

Q3 Arithmetic

Nirmal's monthly salary is ₹15,000. He spends ₹6,000 on house rent and ₹1,500 on utility bills and saves the remaining amount each month. If, during his birthday month, he spends his entire monthly savings on his birthday celebration, find his total savings (in ₹) for the year.

A. 67,500

B. 82,500 ✓

C. 90,000

D. 75,000

Q4 Average Speed

A car runs the first one-third of a distance at a speed of 42 km/hr, the next half of the distance at a speed of 60 km/hr and the remaining distance at a speed of 72 km/hr. Find the approximate average speed (in km/hr) of the car for the whole journey.

A. 53.8 ✓

B. 48.6

C. 56

D. 58

Q5 Dividing Quantity in Ratio

If $(a + b):(b + c):(c + a) = 4:6:10$ and $a + b + c = 40$, what is the value of a ?

A. 22

B. 8

C. 16 ✓

D. 18

Q6 Equivalent Discount

A shop marks an article with ₹1,375. The shop runs a scheme: on buying two identical articles, a customer gets 20% off on the first and 40% off on the second. If a customer buys two, what is the effective percentage discount on the total bill?

A. 24%

B. 27%

C. 30% ✓

D. 25%

Q7 Find SI

Two banks, A and B, offered loans at 3.5% and 8.5% per annum, respectively. Atul borrowed an amount of ₹4,80,000 from each bank. Find the positive difference between the amounts (in ₹) of simple interest paid to the two banks by Atul after 2 years.

A. 47,500

B. 49,500

C. 48,000 ✓

D. 49,000

Q8 Finding Present Age

If 2 times the mother's age is 28 years more than 7 times her daughter's age, and 5 times the daughter's age is 5 year less than the mother's age, then what is the difference (in years) between the ages of the mother and the daughter?

A. 29 ✓

B. 34

C. 25

D. 33



Q9 Finding Value from Percentage

Priya spends 27% of her income on house rent, 22% on groceries, and 18% on education. If she saves ₹12,400 per month, what is her monthly income (rounded off to the nearest integer)?

A. ₹37,356

B. ₹37,446

C. ₹37,216

D. ₹37,576

**Q10 Grouped Data Median**

A manufacturing plant employs 3,000 workers with varying hourly wages. The distribution of their wages is given below.

Wage Range (₹ per hour)	Number of Workers
Less than 3.00	150
3.01 – 4.50	580
4.51 – 6.00	900
6.01 – 7.50	500
7.51 – 9.00	600
More than 9.00	270
Total	3,000

Using the data above, determine the median hourly wage of the employees (Round off your answer to two decimal places.)

A. ₹4.74

B. ₹6.23

C. ₹5.79



D. ₹5.98

Q11 Melting & Recasting

A hemispherical bowl of internal radius 15 cm is full of liquid. This liquid is to be filled into cylindrical bottles of diameter 5 cm and height 6 cm. How many bottles are required to empty the bowl completely?

A. 55

B. 58

C. 60



D. 64

Q12 Profit/Loss Percentage

A vendor purchases lemons at the rate of 27 lemons for ₹1. At what rate (number of lemons per ₹1) should he sell them in order to gain 80%?

A. 16

B. 15



C. 17

D. 19

Q13 Proportion

Find the fourth proportional to 6, 9, and 15.

A. 18.5

B. 25.5

C. 21.5

D. 22.5

**Q14 Two Trains Crossing**

Two trains of equal length cross a pole in 12 seconds and 18 seconds, respectively. If they move in the same direction, find the time taken by the faster train to come from behind and completely cross the other train.

A. 60 seconds

B. 72 seconds



C. 66 seconds

D. 75 seconds

Q15 Weighted Average

A class has boys and girls in the ratio 3:2. In a test, the average marks of the boys are 70 and those of the girls are 80. Find the average marks of the whole class.

A. 72

B. 74



C. 75

D. 76



Q16 Bracket Simplification

Simplify: $2 \div \frac{4}{5} \times (5 + 8 \times 2 - 4) + \left[\frac{1}{5} \div \frac{7}{25} - \left\{ \frac{3}{7} + \frac{16}{28} \right\} \right]$

A. $\frac{589}{14}$

B. $\frac{59}{14}$

C. $\frac{591}{14}$ ✓

D. $\frac{59}{28}$

Q17 Heron's Formula

Find the area of a triangle whose sides are 12 cm, 10 cm and 14 cm.

A. $28\sqrt{2} \text{ cm}^2$

B. 24 cm^2

C. 28 cm^2

D. $24\sqrt{6} \text{ cm}^2$ ✓

Q18 Mean of Grouped Data

What is the value of $(2x + 7y)$, if mean of the following distribution is 53?

Class	0-20	20-40	40-60	60-80	80-100	Total
Frequency	7	11	x	8	y	60

A. 133 ✓

B. 127

C. 137

D. 151

Q19 Order of Operations

Simplify the expression: $12 - 3 \times 2 + \frac{8}{2}$.

A. 14

B. 8

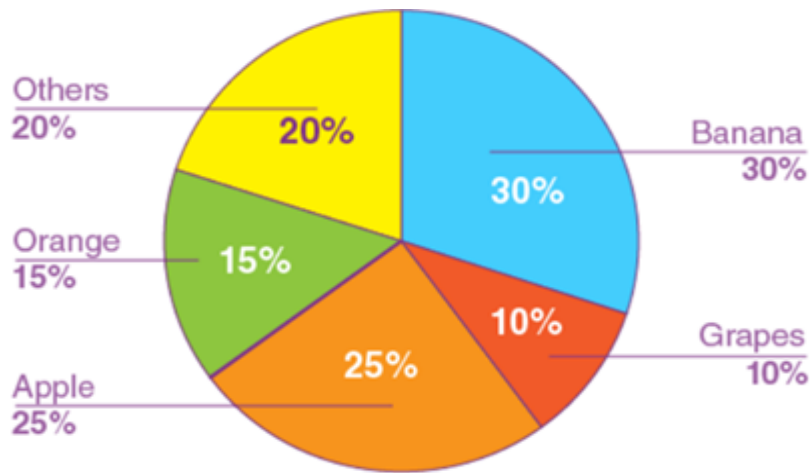
C. 10 ✓

D. 12



Q20 Percentage Based

In a party, fruit chat is made with a total 150 kg of fruits. The distribution of different type of fruits is shown in the given graph.



The amount of Banana used in the fruit chat is what percentage more than the amount of Apple used?

- A. 25%
- B. 22%
- C. 20%
- D. 30%

**Q21** Pythagorean Identities

If $A = \frac{\cos\theta + 1 + \sin\theta}{2\sin\theta}$, then value of $\frac{\cos\theta}{\sin\theta + 1 - \cos\theta}$ is:

- A. $1 - A^2$
- B. $A - 1$
- C. $1 + \frac{1}{A}$
- D. $1 + A$

**Q22** Simultaneous Fill & Empty

Two pipes A and B can fill a tank in 20 hours and 30 hours, respectively, while pipe C can empty the tank in 60 hours. All three taps are opened at the beginning. 10 hours before the tank is filled, pipe C is closed. How much total time (in hours) will it take to fill the tank?

- A. $10\frac{1}{2}$
- B. $12\frac{1}{4}$
- C. $12\frac{1}{2}$
- D. $10\frac{1}{4}$



Q23 Standard Angle Values

If $A = 7.5^\circ$, what is the value of $\frac{32\sqrt{3}\sin 8A + 28\sec 8A}{13\sqrt{3}\operatorname{cosec} 6A}$?

A. $\frac{2\sqrt{6}}{3}$

B. $\frac{3\sqrt{6}}{5}$

C. $\frac{5\sqrt{6}}{3}$

D. $\frac{4\sqrt{6}}{3}$

**Q24** Surds

Simplify: $\sqrt{9 + 4\sqrt{5}}$

A. $2 + \sqrt{5}$

B. $5 + \sqrt{2}$

C. $1 + 2\sqrt{5}$

D. $3 + \sqrt{5}$

**Q25** Triangle Area & Perimeter

The midpoints of a triangle with sides 16 cm, 24 cm, and 32 cm are joined to form another triangle. Find the area (in cm^2) of the triangle formed by these midpoints.

A. $12\sqrt{5}$

B. $9\sqrt{7}$

C. $10\sqrt{11}$

D. $12\sqrt{15}$



Mathematics

25 Questions • Answer Key

Q1 $(a+b)^2, (a-b)^2$ Simplify: $(3a + 2b)^2 + (3a - 2b)^2 - 2(9a^2 + 4b^2)$

A. 2

B. 0



C. -1

D. 1

Q2 Basic TSD

Kaushal travelled for 14 hours 10 minutes at the speed of 60 km/h. At what speed (in km/h) should he travel to cover the same distance in 17 hours?

A. 50



B. 51

C. 53

D. 52

Q3 Building/Tower Problems

The angle of elevation of the top of a hill at the foot of a tower is 60° and the angle of depression from the top of the tower to the foot of the hill is 30° . If the tower is 96 m high, find the difference between the height of the hill and the height of the tower.

A. 172 m

B. 163 m

C. 192 m



D. 188 m

Q4 CI-SI Difference

The difference between the compound interest and simple interest on a certain sum at 8% per annum for $1\frac{1}{2}$ years, compounded half-yearly, is ₹36. What is the principal amount? (Rounded off to the nearest integer.)

A. ₹7,401



B. ₹7,404

C. ₹7,411

D. ₹7,201

Q5 Cost with Overhead Expenses

Arvind bought an article for ₹x. He sold it to Biru at a loss of 27%. Biru spent ₹163 on its transportation and sold it to Minu at a profit of 60%. If Minu bought it for ₹1,896, then what is the value of x?

A. 1,382

B. 1,400



C. 1,388

D. 1,386

Q6 Dividing Quantity in Ratio

Ravi, Sohan, Raghu and Ani distributed a sum of money amongst themselves in the ratio of 7 : 4 : 6 : 3. If Raghu's share is ₹1,800 more than Ani's share, then what is Sohan's share?

A. ₹2,300

B. ₹2,400



C. ₹2,200

D. ₹2,500

Q7 Find SI

Find the simple interest (in ₹) on ₹1,500 at an interest rate of 3% per month in 1 month.

A. 7.50

B. 3.75

C. 45



D. 23.75

Q8 Finding HCF

Find the greatest number that divides 85, 153, and 221 leaving the same remainder in each case.

A. 68



B. 38

C. 60

D. 34



Q9 Finding Value from Percentage

The population of a district is 3,35,000, out of which 2,14,000 are males. 31% of the population is literate. If 31% males are literate, then what percentage of females are literate?

- A. 33%
- B. 28%
- C. 30%
- D. 31%

**Q10 Grouped Data Median**

Which of the following best describes the median in the given set of data values?

Profit (₹)	Number of Shops
1,000-2,000	12
2,000-3,000	18
3,000-4,000	20
4,000-5,000	15
5,000-6,000	5

- A. ₹3,200
- B. ₹3,150
- C. ₹3,300
- D. ₹3,250

**Q11 HCF/LCM Word Problems**

What is the minimum number of identical square tiles required to completely floor a room measuring 4m x 3.2 m?

- A. 9
- B. 40
- C. 18
- D. 20

**Q12 Half-Yearly Compounding**

A sum of ₹60,000 is invested for 1 year at 4% per annum, compounded half yearly. What is the compound interest earned at the end of the year?

- A. ₹3,244
- B. ₹2,424
- C. ₹3,102
- D. ₹2,999

**Q13 Laws of Indices**

Given that $24^{0.64} = x$, $24^{0.05} = y$ and $x^z = y^3$, then the value of z is close to:

- A. 1.75
- B. 1.89
- C. 0.91
- D. 0.23

**Q14 Multiple Pipes**

Pipe A can fill a tank in 6 hours, pipe B can fill the same tank in 21 hours and pipe C can fill the same tank in 28 hours. The time taken (in hours) by them to fill one-fourth of the same tank if they operate together is:

- A. 2
- B. 1
- C. 4
- D. 3

**Q15 Parallelogram & Rhombus**

Consider an equilateral quadrilateral whose angle bisectors intersect at right angles. One side of the quadrilateral measures 10 cm, and one of its perpendicular diagonals is 12 cm. Find half of the area of the quadrilateral.

- A. 48 cm²
- B. 96 cm²
- C. 52 cm²
- D. 50 cm²

**Q16 Still Water Speed**

A boatman can travel 22 km downstream and 15 km upstream in 3 hours and 20 minutes. He can also travel 14 km downstream and 12 km upstream in 2 hours and 24 minutes. What is the speed of the boat in still water? (Round off your answer to two decimal places.)

- A. 11.15 km/h
- B. 13.50 km/h
- C. 13.15 km/h
- D. 11.75 km/h



Q17 Successive Discount

A wholesaler marked school uniforms at ₹1,200 each. He offered a 25% trade discount to a retailer. The retailer also received a scheme discount of 1 uniform free for every 5 purchased. Additionally, if the payment was made within 10 days, a cash discount of 8% on the billed amount (after trade discount) was offered. If the retailer received 72 uniforms in total and made the payment within 10 days, find the effective price per uniform in rupees.

