MAT Mathematical Skills Sample Paper-15

Duration: 24 Minutes **Maximum Marks: 30**

Instructions

- This paper contains **30** Multiple Choice Questions from the **Mathematical Skills** section of MAT.
- Each correct answer carries **+1 mark**. Incorrect answer: **−0.25** marks. Only **one** correct option.
- There is **no** negative marking for unattempted questions.
- Suggested time for this section in the full MAT is **24 minutes**.
- Use of mobile phones, smartwatches, calculators, or any electronic gadgets is strictly prohibited.

Q1. A product costs ₹500 and is sold for ₹650. What is the profit percentage?

(A) 30%

(B) 25%

(C) 35%

(D) 40%

Q2. A man is 5 times as old as his son. After 10 years, he will be 3 times as old as his son. Find the son's current age.

(A) 5 years

(B) 10 years

(C) 15 years

(D) 20 years

Q3. A person saves ₹200 more in January than in December. If the total savings for both months is ₹1200, find the savings in December.

(A) ₹400

(B) ₹500

(C) ₹600

(D) ₹700

Q4. If $5^x = 125$, find the value of x.

(A) 2

(B) 3

(C) 4

(D) 5

Q5. A water tank has a capacity of 2000 liters. It is $\frac{3}{4}$ full. How many liters of water are there?

(A) 1200 liters

(B) 1400 liters

(C) 1500 liters

(D) 1600 liters

Q6. The LCM of two numbers is 48 and their HCF is 4. If one number is 12, find the other.

(A) 12

(B) 16

(C) 18

(D) 20

Q7. A sequence is $2, 6, 18, 54, \ldots$. What is the next term?

(A) 162

(B) 160

(C) 150

(D) 140

Q8. A car travels 120 km in 2 hours. What is its speed?

(A) 50 km/h

(B) 60 km/h

(C) 70 km/h

(D) 80 km/h

Q9. If $\sqrt{x} = 9$, find the value of x.

(A) 81

(B) 64

(C) 100

(D) 121

Q10. A number increased by 20% becomes 96. Find the original number.

(A) 70

(B) 75

(C) 80

(D) 85

Q11. Two numbers are in the ratio 3 : 4. If their sum is 35, find the smaller number.

(A) 10

(B) 12

(C) 15

(D) 18

Q12. The area of a circle is πr^2. If the radius is 7 cm, find the area. (Take $\pi = \frac{22}{7}$)

(A) 154 cm^2

(B) 308 cm^2

(C) 77 cm^2

(D) 231 cm^2

Q13. If a pen costs ₹5 and a notebook costs ₹10, what is the total cost of 8 pens and 5 notebooks?

(A) ₹90

(B) ₹100

(C) ₹110

(D) ₹120

Q14. A box contains 15 red and 25 blue balls. What is the probability of drawing a red ball?

(A) $\frac{1}{4}$

(B) $\frac{3}{8}$

(C) $\frac{1}{3}$

(D) $\frac{2}{5}$

Q15. If $3x - 5 = 16$, find the value of x.

(A) 5

(B) 7

(C) 9

(D) 11

Q16. A rope of length 100 m is cut into 4 equal pieces. What is the length of each piece?

(A) 20 m

(B) 25 m

(C) 30 m

(D) 35 m

Q17. The simple interest on ₹1000 for 2 years at 5% per annum is?

(A) ₹50

(B) ₹100

(C) ₹150

(D) ₹200

Q18. If $x + y = 10$ and $x - y = 4$, find the value of x.

(A) 5

(B) 6

(C) 7

(D) 8

Q19. A student scores 80, 85, and 90 in three tests. What is the average score?

(A) 83

(B) 85

(C) 87

(D) 89

Q20. If 15% of a number is 45, find the number.

(A) 200

(B) 250

(C) 300

(D) 350

Q21. A cube has an edge length of 5 cm. Find its volume.