- A. ₹668
- B. ₹700
- C. ₹672
- D. ₹690

**Q18 Two Items Mixing**

10 kg of rice at ₹22.50 per kg is mixed with 10 kg of rice at ₹37.50 per kg. What is the price per kg (in ₹) of the mixture?

- A. 30
- B. 22
- C. 28
- D. 25

**Q21 Algebra**

If $\frac{\sin^2\theta}{\tan^2\theta - \sin^2\theta} = \frac{1}{3}$, $0^\circ < \theta < 90^\circ$, then the value of $(\cot\theta + \operatorname{cosec}\theta)$ is:

- A. $2 + \sqrt{3}$
- B. $3\sqrt{3}$
- C. $\sqrt{3}$
- D. $1 - \sqrt{3}$

**Q22 Chord Properties**

In a circle, a diameter AB and a chord PQ (which is not a diameter) intersect perpendicularly at a point X. If $AX : XB = 3 : 2$ and the radius of the circle is 5 cm, then what is the length (in cm) of the chord PQ?

- A. $2\sqrt{6}$
- B. $4\sqrt{6}$
- C. $3\sqrt{6}$
- D. $5\sqrt{6}$

**Q19 Two Persons Age Relation**

The ratio of the present ages of A and B is 5 : 7. Ten years later, the ratio becomes 7 : 9. What is A's present age?

- A. 35 years
- B. 30 years
- C. 25 years
- D. 40 years

**Q20 Two Successive Changes**

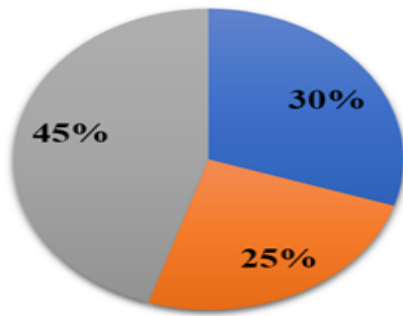
A number is increased by 25% and then decreased by 10%. By what percent does the number increase?

- A. 12.5%
- B. 13.9%
- C. 15.6%
- D. 10.4%

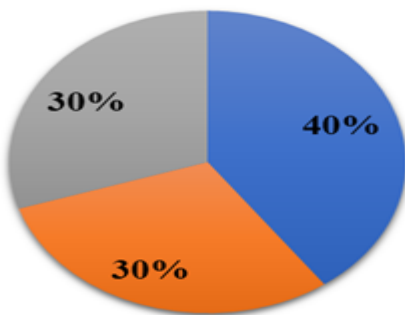


Q23 Double Pie Chart

The given pie charts show the distribution of students in different streams in two schools, A and B. If school A has 1000 students and school B has 1200 students, what is the difference in the number of students in the science stream between the two schools?

SCHOOL A

■ Science ■ Commerce ■ Arts

SCHOOL B

■ Science ■ Commerce ■ Arts

A. 150

B. 100

C. 200

D. 180

**Q24 Mean of Grouped Data**

Study the table and answer the question that follows.

The following table shows the class interval and frequency of a certain distribution.

Class	0-20	20-40	40-60	60-80	80-100
Frequency	17	28	32	A	19

If the mean of the distribution is 50, then the value of A is:

A. 20

B. 24

C. 29

D. 30



Q25 Total Surface Area

A closed metallic cylindrical box is 1.44 m high and its base radius is 56 cm. If the sheet metal costs ₹90 per m², then what is the cost of the material used in the box?

(Use $\pi = \frac{22}{7}$)

A. ₹483.4

B. ₹633.6



C. ₹738.4

D. ₹855.5



Mathematics

25 Questions • Answer Key

Q1 Arithmetic

Sachin's monthly salary is ₹15,000. He spends ₹5,500 on house rent and ₹2,000 on utility bills, and saves the remaining amount each month. If, during his birthday month, he spends his entire monthly savings on his birthday celebration, find his total savings (in ₹) for the year.

- A. 90,000
- B. 75,000
- C. 67,500
- D. 82,500



Q2 Basic CI Calculation

A certain sum amounts to ₹1,08,864 at the rate of 40% per annum in two years, with interest compounded half-yearly. What will be the amount payable (in ₹) on the same sum at the same rate and for the same time, if the interest is compounded annually?

- A. 1,07,600
- B. 1,08,200
- C. 1,02,900
- D. 1,07,300



Q3 Basic TSD

Car M takes 7 hours to travel from point A to point B. It would have taken 8 hours if it had travelled the same distance at a speed 23.8 km/hr less than its original speed. What is the distance between points A and B?

- A. 1330.2 km
- B. 1332.8 km
- C. 1333.9 km
- D. 1331.5 km



Q4 CP-SP Relation

A vendor buys 41 laptop bags for ₹21,115 and sells them at 26 for ₹13,520. How many laptop bags should be bought and sold, at this rate, to earn a total profit of ₹8,845?

- A. 1757
- B. 1745
- C. 1760
- D. 1769



Q5 Direct Proportion

Ram purchases 8 pens for ₹240 and 6 pencils for ₹54. How much money does he need to buy 1 pen and 3 pencils?

- A. ₹57
- B. ₹48
- C. ₹78
- D. ₹69



Q6 Divisibility Rules

The number 1408 is divisible by which of the following numbers?

- A. 13
- B. 24
- C. 21
- D. 22



Q7 Find SI

Two banks, A and B, offered loans at 3.5% and 8.5% per annum, respectively. Shivam borrowed an amount of ₹2,40,000 from each bank. Find the positive difference between the amounts (in ₹) of simple interest paid to the two banks by Shivam after 4 years.

- A. 49,000
- B. 49,500
- C. 48,000
- D. 47,500



Q8 Finding Present Age

If three times the mother's present age is 24 years more than eight times her daughter's age, and three times the daughter's age is 3 years less than the mother's age, then what is the difference (in years) between the ages of the mother and the daughter?

- A. 33
- B. 36
- C. 35
- D. 28



Q9 Finding Value from Percentage

Rajan spends 60% of his income on household expenses. From the remaining income, he saves 50%. If his savings are ₹8,000, what is his total income?

A. ₹40,000



B. ₹32,000

C. ₹35,000

D. ₹45,000

Q10 Half-Yearly Compounding

If a sum of ₹2,70,000 is invested for a year at 10% per annum compounded half-yearly, then find the compound interest.

A. ₹27,850

B. ₹25,825

C. ₹27,625

D. ₹27,675

**Q11 Ratio Comparison**

What is the correct ascending order of the following ratios: 12:13, 25:26, 2:3, 5:6?

A. 5:6, 2:3, 12:13, 25:26

B. 2:3, 5:6, 12:13, 25:26



C. 2:3, 5:6, 25:26, 12:13

D. 2:3, 12:13, 5:6, 25:26

Q12 Ratio Simplification

The salaries of P, Q, and R are in the ratio 3 : 4 : 5. Their salaries are increased by 5%, 10%, and 15%, respectively. Find the new ratio of their salaries after the increases.

A. 53 : 88 : 105

B. 63 : 88 : 115



C. 63 : 78 : 115

D. 63 : 84 : 115

Q13 Rectangle & Square

The perimeter of a square is 564 m. Its area (in m²) is:

A. 19880

B. 19892

C. 19881



D. 19841

Q14 Replacement in Group

The average weight of 12 children increases by 1.5 kg when a new child comes in place of one child who weighed 42 kg. What might be the weight of the new child?

A. 61 kg

B. 62 kg

C. 59 kg

D. 60 kg

**Q15 Sequential Workers**

A can do a task in 24 days, while B can do the same task in 16 days. A begins the task and works for 6 days before B joins him. After that, they work together to complete the remaining job. In how many days is the task completed?

A. 13.2 days



B. 14.5 days

C. 16.2 days

D. 15 days

Q16 Simple Mean

In a group of 10 students, the mean of the lowest 9 scores is 46 while the mean of the highest 9 scores is 50. For the entire group of 10 students, the maximum possible mean exceeds the minimum possible mean by:

A. 4.3

B. 3.6

C. 3.4

D. 3.2

**Q17 Volume**

A cuboid has its three edges in arithmetic progression and its volume is 384 cm³. If the smallest edge measures 4 cm, find the length of the largest edge.

A. 14 cm

B. 32 cm

C. 17 cm

D. 12 cm



Q18 Average Speed

An aircraft covered a distance of 1440 km from place A to place B in $10\frac{1}{2}$ hours. The aircraft stopped for 10 minutes and 20 minutes, respectively. What is the average speed of the aircraft?

A. 144 km/hr



B. 140 km/hr

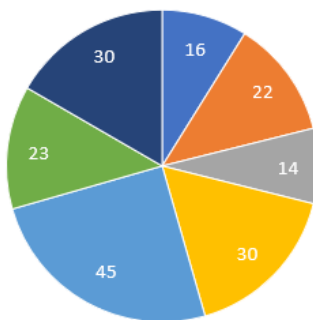
C. 148 km/hr

D. 154 km/hr

Q19 Degree Based

Study the data of the number of accidents on different days of a week in the given pie chart and answer the question below it.

Accidents



■ Sunday ■ Monday ■ Tuesday ■ Wednesday ■ Thursday ■ Friday ■ Saturday

If the data of Thursday is dropped and rest of the data is plotted on a pie chart, then what is the difference in angles (in degrees) made at the centre by Wednesday earlier and now?

A. 25

B. 20



C. 45

D. 30

Q20 Laws of Indices

Simplify:

$$\frac{(a^3 b^{-2})^2 (a^{-1} b^5)^3}{a^4 b^{-1}}$$

A. $\frac{b^{12}}{a}$ B. $\frac{a}{b^9}$ C. $\frac{b^8}{a^3}$ D. $\frac{a^2}{b^6}$ 

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Q21 MP with Discount and Profit

A shopkeeper gains ₹56 on a toy after allowing 23% discount on its marked price. If his gain is 10%,

A. ₹800



B. ₹805

C. ₹770

D. ₹870

Q22 Mean of Grouped Data

The following table shows the distribution of marks obtained by students in a test: Find the arithmetic mean of the marks using the direct method.

Marks(x)	10	15	20	25	30
Number of students	3	7	12	6	2

A. 18.5

B. 23.5

C. 19.5



D. 13.5

Q23 Parallelogram

If the ratio of the angles of a quadrilateral is 2 : 7 : 2 : 7, then it is a:

A. parallelogram



B. square

C. rectangle

D. trapezium

Q24 Pythagorean Identities

Evaluate: $\frac{1 + \sin \theta}{\cos \theta} + \frac{\cos \theta}{1 + \sin \theta}$.

A. $2\cos \theta$ B. $2\sec \theta$ C. $2\sin \theta$ D. $2\operatorname{cosec} \theta$ **Q25** $\operatorname{cosec}^2 - \cot^2 = 1$

If $\operatorname{cosec} \theta + \cot \theta = p$, $p > 1$, then find the value of $\frac{\sec \theta + 1}{\sec \theta - 1}$.

A. $2p$ B. $p^2 + 1$ C. p^2 D. $p^2 - 1$ 

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Mathematics

25 Questions • Answer Key

Q1 Annual Compounding

A certain sum of money becomes three times its original value in 4 years when invested at compound interest, compounded annually. In how many years will the same sum become nine times its original value at the same rate of interest?

- A. 5 years
- B. 6 years
- C. 9 years
- D. 8 years



Q2 Basic TSD

Giri covers a distance of 56 km in 7 hours. He covers the distance partly on foot at a speed of 6 km/h and partly on a bicycle at a speed of 11 km/h. What is the distance covered by him on the bicycle?

- A. 30.8 km
- B. 30.7 km
- C. 30.2 km
- D. 30.5 km



Q3 Basic TSD

A delivery rider starts 6 minutes 40 seconds late but still manages to reach a destination 21 km away on time by riding 12 km/hr faster than his usual speed. What is his usual speed in km/hr?

- A. 41
- B. 40
- C. 42
- D. 43



Q4 Combined Work Rate

A, B and C together finish a work in 2 days. If A alone can finish the same work in 4 days and B in 8 days, find how long (in days) will C take to finish twice the same work?

- A. 16
- B. 8
- C. 17
- D. 9



Q5 Cost with Overhead Expenses

Arvind bought an article for ₹x. He sold it to Biru at a loss of 10%. Biru spent ₹135 on its transportation and sold it to Minu at a profit of 50%. If Minu bought it for ₹1,728, then what is the value of x?

- A. 1,140
- B. 1,150
- C. 1,080
- D. 1,130



Q6 Dividing Quantity in Ratio

A certain sum is divided into two parts in the ratio 8 : 5. If one part is ₹306 more than the other, then find the sum (in ₹).

- A. 1,326
- B. 816
- C. 510
- D. 1,122



Q7 Find SI

Find the simple interest (in ₹) on ₹1,500 at an interest rate of 3% per month in 2 months.

- A. 27.50
- B. 7.50
- C. 90
- D. 15



Q8 Finding Value from Percentage

In an election between two candidates 80 % of the registered voters cast their vote and 10 % of the votes polled were found invalid. Winning candidate got 55% of the valid votes and won the election by a margin of 378 votes. How many voters were registered?

- A. 5250
- B. 5251
- C. 5249
- D. 5253



Q9 Finding Value from Percentage

In an election, A gets 63.2% of the votes polled. If the total number of voted polled is 5000, how many votes did A get?

- A. 2580
- B. 3580
- C. 2760
- D. 3160

**Q10 Half-Yearly Compounding**

A sum of ₹2,20,000 is invested for 1 year at 4% per annum, compounded half yearly. What is the compound interest earned at the end of the year?

- A. ₹8,888
- B. ₹8,648
- C. ₹9,551
- D. ₹9,364

**Q11 Laws of Indices**

Given that $102^{0.63} = x$, $102^{0.94} = y$ and $x^z = y^5$, then the value of z is close to:

- A. 9.71
- B. 6.41
- C. 7.46
- D. 8.63

**Q12 Measures of Central Tendency**

A dataset has a mean μ , median M , and mode m , following the empirical formula $m = 3M - 2\mu$. Each data point x undergoes a linear transformation given by $x' = kx + d$, where k and d are constants.

The transformed dataset has a new mean μ' , median M' , and mode m' .

Which of the following options correctly represents μ' , M' , and m' while ensuring that the empirical relationship remains valid?

- A. $\mu' = k\mu + d$, $M' = kM + d$, $m' = km + d$
- B. $\mu' = k\mu$, $M' = kM + d$, $m' = km + d$
- C. $\mu' = k\mu + d$, $M' = kM + d$, $m' = k(m + d)$
- D. $\mu' = k\mu + d$, $M' = kM$, $m' = km + d$

**Q13 Melting & Recasting**

A solid cone is melted and recast into a solid cylinder having the same radius as the cone. Find the ratio of the height of the cone to the height of the cylinder.

- A. 1:1
- B. 3:1
- C. 2:3
- D. 1:2

**Q14 Partnership**

Two partners, A and B, invested ₹1,50,000 and ₹1,80,000, respectively, in a business. They agreed to distribute 50% of the profit equally and the remaining 50% in proportion to their capital investments. If B receives ₹46,000 as his share of the total profit, find the total profit.

- A. ₹96,000
- B. ₹86,000
- C. ₹88,000
- D. ₹98,000

**Q15 Rules for 2,3,4,5,6**

Find the least value of $(3K^2 - 2)$ for which six digits number 7K8508 is divisible by 6.

- A. 10
- B. 17
- C. 8
- D. 14

**Q16 Rules for 2,3,4,5,6**

The 7-digit number 36A836B is divisible by 3. What is the minimum value of $(A + B)$?

- A. 5
- B. 1
- C. 6
- D. 4

**Q17 Simple Ratio Partnership**

A, B, and C invest ₹5,000, ₹7,000, and ₹8,000 in a business. If profit is ₹4,000, find A's share.

- A. ₹1,100
- B. ₹1,400
- C. ₹1,000
- D. ₹1,200



Q18 Single Right Triangle

A ladder is leaning against a vertical wall. The ladder is 25 meters long and makes an angle of 30 degrees with the ground. How high does the ladder reach up the wall?

- A. 25 meters
- B. 15 meters
- C. 21.7 meters
- D. 12.5 meters

**Q19 Successive Discount**

The marked price of a cooker is same at four shops I, II, III and IV. Shop I allows two successive discounts of 74% and 72%, shop II allows successive discounts of 12% and 70%, shop III allows successive discounts of 51% and 92% and shop IV allows successive discounts of 29%, 78% and 56% on the marked price of the cooker. Which shop is selling the cooker at the lowest price?

- A. II
- B. III
- C. I
- D. IV

**Q20 Surface Area (TSA/LSA)**

Two cubes, each with a volume of 216 cm^3 , are joined together end to end. The surface area of the resulting cuboid is:

- A. 300 cm^2
- B. 495 cm^2
- C. 360 cm^2
- D. 406 cm^2

**Q21 Weighted Average**

Find the weighted arithmetic mean of the first 6 multiples of 8, where each multiple's weight is half of its value. Give your answer correct to two decimal places.

- A. 25.36
- B. 34.67
- C. 52.52
- D. 43.67

**Q22 Building/Tower Problems**

The angle of elevation of the top of a tower from a point on the ground is 45° . Moving 24 m directly towards the base of the tower, the angle of elevation changes to 60° . What is the height of the tower?

(Use $\sqrt{3} = 1.732$, and round off your answer to two decimal places.)

- A. 54.78 m
- B. 55.78 m
- C. 56.78 m
- D. 53.78 m

**Q23 Congruence & Similarity**

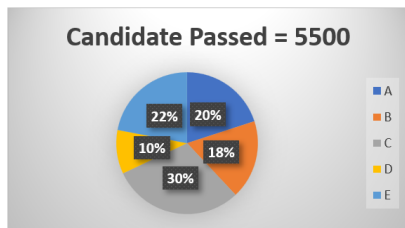
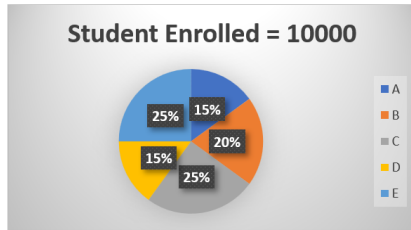
Given that $\angle F = \angle Z$ and $DF = XZ$, which of the following conditions must be true for $\triangle DEF$ and $\triangle XYZ$ to be congruent?

- A. $DE = XY$ by SAS criteria
- B. $EF = YZ$ by SSA criteria
- C. $DE = XY$ by SSS criteria
- D. $EF = YZ$ by SAS criteria



Q24 Double Pie Chart

The given pie charts represent distribution of candidates who were enrolled for MBBS entrance exam and the candidates (out of those enrolled) who passed the exam in different institutes (A, B, C, D and E).



For Institutes A and E together, what is the percentage of candidates who passed out of the total candidates enrolled?

A. 64.75%

B. 42.25%

C. 57.75%



D. 62.25%

Q25 Simple Mean

The average of five numbers is 18.45. What is the sum of the five numbers?

A. 90.25

B. 95.25

C. 92.25



D. 84.25



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Mathematics

25 Questions • Answer Key

Q1 2-Year Difference

A sum of ₹1,000 is invested for 2 years at 10% per annum. Find the difference between the compound interest and the simple interest (in ₹), if the interest is compounded annually.

A. 20

B. 10



C. 30

D. 40

Q2 Annual Compounding

At what rate of interest per annum will a sum of money become 40 times its original amount in 2 years, if the interest is compounded annually? (Give your answer correct to one decimal place.)

A. 532.5%



B. 537.9%

C. 529.3%

D. 538.3%

Q3 Basic TSD

Kaushal travelled for 24 hours 56 minutes at the speed of 90 km/h. At what speed (in km/h) should he travel to cover the same distance in 17 hours?

A. 135

B. 132



C. 131

D. 130

Q4 CP-SP Relation

A vendor buys lemons at the rate of 28 for ₹1. How many lemons should he sell for ₹1 to earn a profit of 75%?

A. 18

B. 16



C. 20

D. 17

Q5 Combined Work Rate

Nitin can prepare one wooden shoe-stand in 2 days, and Pravin can prepare the same shoe-stand in 4 days. If they work together, in how many days will they prepare 117 shoe-stands?

A. 158

B. 160

C. 156



D. 152

Q6 Dividing Quantity in Ratio

A bag contains 50-paise, ₹1, and ₹2 coins in the ratio 2 : 5 : 8. If the total value of all the coins is ₹352, find the total number of coins in the bag.

A. 260

B. 240



C. 215

D. 235

Q7 False Weight

A dishonest dealer professes to sell his goods at C.P, but he cheats by 7% while purchasing and 9% while selling. What percent of profit does he gain?

A. 14%

B. 12.25%

C. 17.20%

D. 16.63%



Q8 Find SI

Find the simple interest (in ₹) on ₹1,500 at an interest rate of 3% per month in 4 months.

A. 15

B. 35

C. 30

D. 180



Q9 Percentage Increase/Decrease

The expenditure of Sudha is 150% more than her savings. If her expenditure decreases by 3% and savings increase by 21.5%, then by what percent does her income increase?

A. 1%

B. 4% ✓

C. 6%

D. 3%

Q10 Rules for 2,3,4,5,6

What is the least value that must be assigned to A so that the number 604A4744 is divisible by 3?

A. 1 ✓

B. 4

C. 7

D. 8

Q11 Successive Discount

The marked price of a cooker is same at four shops I, II, III and IV. Shop I allows two successive discounts of 66% and 81%, shop II allows successive discounts of 42% and 41%, shop III allows successive discounts of 57% and 99% and shop IV allows successive discounts of 35%, 32% and 15% on the marked price of the cooker. Which shop is selling the cooker at the lowest price?

A. IV

B. III ✓

C. I

D. II

Q12 Train Problems

Two trains, P and Q, start from stations S and T towards each other. They take 4 hours 48 minutes and 3 hours 20 minutes to reach T and S, respectively. If train P is running at 45 km/hr, then the speed of train Q is:

A. 60 km/hr

B. 45 km/hr

C. 50 km/hr

D. 54 km/hr ✓

Q13 Two Persons Age Relation

10 years ago, Elephant was five times older than Giraffe. Five years from now, the age of Elephant will be twice the age of the Giraffe. What was the sum of the age of Elephant and Giraffe five years ago?

A. 35 years

B. 50 years

C. 45 years

D. 40 years ✓

Q14 Weighted Average

In a class, the average score of 25 students is 80. If the average score of 15 of these students is 85, what is the average score of the remaining students?

A. 72

B. 72.5 ✓

C. 73

D. 73.5

Q15 $(a+b)^2$, $(a-b)^2$

Find the value of $x + \frac{1}{x}$ if $\sqrt{x} + \frac{1}{\sqrt{x}} = 3$.

A. 9

B. 11

C. 7 ✓

D. 5



Q16 Circle Area & Circumference

The radius of a circle inscribed in a square is $5\sqrt{7}$ cm. Find the area (in cm^2) of the circumcircle.

(Use $\pi = \frac{22}{7}$)

- A. 550
- B. 1,000
- C. 1,155
- D. 1,100

**Q17** Mean Price

A shopkeeper mixes two types of rice to sell as a single blend.

He mixes 4 kg of Basmati rice priced at ₹120 per kg with 6 kg of Sona Masuri rice priced at ₹80 per kg.

At what price per kg should he sell the mixture to make no profit or loss?

- A. ₹100
- B. ₹90
- C. ₹88
- D. ₹96

**Q18** Mean of Grouped Data

If the mean of the following data is 47, then what is the value of x?

Class	20-30	30-40	40-50	50-60	60-70
Frequency	44	50	16	20	x

- A. 80
- B. 66
- C. 68
- D. 61

**Q19** Order of Operations

Find the value of y, if $29 \times 6 \times 780 \div \sqrt{2704} = y + 602$

- A. 2016
- B. 1998
- C. 2008
- D. 2007



Q20 Pythagorean Identities

If $X = \frac{1 + \sec\theta + \tan\theta}{2\tan\theta}$, then the value of $\frac{\sec\theta - 1 + \tan\theta}{\sec\theta + \tan\theta}$ is:

A. X

B. $1 + X^2$

C. $\frac{1}{X}$



D. $1 + \frac{1}{X}$

Q21 Rectangle & Square

The perimeter of a square is 28 cm, find its area.

A. 64 cm^2

B. 28 cm^2

C. 84 cm^2

D. 49 cm^2

**Q22** Sphere & Hemisphere

The surface area of a sphere is numerically equal to the volume of a hemisphere of radius $\frac{R}{2}$ cm. If the surface area of the sphere is $v \text{ cm}^2$, then find the value of $\left(\frac{12v}{\pi}\right)^{\frac{1}{3}}$ in terms of R .

A. R^2

B. R^3

C. $2R$

D. R

**Q23** Trigonometric Identities

If $4\cot A = 2$, then find the value of $\frac{1 - \tan^2 A}{1 + \tan^2 A}$.

A. $\frac{3}{5}$

B. $\frac{3}{4}$

C. $\frac{-3}{4}$

D. $\frac{-3}{5}$



Q24 Two Items Mixing

Rahul sells fruit juice by mixing fruit and water in the ratio of 17 : 8. Since Rahul's juice tastes good, mixture by mixing m litres of water with 153 litres of fruit, following Rahul's recipe. Find the value of m.