(A) 100 cm^3

(B) 125 cm^3

(C) 150 cm^3

(D) 175 cm^3

Q22. What is the greatest common divisor (GCD) of 24 and 36?

(A) 4

(B) 6

(C) 8

(D) 12

Q23. A rectangle has length 12 cm and width 8 cm. What is its perimeter?

(A) 40 cm

(B) 50 cm

(C) 60 cm

(D) 70 cm

Q24. If $(x-2)^2 = 9$, find the value of x.

(A) 5 or -1

(B) 5 or 1

(C) 3 or -1

(D) 3 or 1

Q25. A train travels at 80 km/h for 3 hours. What is the distance covered?

(A) 200 km

(B) 240 km

(C) 260 km

(D) 280 km

Q26. The sum of angles in a triangle is?

(A) 90

(B) 180

(C) 270

(D) 360

Q27. If the cost price is ₹400 and profit is ₹100, what is the profit percentage?

(A) 20%

(B) 25%

(C) 30%

(D) 35%

Q28. A shop gives a discount of 10% on an item marked ₹500. What is the selling price?

(A) ₹400

(B) ₹420

(C) ₹450

(D) ₹480

Q29. If $2^x = 32$, find the value of x.

(A) 4

(B) 5

(C) 6

(D) 7

Q30. A number has 8 as a factor. Which of the following could be the number?

(A) 16

(B) 18

(C) 22

(D) 26

Detailed Solutions

Q1.

Solution

Concept: Profit is the difference between selling price and cost price. Profit percentage is calculated as $\frac{\text{Profit}}{\text{CP}} \times 100\%$.

Solution:

(a) Cost Price CP = |500, Selling Price SP = |650.

(b) Profit = SP − CP = 650 − 500 = |150.

(c) Profit% = $\frac{150}{500} \times 100 = 30\%$.

Final Answer: The profit percentage is 30%.

Answer: (A)

Go Back to Question 1

Q2.

Solution

Concept: Age problems involve setting up equations based on relationships at different times. If someone is k times another's age now, after t years the relationship changes proportionally.

Solution:

(a) Let son's age = s. Then father's age = $5s$.

(b) After 10 years: Father's age = $5s + 10$, Son's age = $s + 10$.

(c) Given: $5s + 10 = 3(s + 10)$.

(d) $5s + 10 = 3s + 30$, so $2s = 20$, giving $s = 10$.

Final Answer: The son's current age is 10 years.

Answer: (B)

Go Back to Question 2

Q3.

Solution

Concept: When two quantities have a difference and a sum, we can solve for each using simple algebra.

Solution:

(a) Let savings in December = x. Savings in January = $x + 200$.

(b) Total savings = $x + (x + 200) = 1200$.

(c) $2x + 200 = 1200$, so $2x = 1000$, giving $x = 500$.

Final Answer: Savings in December is ₹500.

Answer: (B)

Go Back to Question 3

Q4.

Solution

Concept: Exponential equations: If $a^x = b$, express b as a power of a to find x.

Solution:

(a) Given: $5^x = 125$.

(b) $125 = 5^3$ (since $5 \times 5 \times 5 = 125$).

(c) Therefore, $5^x = 5^3$, so $x = 3$.

Final Answer: The value of x is 3.

Answer: (B)

Go Back to Question 4

Q5.

Solution

Concept: To find a fraction of a quantity, multiply the quantity by the fraction.

Solution:

(a) Tank capacity = 2000 liters, Tank is $\frac{3}{4}$ full.

(b) Water in tank = $\frac{3}{4} \times 2000 = 1500$ liters.

Final Answer: There are 1500 liters of water.

Answer: (C)

Go Back to Question 5

Q6.

Solution

Concept: The fundamental property: $\text{HCF}(a, b) \times \text{LCM}(a, b) = a \times b$.

Solution:

(a) Given: LCM = 48, HCF = 4, One number = 12. Let other = x.

(b) $4 \times 48 = 12 \times x$.