A. 9

B. 5

C. 3

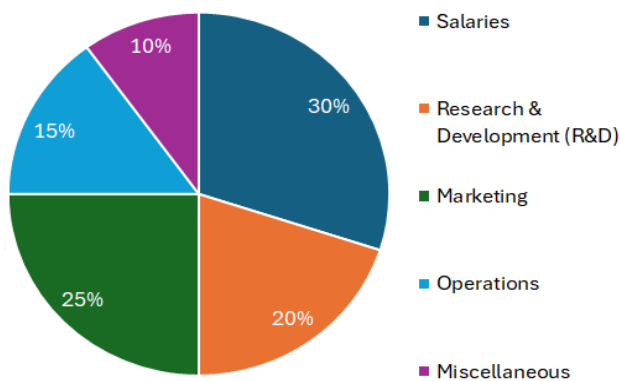
D. 6



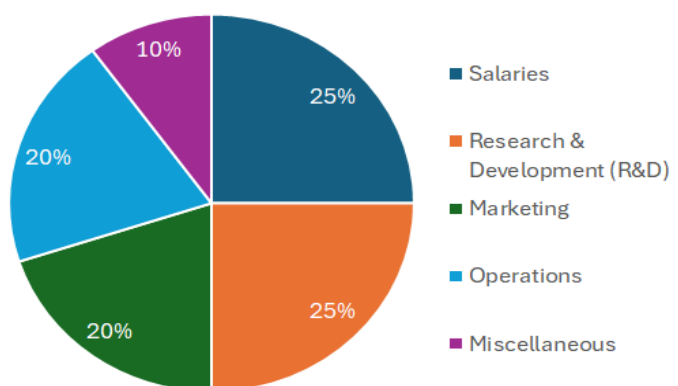
Q25 Year-on-Year Comparison

The two pie charts show the distribution of annual expenditure of a company for 2023 and 2024. The total expenditure was ₹4 crore in 2023 and ₹5 crore in 2024.

Pie Chart (2023)



Pie Chart (2024)



Which category recorded the highest increase in expenditure from 2023 to 2024?

A. Operations

B. Salaries

C. Marketing

D. Research & Development (R&D)



Mathematics

25 Questions • Answer Key

Q1 Annual Compounding

At what rate of interest per annum will a sum of money become 57 times its original amount in 2 years, if the interest is compounded annually? (Round off your answer to the nearest integer.)

A. 653%

B. 660%

C. 655%



D. 662%

Q2 Average Speed

A car starts at a speed of 52 km/hr and increases its speed for every 30 minutes by 7 km/hr. Find the average speed (in km/hr) of the car for 3 hours.

A. 70.2

B. 69.5



C. 65.6

D. 60.8

Q3 Boat and Stream

S1, S2 and S3 are three shops in a straight line on a river, which flows at a constant speed from S1 towards S3. S2 is equidistant between S1 and S3. Seerat rows his boat to purchase an item from S1 to S2 and back in 12.5 hours and he can row from shop S1 to S3 in 9.5 hours. Compare the speed of his boat in still water to that of the river.

A. 25 : 6



B. 8:1

C. 8:3

D. 25 : 8

Q4 Combined Work Rate

Varun can prepare one wooden table in 2 days, and Ashish can prepare the same table in 4 days. If they work together, in how many days will they prepare 123 tables of the same kind?

A. 166

B. 164



C. 168

D. 160

Q5 Find SI

Find the simple interest (in ₹) on ₹1,500 at an interest rate of 3% per month in 3 months.

A. 31.25

B. 11.25

C. 135



D. 22.50

Q6 Finding Present Age

A's age is 5 years more than twice B's age. If B is 8 years old, what is A's age?

A. 18 years

B. 16 years

C. 21 years



D. 19 years

Q7 Finding Ratio

In what ratio must rice at ₹20/kg be mixed with rice at ₹30/kg so that the average price is ₹25/kg?

A. 3 : 2

B. 1 : 1



C. 5 : 3

D. 2 : 3

Q8 Finding Value from Percentage

In an election between two candidates, 18% of the registered voters did not cast their votes, and 750 of the votes cast were declared invalid. The winning candidate secured 70% of the valid votes and won by a margin of 4,620 votes. Find the total number of registered voters.

A. 15,600

B. 16,200

C. 16,700

D. 15,000



Q9 Parallelogram & Rhombus

The diagonals of a rhombus measure 30 cm and 40 cm. Find the area and perimeter of the rhombus.

- A. Perimeter = 100 cm, Area = 500 cm²
- B. Perimeter = 140 cm, Area = 800 cm²
- C. Perimeter = 130 cm, Area = 700 cm²
- D. Perimeter = 100 cm, Area = 600 cm² ✓

Q10 Percentage Increase/Decrease

The expenditure of Sudha is 150% more than her savings. If her expenditure decreases by 12% and savings increase by 37%, then by what percent does her income increase?

- A. 7%
- B. 5%
- C. 2% ✓
- D. 3%

Q11 Prime & Composite Numbers

Which of the following number pairs is NOT co-prime?

- A. (137, 221)
- B. (143, 286) ✓
- C. (211, 337)
- D. (101, 107)

Q12 Profit/Loss Percentage

A vendor bought lemons at 28 for a rupee. How many must he sell for a rupee to gain 40%?

- A. 21
- B. 22
- C. 20 ✓
- D. 24

Q13 Rules for 7,8,9,11

What is the value that must be assigned to A so that the number 391A6922 is divisible by 11?

- A. 7
- B. 3 ✓
- C. 6
- D. 5

Q14 Simple Ratio Partnership

Rishabh and Neha started a business together. Rishabh invested ₹21,000 and Neha invested ₹35,000. At the end of two years, they earned a profit of ₹10,000. Find the share of Neha in the total profit.

- A. ₹6,205
- B. ₹6,025
- C. ₹6,520
- D. ₹6,250 ✓

Q15 Successive Discount

The marked price of a cooker is same at four shops I, II, III and IV. Shop I allows two successive discounts of 12% and 37%, shop II allows successive discounts of 54% and 63%, shop III allows successive discounts of 28% and 83% and shop IV allows successive discounts of 19%, 59% and 25% on the marked price of the cooker. Which shop is selling the cooker at the lowest price?

- A. I
- B. III ✓
- C. IV
- D. II

Q16 Two Successive Changes

Arvind's income at first increased by 19% and later on increased again by 10%. Find the total percentage increase.

- A. 28.2%
- B. 30%
- C. 30.9% ✓
- D. 29%

Q17 Ungrouped Data Median

The following numbers are given in ascending order of their magnitudes.

20, 22, 25, 30, $x - 11$, $x - 8$, $x - 3$, 52, 60 and 68. Find the value of x if the median of the data is 39.

- A. 48.5 ✓
- B. 46.7
- C. 44.6
- D. 43.5



Q18 Volume

A cylindrical tank of radius 7 cm contains water up to a height of 20 cm. This water is poured into another cylindrical tank of radius 14 cm. What is the height of water in the second tank?

A. 8 cm

B. 5 cm



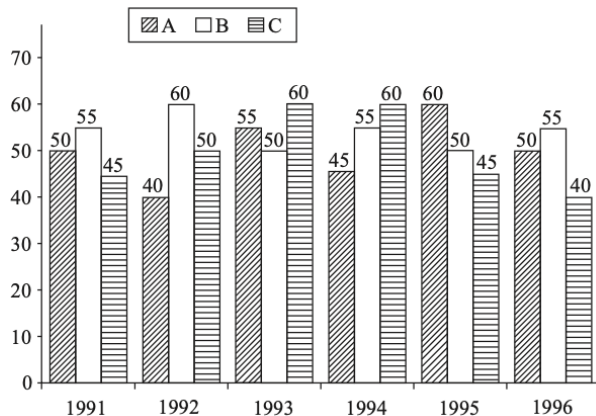
C. 6 cm

D. 7 cm

Q19 Bar Graph

Study the given graph carefully and answer the question that follows.

Production of scooters by three companies in a year (in 1000s)



What is the percentage decrease in production of scooters of company B from 1992 to 1993 rounded off to one decimal place?

A. 16.7%



B. 17.2%

C. 19.2%

D. 18.3%

Q20 Congruence & Similarity

$\triangle DEF$ and $\triangle XYZ$ are two triangles such that $\triangle XYZ \cong \triangle FDE$. If $XY = 23$ cm $\angle Y = 68^\circ$ and $\angle X = 43^\circ$, then which of the following options is correct?

A. $DE = 23$ cm, $\angle E = 69^\circ$

B. $DE = 23$ cm, $\angle D = 69^\circ$

C. $DF = 23$ cm, $\angle E = 69^\circ$



D. $DF = 23$ cm, $\angle D = 69^\circ$



Q21 Laws of Indices

If $3^{(n+1)} = 27 \times 9^n$, find the value of n .

A. 2

B. -2



C. 6

D. 4

Q22 Mean of Grouped Data

What is the value of $(7x + 4y)$, if mean of the following distribution is 53?

Class	0-20	20-40	40-60	60-80	80-100	Total
Frequency	2	10	x	4	y	40

A. 144



B. 124

C. 133

D. 154

Q23 Pythagorean Identities

Simplify: $\frac{\cot A + \operatorname{cosec} A - 1}{\cot A - \operatorname{cosec} A + 1}$

A. $\frac{\cos A}{\sin A}$

B. $\frac{1 + \cos A}{\sin A}$



C. $\frac{1 - \cos A}{\sin A}$

D. $\frac{1 - \operatorname{cosec} A}{1 + \operatorname{cosec} A}$

Q24 Pythagorean Identities

If $\sec \alpha + \tan \alpha = 9$, then $\tan \alpha$ is:

A. $\frac{81}{80}$

B. $\frac{80}{81}$

C. $\frac{9}{40}$

D. $\frac{40}{9}$



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Q25 Ratio Simplification

If the value of A:B:C is 3:5:6, then $\frac{A}{B} : \frac{B}{C} : \frac{C}{A}$ is equal to:

A. 12:34:65

B. 15:25:62

C. 18:25:60



D. 12:25:55



Mathematics

25 Questions • Answer Key

Q1 Annual Compounding

A certain amount of money grows to ₹752 at the end of 20 years and to ₹7,896 at the end of 21 years at a fixed annual compound interest rate. Find the annual rate of compound interest.

- A. 9.5%
- B. 8.5%
- C. 950%
- D. 850%



Q2 Area/Volume Error

In measuring the sides of a rectangular park, if one side is taken 6% in excess and the other is taken 5% in deficit, what is the error percent in the area calculation?

- A. 0.7% increase
- B. 0.7% decrease
- C. No change
- D. 0.2% increase



Q3 Combined Work Rate

Ashok can prepare one wooden chair in 2 days and Robin can prepare the same chair in 4 days. If they work together, in how many days will they prepare 120 chairs of the same kind?

- A. 164
- B. 160
- C. 162
- D. 156



Q4 Cost with Overhead Expenses

Renu purchased an old scooter for ₹14,500 and spent ₹3,500 on its repair. Then he sold it at a profit of ₹3,500 to Rohit. Rohit got the scooter painted for ₹1,200 and sold it to Mukesh at 10% profit. What amount did Mukesh pay for the scooter?

- A. ₹24,970
- B. ₹24,530
- C. ₹23,840
- D. ₹25,240



Q5 Crossing Bridge/Platform

A train passes a station platform in 70 seconds and a man standing on the platform in 40 seconds. If the speed of the train is 90 km/hr, calculate the length of the platform.

- A. 780 m
- B. 760 m
- C. 750 m
- D. 720 m



Q6 Dividing Quantity in Ratio

A class has 60 students, and the ratio of boys to girls is 2:3. If 2 boys and 3 girls are added to the class, what is the new ratio of boys to girls?

- A. 3:2
- B. 4:3
- C. 2:3
- D. 3:4



Q7 Find SI

Find the simple interest (in ₹) on ₹1,500 at an interest rate of 3% per month in 5 months.

- A. 225
- B. 38.75
- C. 37.5
- D. 18.75



Q8 Median

The mean and the mode of a set of data are 65 and 79.7, respectively. Find the median of the data, using the empirical formula.

- A. 69.8
- B. 71.1
- C. 71.7
- D. 69.9



Q9 Order of Operations

Evaluate: $16 - 5 \times 3 + 18$

- A. 17
- B. 18
- C. 21
- D. 19

**Q10 Prime & Composite Numbers**

A molecular compound contains atoms A and B, where their counts per molecule are the 5th and 7th prime numbers from starting, respectively. The compound consists of 10 identical molecules. After a reaction, the number of B atoms per molecule doubles, and C atoms (equal to the 3rd prime number from starting) are added. What is the total number of A, B, and C atoms in all 10 molecules after the reaction?

- A. 500
- B. 690
- C. 550
- D. 330

**Q11 Relative Speed**

Two persons, A and B, start from opposite ends of a 325 km road and travel toward each other. A's speed is 70 km/h and B's speed is 50 km/h. If A starts 30 minutes after B, how long after B's start will they meet?

- A. 4 h
- B. 6 h
- C. 5 h
- D. 3 h

**Q12 Rules for 2,3,4,5,6**

What is the least value that must be assigned to A so that the number 469A1423 is divisible by 3?

- A. 4
- B. 1
- C. 6
- D. 5

**Q13 Simple Ratio Partnership**

Three business partners, A, B, and C, agree to divide their total profit for a certain year in the ratios 3 : 4 : 5. If B's share was ₹24,000, what was the total profit of the business partners for the year?

- A. ₹56,000
- B. ₹64,000
- C. ₹72,000
- D. ₹76,000

**Q14 Successive Discount**

The marked price of a cooker is same at four shops I, II, III and IV. Shop I allows two successive discounts of 90% and 41%, shop II allows successive discounts of 19% and 65%, shop III allows successive discounts of 24% and 13% and shop IV allows successive discounts of 78%, 73% and 12% on the marked price of the cooker. Which shop is selling the cooker at the lowest price?

- A. I
- B. III
- C. IV
- D. II

**Q15 Two Persons Age Relation**

The mean of the present ages of a father and his son is 31 years. After 20 years, the father will be twice as old as his son. What is the ratio of the present ages of the son and the father?

- A. 2 : 5
- B. 5 : 21
- C. 3 : 7
- D. 7 : 24

**Q16 Volume**

The length, breadth and height of a cuboid are in the ratio of 8:5:3 and its total surface area is 1422 cm^2 . Find the volume of the cuboid.

- A. 3860 cm³
- B. 3520 cm³
- C. 3780 cm³
- D. 3240 cm³



Q17 Weighted Average

A school has two sections A and B, with 30 and 40 students, respectively. The average score in a Mathematics test of section A is 75, while the average score of section B is 80. What is the average score (rounded off to two decimal places) of the entire class?

A. 76.54

B. 78.53

C. 79.57

D. 77.86

**Q18 Arithmetic Mean**

The weights of 25 students are given below. Find the arithmetic mean of the data.

Weight	65	66	67	68	69
No. of Students	8	6	4	4	3

A. 56.84

B. 64.32

C. 66.52



D. 67.43

Q19 Centres of Triangle

The internal angular bisectors of angles A and B of $\triangle ABC$ intersect at O. If $\angle AOB = 94^\circ$, then find

A. 22°

B. 16°

C. 8°

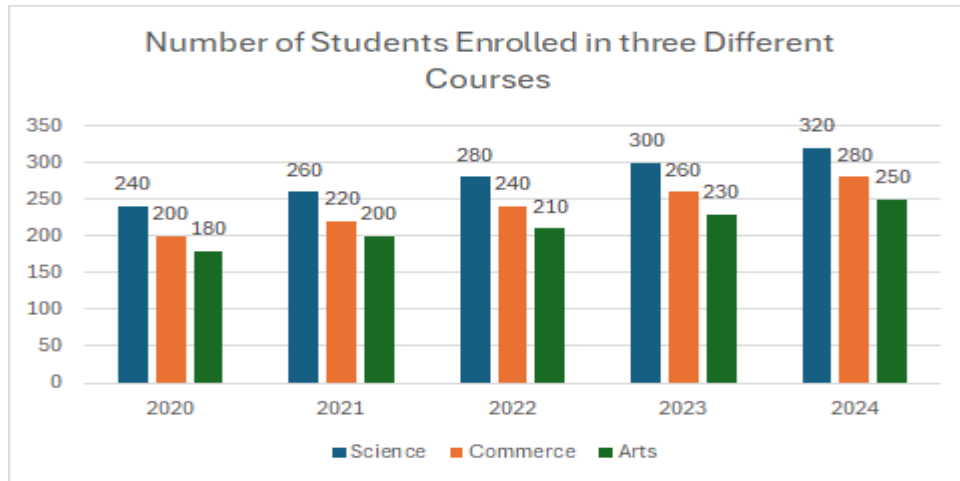


D. 24°



Q20 Comparative Analysis

The multiple bar graph below represents the number of students enrolled in three different courses (Science, Commerce and Arts) in a college over five years.



What was the average number of Commerce students enrolled over the given five years?

A. 242

B. 240



C. 244

D. 246

Q21 Curved Surface Area

A road roller makes 955 complete revolutions to level a road. If the roller has a diameter of 56 cm and a length of 0.8 m, what is the total area of the road covered?

(Take $\pi = \frac{22}{7}$)

A. 1117.56 m²

B. 1230.28 m²

C. 1344.64 m²



D. 1420.35 m²

Q22 Half-Yearly Compounding

In how many years will a sum of ₹64,000 at the rate of 10% per annum compounded semi-annually become ₹74,088?

A. $1\frac{1}{2}$



B. $2\frac{1}{4}$

C. $1\frac{1}{4}$

D. $2\frac{1}{2}$



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Q23 Pythagorean Identities

If $\frac{1 + \cos\theta}{1 - \cos\theta} = \frac{m^2}{n^2}$, then the value of $\left[\frac{m^2 + n^2}{mn} \right]$ is:

- A. $2 + \cos\theta$
- B. $(\sec\theta + \tan\theta)^2$
- C. $2\operatorname{cosec}\theta$
- D. $\operatorname{cosec}\theta + \cot\theta$

**Q24** Reciprocal Relations

If $\tan A + \cot A = 2$, then the value of $\tan^{\frac{3}{4}} A + \cot^{\frac{5}{9}} A$ is:

- A. 0
- B. 1
- C. 2
- D. -1

**Q25** Single Change

The cost of painting one of the rooms of Neha is ₹5000. Next year, the cost is increased to ₹5500. Find the percentage change.

- A. Increased by 10%
- B. Increase by 5%
- C. Increased by 0.1%
- D. Increase by 7.5%



Mathematics

25 Questions • Answer Key

Q1 Annual Compounding

The simple interest on a sum of money at 5% per annum for 3 years is ₹1,200. Find the compound interest on the same sum for the same period at the same rate, if interest is compounded annually.

- A. ₹1,621
- B. ₹1,612
- C. ₹1,216
- D. ₹1,261



Q2 Arithmetic

Kiran's monthly salary is ₹15,000. He spends ₹5,500 on house rent and ₹3,000 on utility bills, and saves the remaining amount each month. If, during his birthday month, he spends his entire monthly savings on his birthday celebration, find his total savings (in ₹) for the year.

- A. 71,500
- B. 65,000
- C. 58,500
- D. 78,000



Q3 Basic Proportionality Theorem

X and Y are the midpoints of sides AB and AC, respectively, of triangle ABC. If $BC = 9$ cm, $AB = 11$ cm and $AC = 14$ cm, then what is the ratio of the perimeters of trapezium XBCY to triangle ABC to triangle AXY?

- A. 26 : 17 : 34
- B. 26 : 34 : 17
- C. 17 : 26 : 34
- D. 34 : 17 : 26



Q4 Basic TSD

A train travels 20% faster than a car. Both start together from the same point and cover a distance of 72 km. The train stops for a total of 12 minutes on the way, but still reaches the destination at the same time as the car. Find the speed of the car.

- A. 70 km/hr
- B. 62 km/hr
- C. 60 km/hr
- D. 65 km/hr



Q5 Cost with Overhead Expenses

Arvind bought an article for ₹x. He sold it to Biru at a loss of 15%. Biru spent ₹122 on its transportation and sold it to Minu at a profit of 50%. If Minu bought it for ₹1968, then what is the value of x?

- A. 1200
- B. 1400
- C. 1800
- D. 1600



Q6 Even/Odd Number Series

The average of the first 8 consecutive even numbers starting from 24 is:

- A. 30
- B. 31
- C. 32
- D. 33



Q7 Find SI

Two banks, A and B, offered loans at 3.5% and 8.5% per annum, respectively. Akshay borrowed an amount of ₹4,60,000 from each bank. Find the positive difference between the amounts (in ₹) of simple interest paid to the two banks by Akshay after 3 years.

- A. 70,000
- B. 70,500
- C. 68,500
- D. 69,000



Q8 Finding Present Age

If two times the mother's present age is 27 years more than nine times her daughter's age, and five times the daughter's age is 8 year less than the mother's age, then what is the difference (in years) between the ages of the mother and the daughter?

- A. 52
- B. 57
- C. 49
- D. 47



Q9 HCF and LCM

What is the sum of the HCF and the LCM of 19 and 57?

- A. 57
- B. 66
- C. 76
- D. 95

**Q10 Half-Yearly Compounding**

A sum of ₹25,000 amounts to ₹29,160 in 1 year when the interest is compounded half-yearly. If the interest rate remains the same, how much interest will be earned on ₹18,000 in 1 year when the interest is compounded annually?

- A. ₹1,760
- B. ₹3,080
- C. ₹2,880
- D. ₹1,440

**Q11 Inverse Proportion**

If 35 machines can produce a certain number of items in 24 days, how many machines are required to produce the same number of items in 14 days?

- A. 60 machines
- B. 62 machines
- C. 58 machines
- D. 61 machines

**Q12 Mode**

The mean of a data is 33 and its median is 37. The mode (using empirical relation) of the data is:

- A. 58
- B. 16
- C. 108
- D. 45

**Q13 Proportion**

In a proportion, the first, second and third proportionals are respectively 6, 24 and 11. If the fourth proportional is $(x^2 - 7x)$, find the positive value of x .

- A. 44
- B. 11
- C. 28
- D. 4

**Q14 Round Trip**

A man can row at 9.5 km/h in still water. When the river flows at 2 km/h, it takes him 4 hours to row to a certain place and return. How far is the place? (Round off the answer to two decimal places.)

- A. 16.08 km
- B. 18.16 km
- C. 17.12 km
- D. 15.06 km

**Q15 Single Change**

Sheela earns ₹48,000 per month. She spends 75% of her income and saves the rest. If her expenditure increases by 10%, what will be her new monthly savings (in ₹)?

- A. 12,000
- B. 10,800
- C. 9,600
- D. 8,400

**Q16 Successive Discount**

A laptop is sold for ₹45,000 after two successive discounts of 25% and 20% on the marked price. Find the original marked price of the laptop.

- A. ₹72,000
- B. ₹68,000
- C. ₹78,000
- D. ₹75,000

**Q17 Volume**

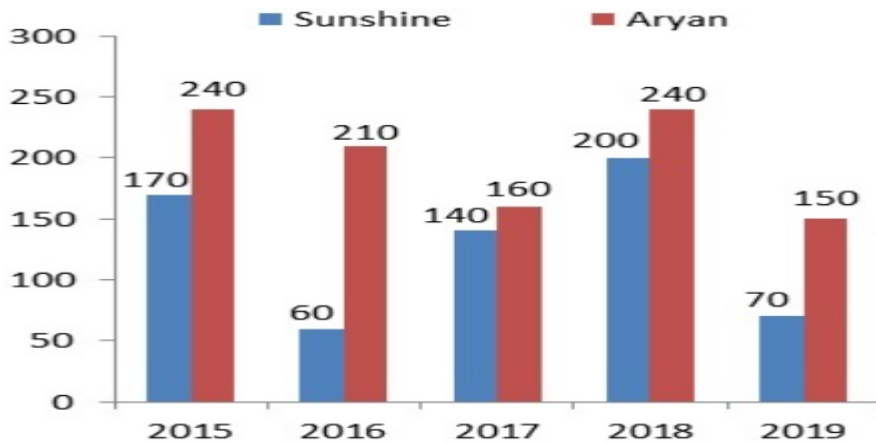
If the height of a cylinder is doubled and radius halved, what is the change in its volume with respect to the original one?

- A. Becomes half of the original
- B. Becomes one-fourth of the original
- C. Becomes double of the original
- D. Remains the same



Q18 Comparative Analysis

The given bar graph shows the total number of students enrolled each year from 2015 to 2019 in two different summer camps: Sunshine and Aryan.



The total number of students enrolled in Sunshine from 2016 to 2019 is what percentage more than the total number of students enrolled in Aryan in 2018 and 2019? (Round off your answer to two decimal places.)

A. 20.51%



B. 23.56%

C. 21.81%

D. 22.51%

Q19 Index Simplification

Simplify:

$$\frac{2^4 \times 3^{-3} \times 9^3}{6^2 \times 3^{-1}}.$$

A. 36



B. 24

C. 18

D. 48

Q20 Recurring Decimals

If the decimal number $0.\overline{15201}$ can be expressed in the form of $\frac{a}{b}$ where a and b are co-primes, then find the value of

$$\sqrt{b - a + 281}.$$

A. 98

B. 120



C. 105

D. 145



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Q21 Sequential Pipe Operation

Two pipes, A and B, can fill an empty water tank in 40 and 50 minutes, respectively. Pipe A is opened, and after 15 minutes pipe B is also opened. What is the time taken by both the pipes to fill the tank from the beginning?

A. $23\frac{4}{9}$ minutes

B. $28\frac{8}{9}$ minutes ✓

C. $24\frac{5}{9}$ minutes

D. $18\frac{8}{9}$ minutes

Q22 Trigonometric Identities

Find the value of $(\operatorname{cosec}\theta + \cot\theta) \times (1 - \cos\theta)$.

A. $\tan\theta$

B. $\cos\theta$

C. $\cot\theta$

D. $\sin\theta$ ✓

Q23 Trigonometric Identities

What is the value of $\frac{\sin\theta - \cos\theta + 1}{\sin\theta + \cos\theta - 1}$?