(c) $192 = 12x$, so $x = 16$.

Final Answer: The other number is 16.

Answer: (B)

Go Back to Question 6

Q7.

Solution

Concept: A geometric sequence has a common ratio between consecutive terms. Each term is the previous term multiplied by this ratio.

Solution:

(a) Sequence: $2, 6, 18, 54, \ldots$

(b) Common ratio = $\frac{6}{2} = 3$ (or $\frac{18}{6} = 3$, or $\frac{54}{18} = 3$).

(c) Next term = $54 \times 3 = 162$.

Final Answer: The next term is 162.

Answer: (A)

Go Back to Question 7

Q8.

Solution

Concept: Speed is distance divided by time: Speed = $\frac{\text{Distance}}{\text{Time}}$.

Solution:

(a) Distance = 120 km, Time = 2 hours.

(b) Speed = $\frac{120}{2} = 60$ km/h.

Final Answer: The speed is 60 km/h.

Answer: (B)

Go Back to Question 8

Q9.

Solution

Concept: A square root is the value that when multiplied by itself gives the original number. If $\sqrt{x} = a$, then $x = a^2$.

Solution:

(a) Given: $\sqrt{x} = 9$.

(b) Squaring both sides: $x = 9^2 = 81$.

Final Answer: The value of x is 81.

Answer: (A)

Go Back to Question 9

Q10.

Solution

Concept: If a number is increased by a percentage $p\%$, the new value is original $\times(1 + \frac{p}{100})$.

Solution:

(a) Let original number = x.

(b) After 20% increase: $x \times 1.20 = 96$.

(c) $x = \frac{96}{1.20} = 80$.

Final Answer: The original number is 80.

Answer: (C)

Go Back to Question 10

Q11.

Solution

Concept: In ratio problems, if $a : b = m : n$ and $a + b = s$, then $a = \frac{m}{m+n} \times s$.

Solution:

(a) Numbers in ratio 3 : 4, sum = 35.

(b) Let numbers be $3k$ and $4k$. Then $3k + 4k = 35$.

(c) $7k = 35$, so $k = 5$.

(d) Smaller number = $3k = 3 \times 5 = 15$.

Final Answer: The smaller number is 15.

Answer: (C)

Go Back to Question 11

Q12.

Solution

Concept: The area of a circle is $A = \pi r^2$ where r is the radius.

Solution:

(a) Radius $r = 7$ cm, $\pi = \frac{22}{7}$.

(b) Area $= \pi r^2 = \frac{22}{7} \times 7^2 = \frac{22 \times 49}{7} = 22 \times 7 = 154$ cm^2.

Final Answer: The area is 154 cm^2.

Answer: (A)

Go Back to Question 12

Q13.

Solution

Concept: Total cost is the sum of individual costs: Cost = (unit price of A $\times$ quantity A) + (unit price of B $\times$ quantity B).

Solution:

(a) Cost of 8 pens $= 8 \times |5 = |40$.

(b) Cost of 5 notebooks $= 5 \times |10 = |50$.

(c) Total cost $= 40 + 50 = |90$.

Final Answer: The total cost is ₹90.

Answer: (A)

Go Back to Question 13

Q14.

Solution

Concept: Probability $= \frac{\text{Number of favorable outcomes}}{\text{Total number of outcomes}}$.

Solution:

(a) Red balls = 15, Blue balls = 25, Total = 40.

(b) Probability of red $= \frac{15}{40} = \frac{3}{8}$.

Final Answer: The probability is $\frac{3}{8}$.

Answer: (B)

Go Back to Question 14

Q15.

Solution

Concept: Solve linear equations by isolating the variable using inverse operations.

Solution:

(a) Given: $3x - 5 = 16$.

(b) Add 5 to both sides: $3x = 21$.

(c) Divide by 3: $x = 7$.

Final Answer: The value of x is 7.

Answer: (B)

Go Back to Question 15

Q16.