A. $\tan\theta - \sec\theta$

B. $\sec\theta + \tan\theta$ ✓

C. $\cot\theta - \operatorname{cosec}\theta$

D. $\cot\theta + \operatorname{cosec}\theta$

Q24 Ungrouped Data Median

The median of the following frequency distribution is:

x	1	2	3	4	5	6	7
f	8	10	11	16	20	25	15

A. 4

B. 5 ✓

C. 3

D. 6



Q25 Volume

The height and the slant height of a cone are 12 cm and 19 cm respectively. What is the volume of the cone? $\left(\text{Use } \pi = \frac{22}{7}\right)$

A. 2726 cm³

B. 2728 cm³



C. 2738 cm³

D. 2719 cm³



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Mathematics

25 Questions • Answer Key

Q1 Age in Ratio Form

The present ages of a father and his son are in the ratio 9 : 4. After 10 years, the ratio of their ages will be 11 : 6. What is the father's present age?

- A. 36 years
- B. 54 years
- C. 45 years
- D. 27 years



Q2 Annual Compounding

At what rate per cent per annum will a certain sum of money multiply itself by 4 times in 2 years, interest being compounded annually?

- A. 75
- B. 100
- C. 50
- D. 200



Q3 Basic CI Calculation

What is 24% of the sum of the compound interest earned on ₹12,500 at 10% per annum for 2 years and the simple interest earned on ₹47,500 at 13% per annum for 2 years?

- A. ₹2,596
- B. ₹2,594
- C. ₹3,594
- D. ₹3,596



Q4 Basic TSD

Kaushal travelled for 23 hours 30 minutes at the speed of 52 km/h. At what speed (in km/h) should he travel to cover the same distance in 13 hours?

- A. 94
- B. 95
- C. 92
- D. 93



Q5 CP-SP Relation

Rajat sells a property to his friend at 10% loss. If the friend sells it for 10,80,000 and gains 20%, then for how much did Rajat buy the property?

- A. 9,00,000
- B. 9,20,000
- C. 10,00,000
- D. 9,80,000



Q6 Combined Work Rate

Veer can prepare one wooden table in 2 days, and Manoj can prepare the same table in 4 days. If they work together, in how many days will they prepare 111 tables?

- A. 152
- B. 144
- C. 148
- D. 150



Q7 Family Age Problems

The ratio of the ages of Aisha and her mother is 2 : 5, and the ratio of the ages of Aisha's mother to her brother is 7 : 1. If Aisha's brother is 9 years younger than Aisha, what was Aisha's mother's age five years ago?

- A. 30 years
- B. 35 years
- C. 40 years
- D. 25 years



Q8 Find SI

Find the simple interest (in ₹) on ₹1,500 at an interest rate of 3% per month in 7 months.

- A. 46.25
- B. 315
- C. 52.5
- D. 26.25



Q9 Finding LCM

The LCM of 48 and 68 is

A. 684

B. 816



C. 864

D. 786

Q10 Mean of Grouped Data

Which of the following shows relation between x and y for the given data if mean of the data is 30?

Class Interval	Frequency
0-10	2
10-20	4
20-30	x
30-40	y
40-50	3

A. $x = y + 10$

B. $y = x + 10$

C. $x = y + 13$

D. $y = x + 13$

**Q11 Percentage Increase/Decrease**

The length of a rectangle is increased by 40%. By what percentage must the breadth be decreased to keep the area constant? (Rounded off to 2 decimal places)

A. 28.57%



B. 30.57%

C. 27.57%

D. 31.57%

Q12 Prime & Composite Numbers

What is the sum of all prime numbers between 0 and 32?

A. 132

B. 131

C. 161

D. 160

**Q13 Rules for 2,3,4,5,6**

What is the least value that must be assigned to A so that the number 506A2404 is divisible by 3?

A. 4

B. 0



C. 3

D. 6

Q14 Successive Discount

The marked price of a cooker is the same at four shops I, II, III and IV. Shop I allows two successive discounts of 46% and 13%, shop II allows successive discounts of 55% and 69%, shop III allows successive discounts of 47% and 68% and shop IV allows successive discounts of 91%, 98% and 18% on the marked price of the cooker. Which shop is selling the cooker at the lowest price?

A. I

B. III

C. II

D. IV

**Q15 Time-based Partnership**

A and B started a business in partnership by investing ₹20,000 and ₹15,000, respectively. After six months, C joined them with ₹20,000. What will be B's share in the total profit of ₹20,000 earned at the end of 2 years from the start of the business?

A. ₹7,200

B. ₹5,400

C. ₹6,000



D. ₹6,800

Q16 Two Successive Changes

A car was originally priced at ₹5,00,000. After a 12% price increase, it is now being sold for ₹5,60,000. If the price is further decreased by 5%, what is the final price of the car?

A. ₹5,25,000

B. ₹5,30,000

C. ₹5,32,000



D. ₹5,35,000



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Q17 Two Variables (Simultaneous)

The sum of two numbers is 1040. If the bigger number is decreased by 4% and the smaller number is increased by 12%, then the numbers obtained are equal. Find the two numbers.

A. 500, 640

B. 560, 480

C. 600, 440

D. 520, 520

Q18 Upstream/Downstream

A boat travels 45 km upstream in 9 hours and 72 km downstream in 6 hours. Find the speed of the stream.

A. 3.5 km/hr

B. 2.5 km/hr

C. 1.5 km/hr

D. 2 km/hr

Q19 Weighted Average

The average score of a cricketer in four matches is 45 and in six other matches is 65. Find the average score in all ten matches.

A. 56

B. 57

C. 58

D. 55

Q20 Full Circle

The sides of a rectangular field are 35 m and 110 m long. Its area is equal to the area of a circular field. What is the perimeter (in m) of the circular field?

(Take $\pi = \frac{22}{7}$)

A. 189

B. 227

C. 222

D. 220

Q21 Mean of Grouped Data

If the mean of the following data is 46, then what is the value of x?

Class	10-20	20-30	30-40	40-50	50-60
Frequency	24	16	25	49	x

A. 181

B. 156

C. 147

D. 137



Q22 Pythagorean Identities

If $\operatorname{cosec}^2 \theta + \cot^2 \theta = \frac{7}{2}$, $0^\circ < \theta < 90^\circ$, then find the value of $\sqrt{5} \cos \theta + \sin \theta$.

A. $\frac{7}{3}$



B. $\frac{3}{5}$

C. $\frac{5}{3}$

D. $\frac{3}{7}$

Q23 Quadrilaterals

In quadrilateral PQRS, $\angle P = 105^\circ$, $\angle Q = 65^\circ$ and $\angle R = \angle S$. Find the measure of $2\angle P + \angle S$ –

A. 240°



B. 205°

C. 183°

D. 259°

Q24 Trigonometric Identities

Find the value of $\frac{(\sin A + \cos A)^2 - (\sin A - \cos A)^2}{(1 + \sin A)(1 - \cos A) - (\sin A - \cos A) - 1}$.

A. -3

B. 4

C. 3

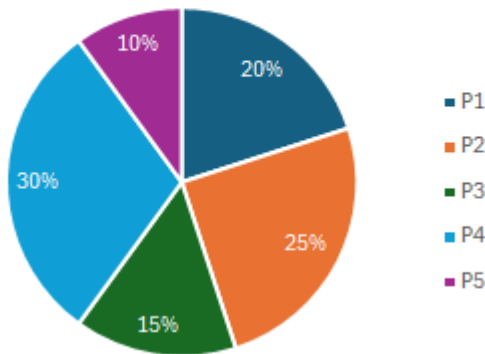
D. -4



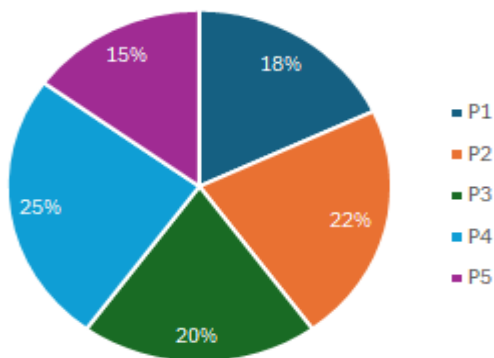
Q25 Year-on-Year Comparison

A company sells five products: P1, P2, P3, P4, and P5. The two pie charts show percentage contribution to total sales revenue in 2023 and 2024. Study the pie charts and answer the question that follows.

Pie Chart 1 – 2023 (Total Revenue ₹200 crore)



Pie Chart 2 – 2024 (Total Revenue ₹240 crore)



What percentage of the combined two-year total revenue was earned from P2 (rounded off to two decimal places)?

A. 26.08%

B. 23.36%

C. 24.11%

D. 25.52%



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Mathematics

25 Questions • Answer Key

Q1 Annual Compounding

A sum of ₹30,000 is invested in each of two different schemes for 2 years. The first scheme offers compound interest at 8% per annum, compounded annually, while the second scheme offers compound interest at 6% per annum, compounded annually. Find the difference between the compound interest earned from the two schemes.

A. ₹1284



B. ₹1087

C. ₹1344

D. ₹1210

Q2 Annual Compounding

At what rate percent per annum will a certain sum of money multiply itself by 9 times in 2 years, the interest being compounded annually?

A. 75

B. 100

C. 200



D. 150

Q3 Average of Series

The mean of n observations 1, 4, 9, 16, ..., n^2 is 130. What is the value of n ?

A. 15

B. 19



C. 20

D. 13

Q4 Basic TSD

Kaushal travelled for 16 hours 15 minutes at the speed of 64 km/h. At what speed (in km/h) should he travel to cover the same distance in 10 hours?

A. 106

B. 105

C. 104



D. 103

Q5 Combined Work Rate

Krish can prepare one wooden wardrobe in 2 days, and Moksh can prepare the same wardrobe in 4 days. If they work together, in how many days will they prepare 114 wardrobes?

A. 148

B. 156

C. 154

D. 152



Q6 Congruence & Similarity

In ΔABC , D, E and F are the mid-points of sides AB, BC and CA, respectively. Four triangles, ΔADF , ΔBDE , ΔCEF and ΔDEF are formed by using A, B, C, D, E and F.

The following observations are made about these four triangles.

- All the four triangles have equal perimeter.
- All the four triangles have equal area.

Which of the following is true regarding the given observations?

A. Both (i) and (ii) are true.



B. Neither (i) nor (ii) is true.

C. Only (i) is true.

D. Only (ii) is true.

Q7 Find SI

Find the simple interest (in ₹) on ₹1,500 at an interest rate of 3% per month in 6 months.

A. 45

B. 270



C. 42.5

D. 22.5

Q8 Laws of Indices

If $x = 5^3 \times 5^2$, then what is the value of $x \div 5^4$?

A. 25

B. 15

C. 10

D. 5



Q9 MP with Discount and Profit

A trader marks his goods at 45% above the cost price and allows a discount of 17% on it. If he gains $x\%$, then value of x is:

- A. 19.35
- B. 22.35
- C. 21.35
- D. 20.35

**Q10 Ratio Comparison**

Which of the following ratios is the greatest?

- A. 7:10
- B. 4:5
- C. 5:7
- D. 3:4

**Q11 Ratio Simplification**

Three-fifths of a certain number is equivalent to 70% of another number. What is the ratio of the first number to the second number?

- A. 5 : 6
- B. 4 : 5
- C. 6 : 7
- D. 7 : 6

**Q12 Round Trip**

A ship takes 15.5 hours for travelling downstream from point M to point N and coming back to a point P midway between M and N. If the speed of the stream is 3.5 kmph and the speed of the ship in still water is 11.5 kmph, what is the distance between M and N?

- A. 105 km
- B. 110 km
- C. 118 km
- D. 120 km

**Q13 Rules for 2,3,4,5,6**

What is the least value that must be assigned to A so that the number 659A9422 is divisible by 3?

- A. 2
- B. 7
- C. 4
- D. 1

**Q14 Simple Mean**

The average marks of 21 students is 32. If the first 10 students' average marks is 30 and the last 10 students' average marks is 31, find the marks of the 11th student.

- A. 60
- B. 62
- C. 65
- D. 64

**Q15 Successive Discount**

The marked price of a cooker is the same at four shops I, II, III and IV. Shop I allows two successive discounts of 97% and 13%, shop II allows successive discounts of 43% and 31%, shop III allows successive discounts of 73% and 14% and shop IV allows successive discounts of 97%, 83% and 24% on the marked price of the cooker. Which shop is selling the cooker at the lowest price?

- A. III
- B. II
- C. IV
- D. I

**Q16 Two Persons Age Relation**

Two years ago, Rohit's age was four times that of his son. Five years from now, the ratio of Rohit's age to his son's age will be 5 : 2. What will be the age of his son five years from now?

- A. 18 years
- B. 9 years
- C. 13 years
- D. 14 years

**Q17 Two Successive Changes**

Income of Peter was ₹6,000. The company he worked for came under loss and his salary was reduced by 20%. After a year, the company gave him a 30% increase on the reduced income. Compare Peter's final income with his original income and calculate by how much more or less his final income is.

- A. Less by ₹200
- B. Less by ₹240
- C. More by ₹240
- D. More by ₹200



Q18 Cylinder

A hollow cylindrical pipe is 40 cm long. Its external radius is 8 cm and internal radius is 3 cm. If the material costs ₹1 per cm^3 , then find the cost of the pipe (₹). (Use $\pi = 3.14$)

A. ₹6908



B. ₹6788

C. ₹6160

D. ₹6645

Q19 Full Circle

The sides of a rectangular field are 63 m and 22 m long. Its area is equal to the area of a circular field. What is the perimeter (in m) of the circular field?

(Take $\pi = \frac{22}{7}$)

A. 132



B. 152

C. 146

D. 119

Q20 Mean of Grouped Data

What is the value of $(6x + 9y)$, if mean of the following distribution is 50?

Class	0-20	20-40	40-60	60-80	80-100	Total
Frequency	9	16	x	2	y	70

A. 306



B. 297

C. 312

D. 301

Q21 Single Change

The price of an article becomes ₹18,000 when increased by 12.5%. Find the original income of the

A. ₹20,000

B. ₹18,000

C. ₹16,000



D. ₹14,000

Q22 Surds and Indices

If $x = \sqrt{36} + (5)^2$, then find the value of x.

A. 32

B. 30

C. 31



D. 28



Q23 Trigonometric Identities

Simplify $(2\cos^2 A - 1) \left(\frac{1 + \tan A}{1 - \tan A} + \frac{1 - \tan A}{1 + \tan A} \right)$.

A. $2\tan^2 A$

B. $2\cos^2 A$

C. 1

D. 2

**Q24** Trigonometric Identities

Find the value of $\sqrt{\frac{\tan \theta + \sin \theta}{\tan \theta - \sin \theta}} - \operatorname{cosec} \theta$.

A. $\operatorname{cosec} \theta - \cot \theta$

B. $\operatorname{cosec} \theta$

C. $\operatorname{cosec} \theta + \cot \theta$

D. $\cot \theta$

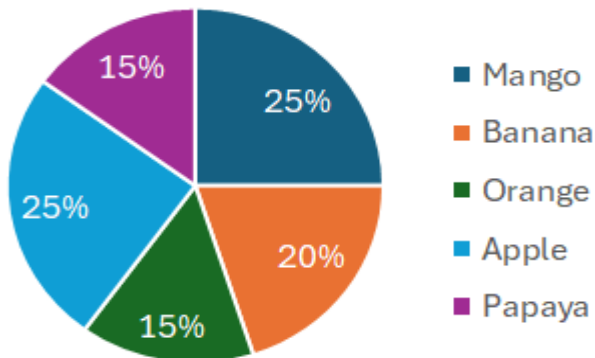
**Q25** Year-on-Year Comparison

The two given pie charts show the distribution of production (in tonnes) of different fruits in a farm for Year 2023 and Year 2024. Total production:

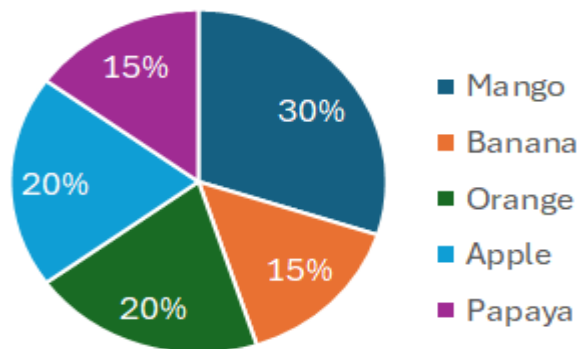
2023 → 2400 tonnes

2024 → 3000 tonnes

Pie Chart (2023)



Pie Chart (2024)



The production of which fruit increased by the highest percentage from 2023 to 2024?

A. Mango

B. Banana

C. Papaya

D. Orange



Mathematics

25 Questions • Answer Key

Q1 2-Year Difference

The difference between the compound interest (compounded annually) and the simple interest if ₹21400 is deposited at 5% rate of interest per annum for 2 years is:

A. ₹46.60

B. ₹56.50

C. ₹53.50



D. ₹56.40

Q2 Area/Volume Error

If the volume of a solid sphere is increased by 119.7%, find the percentage increase in its surface area.

A. 56%

B. 69%



C. 81%

D. 76%

Q3 Arithmetic

Keshav's monthly salary is ₹15,000. He spends ₹5,500 on house rent and ₹2,500 on utility bills and saves the remaining amount each month. If, during his birthday month, he spends his entire monthly savings on his birthday celebration, find his total savings (in ₹) for the year.

A. 70,000

B. 77,000



C. 84,000

D. 63,000

Q4 Basic TSD

Anusha covers a certain distance between her home and college by car. At a speed of 35 km/hr, she is late by 20 minutes. However, at a speed of 45 km/hr, she reaches her college 10 minutes early. Find the distance between her home and college.

A. 76.65 km

B. 78.75 km



C. 72.25 km

D. 74.5 km

Q5 CP-SP Relation

A vendor buys 39 laptop bags for ₹33,033 and sells them at 32 for ₹27,552. How many laptop bags should be bought and sold, at this rate, to earn a total profit of ₹7,154?

A. 529

B. 501

C. 491

D. 511



Q6 Find Rate

The simple interest earned on three different sums is in the ratio 5 : 7 : 9. The sums are in the ratio 10 : 14 : 15, and the time periods are in the ratio 3 : 4 : 5. What is the ratio of the rates of interest?

A. 100 : 75 : 72



B. 100 : 78 : 64

C. 100 : 75 : 64

D. 100 : 78 : 72

Q7 Find SI

Two banks, A and B, offered loans at 3.5% and 8.5% per annum, respectively. Ashish borrowed an amount of ₹4,60,000 from each bank. Find the positive difference between the amounts (in ₹) of simple interest paid to the two banks by Ashish after 2 years.

A. 45,500

B. 46,000



C. 47,500

D. 47,000

Q8 Finding Present Age

If twice the mother's present age is 30 years less than six times her daughter's present age, and five times the daughter's present age is 55 years more than the mother's present age, then what is the difference (in years) between the present ages of the mother and the daughter?

A. 30

B. 25



C. 20

D. 27



Q9 Finding Ratio

In what ratio must rice costing ₹142 per kg be mixed with wheat costing ₹154 per kg to get a mixture worth ₹146 per kg?

A. 4:1

B. 4:3

C. 3:1

D. 2:1

**Q10 Finding Value from Percentage**

In an election contested by two candidates, 25% of the registered voters did not cast their votes, and 795 of the votes cast were declared invalid. The winning candidate secured 70% of the valid votes and defeated the other candidate by a margin of 3,600 votes. Find the total number of voters on the electoral roll.

A. 12,680

B. 12,090

C. 13,060



D. 13,456

Q11 HCF/LCM Word Problems

Three numbers are in the ratio 3 : 14 : 13, and their LCM is 5460. Their HCF is:

A. 59

B. 5

C. 10



D. 36

Q12 MP with Discount and Profit

A shopkeeper gains 25% by selling an item at a 37.5% discount on its marked price. If the cost price increases by 20% and the shopkeeper wishes to maintain the same profit percentage, what discount should he offer?

A. 22%

B. 24%

C. 25%



D. 23%

Q13 Mean Proportional

If 4, 8, x and 12 are in proportion, then what is the mean proportion between $(x + 3)$ and $(x + 30)$?

A. 14

B. 16

C. 18



D. 15

Q14 Mode

The mean of a data is 74 and its median is 88. The mode (using empirical relation) of the data is:

A. 116



B. 91

C. 34

D. 150

Q15 Relative Speed

A bus leaves Delhi for Jaipur traveling at 60 km/h. Two hours later, a car starts from Delhi towards Jaipur at 90 km/h on the same route. How long will it take the car to overtake the bus, and what distance from Delhi will the car meet the bus?

A. 4 hours, and 306 km

B. 4 hours, and 360 km



C. 3 hours, and 360 km

D. 4 hours, and 330 km

Q16 Single Change

The salary of Margaret is increased by 12%. If her new salary becomes ₹22,400, find the original salary of Margaret.

A. ₹20,000



B. ₹19,800

C. ₹21,500

D. ₹19,500

Q17 Weighted Average

During the first half of 2024, Sulekha consumed 2.2 kg of sugar on average each month (January to June). Over the course of 2024, she consumed 2.5 kg of sugar on average each month. Between July and December of 2024, her average sugar intake was:

A. 2.8 kg



B. 2.5 kg

C. 2.2 kg

D. 2.7 kg



Q18 Index Simplification

If $y = 25$, then find the value of $y^{\frac{3}{2}} + (40\% \text{ of } y) - 27^{\frac{2}{3}}$.

A. 123

B. 124

C. 126



D. 121

Q19 Laws of Indices

Simplify:

$$(5^3)^2 \div 5^2$$

A. 525

B. 625

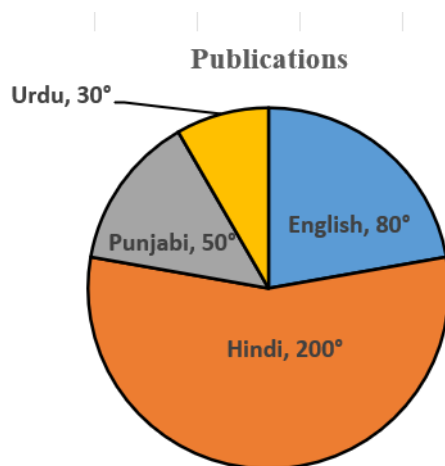


C. 125

D. 225

Q20 Percentage Based

The given pie chart shows the books published in English, Hindi, Punjabi and Urdu languages by a publishing house. In 2020, the publishing house published a total of 72 books in these languages. Books published in English, Punjabi and Urdu taken together is what percentage of books published in Hindi?



A. 100%

B. 125%

C. 95%

D. 80%



Q21 Properties of Triangles

In an isosceles triangle $\triangle ABC$, $AB = AC$. Each of the equal angles is 5° more than three – fourths of $\angle A$. Find the value of $(3\angle A - \angle B)$.

A. 75°

B. 120°

C. 148° ✓

D. 90°

Q22 Pythagorean Identities

Evaluate: $\frac{1}{\sec \theta - \tan \theta}$

A. $(\sec \theta - \tan \theta)$

B. $(2\sec \theta + 3\tan \theta)$

C. $(\sec \theta + \tan \theta)$ ✓

D. $(\sec \theta - 2\tan \theta)$

Q23 Simultaneous Fill & Empty

Two pipes, A and B, can fill a tank in 8 hours and 14 hours, respectively. A third pipe C, can empty the completely filled tank in 12 hours. If all three pipes are opened together in an empty tank, then how long (in hours) will it take to fill the tank?

A. $9\frac{1}{19}$

B. $8\frac{11}{19}$

C. $8\frac{16}{19}$ ✓

D. $8\frac{9}{19}$

Q24 Trigonometric Identities

Find the value of $\sqrt{\frac{\cot \theta + \cos \theta}{\cot \theta - \cos \theta}}$.

A. $\sec \theta \tan \theta$

B. $\sec \theta - \tan \theta$

C. $\tan \theta - \sec \theta$

D. $\sec \theta + \tan \theta$ ✓



Q25 Volume

The height and the slant height of a cone are 10 cm and 32 cm respectively. What is the volume of the cone? $\left(\text{Use } \pi = \frac{22}{7}\right)$

A. 9680 cm³



B. 9689 cm³

C. 9684 cm³

D. 9679 cm³



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Mathematics

25 Questions • Answer Key

Q1 Annual Compounding

Sakshi invested a sum of ₹8900 at 10% per annum compound interest, compounded annually. If she received an amount of ₹10,769 after n years, the value of n is:

A. 2



B. 1.5

C. 2.4

D. 3

Q2 CP-SP Relation

A vendor buys 19 laptop bags for ₹43,149 and sells them at 17 for ₹38,658. How many laptop bags should be bought and sold, at this rate, to earn a total profit of ₹5,487?

A. 1849

B. 1829



C. 1840

D. 1835

Q3 Direct Proportion

If 6 pencils cost ₹42, what will be the cost of 14 pencils?

A. ₹98



B. ₹84

C. ₹90

D. ₹100

Q4 Direct Proportion

The cost of 7 meters of cloth is ₹840. What will be the cost of 11 meters of the same cloth?

A. ₹1,320



B. ₹1,120

C. ₹1,200

D. ₹1,260

Q5 Discount

A shopkeeper offers the following schemes on toys of the same marked price.

(A) Successive discounts of 3% and 7% on any number of toys bought.

(B) Successive discounts of 8%, 39% and 26% on any number of toys bought.

(C) 11% discount on the first 4 toys and 32% discount on each toy thereon.

(D) 4 toys free of cost on buying 5 toys.

A customer wants to buy 5 toys. Which of the above schemes is the least beneficial to her?

A. B

B. A



C. D

D. C

Q6 Dividing Quantity in Ratio

The number 243 is divided into three parts such that half of the first part, one-third of the second part, and one-fourth of the third part are equal. Find the value of the largest part.

A. 98

B. 112

C. 108



D. 88

Q7 Divisibility Rules

The number 13167 is divisible by which of the following numbers?

A. 69

B. 63



C. 61

D. 67

Q8 Find SI

Two banks, A and B, offered loans at 3.5% and 8% per annum, respectively. Sachin borrowed an amount of ₹3,00,000 from each bank. Find the positive difference between the amounts (in ₹) of simple interest paid to the two banks by Sachin after 3 years.

A. 41,500

B. 42,000

C. 40,000

D. 40,500



Q9 Finding Present Age

If twice the mother's present age is 30 years less than six times her daughter's present age, and six times the daughter's present age is 75 years more than the mother's present age, then what is the difference (in years) between their present ages?

- A. 20
- B. 19
- C. 22
- D. 25

**Q10 Finding Value from Percentage**

The population of a district is 3,54,000, out of which 2,30,000 are males. 17% of the population is literate. If 17% males are literate, then what percentage of females are literate?

- A. 17%
- B. 16%
- C. 20%
- D. 15%

**Q11 Half-Yearly Compounding**

A student wants to invest a sum of ₹16,000 at an annual interest rate of 3% per annum compounded half yearly. Calculate the compound interest received after 2 years. [Given $(1.015)^4 = 1.0614$]

- A. ₹982.40
- B. ₹782.40
- C. ₹880.20
- D. ₹900.10

**Q12 Mean of Grouped Data**

In an office, there are 25 employees who travel to work every day. The time taken to commute to office is as follows.

Time taken (in minutes)	No. of employees
Less than 10	2
Less than 20	6
Less than 30	15
Less than 40	19
Less than 50	23
Less than 60	25

Calculate the mean time of commuting (in minutes).

- A. 32
- B. 29
- C. 15
- D. 21

**Q13 Melting & Recasting**

A solid cylindrical rod of radius 3 cm and height 12 cm is melted and recast into solid spheres each of radius 3 cm. How many such spheres can be made?

- A. 4
- B. 2
- C. 1
- D. 3

**Q14 Population Based Problems**

The population of a town is increased from 60,000 to 61,260. What is the percentage increase?

- A. 2.1%
- B. 2.0%
- C. 2.2%
- D. 2.3%

**Q15 Proportional Wages**

Three workers are hired to complete a job worth ₹1,200. Worker A can finish the job alone in 8 days, Worker B in 12 days, and Worker C in 16 days. With the help of a fourth worker, they finish the job in 3 days. How much should the fourth worker be paid from the total amount?

- A. ₹222
- B. ₹221
- C. ₹225
- D. ₹226

**Q16 Replacement in Group**

The average weight of 3 women is increased by 4 kg, when one of them whose weight is 102 kg, is replaced by another woman. What is the weight of the new woman?

- A. 116 kg
- B. 118 kg
- C. 112 kg
- D. 114 kg

**Q17 Rhombus Properties**

Which of the following statements about a rhombus is incorrect?

- A. The diagonals of a rhombus do not bisect the opposite angles.
- B. The diagonals of a rhombus intersect at right angles.
- C. Each side of a rhombus is equal in length.
- D. The opposite angles of a rhombus are equal.



Q18 Rules for 2,3,4,5,6

The 7-digit number 69A840B is divisible by 12, What is the maximum value of (A + B)?

A. 11

B. 16

C. 15



D. 10

Q19 Two Trains Crossing

Two trains, 200 m and 160 m long are running in opposite directions at speeds of 78 km/h and 66 km/h, respectively. In how much time will they completely cross each other from the moment they meet?

A. 8 seconds

B. 9 seconds



C. 7 seconds

D. 6 seconds

Q20 Basic TSD

Ramesh takes 10 hours longer than Suresh to cover a distance of 120 km. However, if Ramesh were to double his speed, he would take 8 hours less than Suresh. What is Ramesh's original speed?

A. $3\frac{1}{3}$ km/hr



B. $7\frac{5}{7}$ km/hr

C. $5\frac{1}{5}$ km/hr

D. $4\frac{3}{4}$ km/hr

Q21 Curved Surface Area

Mohini is making a cylindrical kaleidoscope for her science project using chart paper. If the kaleidoscope is 178 cm long and has a radius of 24.5 cm, what is the area of chart paper required to make only its curved surface? $\left(\text{Use } \pi = \frac{22}{7}\right)$

A. 27412 cm²



B. 27380 cm²

C. 27433 cm²

D. 27445 cm²

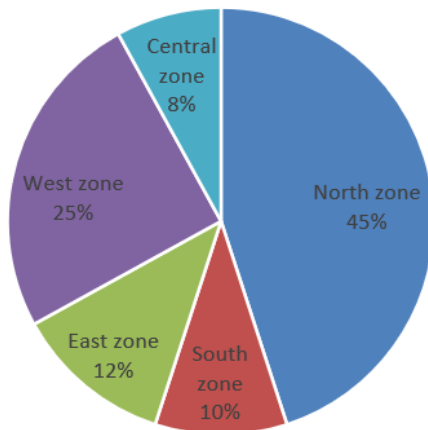


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Q22 Degree Based

The given pie chart represents the percentage of a particular company's mobile phone users in five different zones of India. Study the pie chart carefully and answer the question that follows.



What is the central angle made by the central zone in the pie chart?

- A. 26.2°
- B. 28.8°
- C. 27.4°
- D. 30.6°

**Q23** Pythagorean Identities

If $7\cos^2\theta + 5\sin^2\theta - 6 = 0$, ($0^\circ < \theta < 90^\circ$), then the value of $\sqrt{\frac{\sec\theta + \tan\theta}{\sec\theta - \tan\theta}}$ is:

- A. $\sqrt{2} + 1$
- B. $\sqrt{2} - 1$
- C. $-\sqrt{2}$
- D. $\sqrt{2}$

**Q24** Pythagorean Identities

Find the value of $\frac{1}{\sec x - \tan x}$.

- A. $\cos x - \cot x$
- B. $\sec x + \tan x$
- C. $\sec x - \tan x$
- D. $\cos x + \cot x$



Q25 Ungrouped Data Mode

The shirt size worn by a group of 280 persons is as follows:

Shirt Size	37	38	39	40	41	42	43	44
No. of persons	31	35	49	51	50	37	15	12

The modal shirt size worn by the group is:

A. 39

B. 42

C. 40



D. 41



Mathematics

25 Questions • Answer Key

Q1 Adding/Removing Element

The average seats secured by a political party in the last 5 elections is 23. If the party secures 47 seats in the current elections, find the new average seats secured by this political party in the six elections.

A. 27



B. 28

C. 29

D. 30

Q2 Annual Compounding

Suman invested a sum of ₹3,500 at 20% per annum compound interest, compounded annually. If she received an amount of ₹6,048 after n years, the value of n is:

A. 3



B. 2

C. 2.6

D. 4

Q3 Average Speed

A man drives to a town at 45 km/hr and returns by the same route at 60 km/hr. The total time taken is 7 hours. Find the distance to the town from the starting point.

A. 182 km

B. 175 km

C. 165 km

D. 180 km



Q4 Basic Ratio

In a coding assessment conducted by a tech company, the scores of Candidate X and Candidate Y are in the ratio 12 : 15. If Candidate Y scored 75 marks, then find the score obtained by Candidate X.

A. 65

B. 60



C. 50

D. 55

Q5 CP-SP Relation

A vendor buys 22 laptop bags for ₹43,670 and sells them at 20 for ₹39,760. How many laptop bags should be bought and sold at this rate, to earn a total profit of ₹1,227?

A. 409



B. 388

C. 397

D. 417

Q6 Divisibility Rules

The number 4488 is divisible by which of the following numbers?

A. 26

B. 19

C. 30

D. 22



Q7 Find SI

Two banks, A and B, offered loans at 3.5% and 8% per annum, respectively. Rupesh borrowed an amount of ₹3,00,000 from each bank. Find the positive difference between the amounts of simple interest (in ₹) paid to the two banks by Rupesh after 2 years.

A. 28,500

B. 26,500

C. 28,000

D. 27,000



Q8 Finding Present Age

Twice the mother's present age is equal to four times her daughter's present age. The sum of their present ages is 72 years. What is the difference (in years) between their present ages?

A. 26

B. 19

C. 24



D. 21



Q9 Grouped Data Mode

Given the following frequency distribution table of class intervals and frequencies:

Class Intervals	Frequency
10-20	5
20-30	9
30-40	15
40-50	6

What is the mode of the distribution?

A. 40

B. 34

C. 20

D. 24

Q10 Leaving Midway

Aman can complete a project alone in 27 days. Bela is 25% more efficient than Aman. They work together on the same project for 10 days. Then, Bela leaves, and Aman continues the work alone. In how many days will the project be completed?

A. 14.5 days

B. 16 days

C. 15 days

D. 13.5 days

Q11 MP with Discount and Profit

A dealer buys two articles X and Y for ₹2,500 each. He marks each of them at the same price. He sells X by giving two successive discounts of 84% and 37% and still earns ₹947 as profit. If he sells Y at a single discount of 86%, then what is the profit percentage on Y?

A. 90.5%

B. 91.5%

C. 91%

D. 90%

Q12 Percentage Increase/Decrease

The expenditure of Sudha is 100% more than her savings. If her expenditure decreases by 6% and savings increase by 18%, then by what percentage does her income increase?

A. 7%

B. 6%

C. 2%

D. 5%

Q13 Rectangle & Square

The perimeter of a square is 948 m. Its area (in m^2) is:

A. 56,149

B. 56,169

C. 56,168

D. 56,152

Q14 Single Change

The monthly income of a person is ₹7,545. If his income is increased by 20%, then what will be his new monthly income?

A. ₹9,054

B. ₹9,056

C. ₹9,052

D. ₹9,058

Q15 Still Water Speed

A motorboat travels 72 km downstream in 3 hours. The same boat takes 4 hours to cover 48 km upstream. What is the speed of the motorboat in still water?

A. 15 km/hr

B. 20 km/hr

C. 18 km/hr

D. 16 km/hr

Q16 Value Decrease Over Time

A bike is purchased for ₹1,20,000. If it depreciates by 18% in the first year and 7% in the second year, what is its value after two years?

A. ₹89,450

B. ₹91,512

C. ₹90,340

D. ₹98,230

Q17 Volume

If the surface area of a sphere is 28.26 cm^2 . What is its volume? (Use $\pi = 3.14$)

A. 18.31 cm^3

B. 12.24 cm^3

C. 20.42 cm^3

D. 14.13 cm^3



Q18 Weighted Average

The average of the marks obtained by 25 boys and 20 girls in a class is 73. If the girls' average marks are 4.5 more than the boys' average marks, find the total marks scored by all the girls.

A. 1450

B. 1570

C. 1510



D. 1550

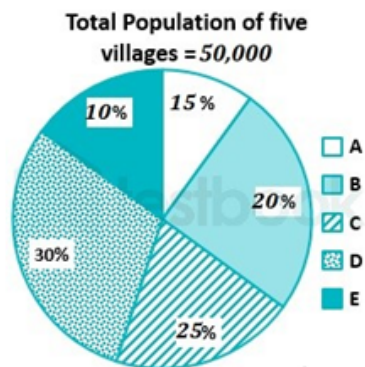
Q19 Fractions and Decimals

Simplify the following: $3.6 + \frac{5}{2} - 1.25$

A. $3\frac{9}{20}$ B. $5\frac{3}{20}$ C. $4\frac{7}{20}$ D. $4\frac{17}{20}$ **Q20 Percentage Based**

Study the given pie chart and answer the question that follows.

The pie chart shows the percentage of the population in five villages in a year.



Find the ratio of population in village A to that in village C.

A. 2 : 3

B. 3 : 5



C. 2 : 5

D. 1 : 3



Q21 Proportion

Find the fourth proportional of $5\sqrt{3}$, $4\sqrt{5}$, and $10\sqrt{3}$.

A. $5\sqrt{3}$

B. $4\sqrt{3}$

C. $8\sqrt{3}$

D. $8\sqrt{5}$

**Q22** Quadrilateral Area & Perimeter

What will be the area of a rhombus whose side is 8 cm and altitude is 6 cm?

A. 48 cm^2

B. 54 cm^2

C. 44 cm^2

D. 38 cm^2

**Q23** Surds and Indices

Simplify: $\sqrt{256} + \sqrt{0.0121} - \sqrt{8.41}$

A. 3.48

B. 15.34

C. 11.09

D. 13.21

**Q24** Trigonometric Identities

Find the value of $\frac{\sin x}{1 - \cot x} + \frac{\cos x}{1 - \tan x}$.

A. $\sin x - \cos x$

B. $\sin x + \cos x$

C. 1

D. $\cos x - \sin x$

**Q25** Trigonometric Identities

If $\frac{\operatorname{cosec} \theta (1 - \cos \theta)(\operatorname{cosec} \theta + \cot \theta)}{(\cos \theta (\sec \theta + \tan \theta))} = \frac{1}{1 + k}$, then the value of k is

A. $\operatorname{cosec} \theta$

B. $\sin \theta$

C. $\cos \theta$

D. $\sec \theta$