Solution

Concept: To divide a quantity into equal parts, divide the total by the number of parts.

Solution:

(a) Total length = 100 m, Number of pieces = 4.

(b) Length of each piece = $\frac{100}{4}$ = 25 m.

Final Answer: The length of each piece is 25 m.

Answer: (B)

Go Back to Question 16

Q17.

Solution

Concept: Simple Interest = $\frac{\text{Principal} \times \text{Rate} \times \text{Time}}{100}$.

Solution:

(a) Principal = |1000, Rate = 5% per annum, Time = 2 years.

(b) SI = $\frac{1000 \times 5 \times 2}{100} = \frac{10000}{100}$ = |100.

Final Answer: The simple interest is ₹100.

Answer: (B)

Go Back to Question 17

Q18.

Solution

Concept: Solve systems of linear equations by adding or subtracting equations to eliminate variables.

Solution:

(a) Given: $x + y = 10$ ... (1) and $x - y = 4$ ... (2).

(b) Adding (1) and (2): $2x = 14$, so $x = 7$.

Final Answer: The value of x is 7.

Answer: (C)

Go Back to Question 18

Q19.

Solution

Concept: Average is the sum of values divided by the number of values.

Solution:

(a) Scores: $80, 85, 90$.

(b) Sum $= 80 + 85 + 90 = 255$.

(c) Average $= \frac{255}{3} = 85$.

Final Answer: The average score is 85.

Answer: (B)

Go Back to Question 19

Q20.

Solution

Concept: If $p\%$ of a number is x, then the number is $\frac{100x}{p}$.

Solution:

(a) 15% of a number = 45.

(b) Number $= \frac{45 \times 100}{15} = \frac{4500}{15} = 300$.

Final Answer: The number is 300.

Answer: (C)

Go Back to Question 20

Q21.

Solution

Concept: Volume of a cube is $V = a^3$ where a is the edge length.

Solution:

(a) Edge length = 5 cm.

(b) Volume = $5^3 = 125$ cm^3.

Final Answer: The volume is 125 cm^3.

Answer: (B)

Go Back to Question 21

Q22.

Solution

Concept: GCD (Greatest Common Divisor) is the largest number that divides both numbers without remainder.

Solution:

(a) Factors of 24: 1, 2, 3, 4, 6, 8, 12, 24.

(b) Factors of 36: 1, 2, 3, 4, 6, 9, 12, 18, 36.

(c) Common factors: 1, 2, 3, 4, 6, 12.

(d) GCD = 12.

Final Answer: The GCD is 12.

Answer: (D)

Go Back to Question 22

Q23.

Solution

Concept: Perimeter of a rectangle is $P = 2(\text{length} + \text{width})$.

Solution:

(a) Length = 12 cm, Width = 8 cm.

(b) Perimeter = $2(12 + 8) = 2 \times 20 = 40$ cm.

Final Answer: The perimeter is 40 cm.

Answer: (A)

Go Back to Question 23

Q24.

Solution

Concept: If $(x-a)^2 = b$, then $x - a = \pm\sqrt{b}$, so $x = a \pm \sqrt{b}$.

Solution:

(a) Given: $(x-2)^2 = 9$.

(b) Taking square root: $x - 2 = \pm 3$.

(c) $x = 2 + 3 = 5$ or $x = 2 - 3 = -1$.

Final Answer: $x = 5$ or $x = -1$.

Answer: (A)

Go Back to Question 24

Q25.

Solution

Concept: Distance = Speed $\times$ Time.

Solution:

(a) Speed = 80 km/h, Time = 3 hours.

(b) Distance = $80 \times 3 = 240$ km.

Final Answer: The distance is 240 km.

Answer: (B)

Go Back to Question 25

Q26.

Solution

Concept: A fundamental property of triangles is that the sum of all interior angles equals 180.

Solution:

(a) The sum of the three interior angles of any triangle is 180.

(b) This is true for all triangles regardless of their shape or size.

Final Answer: The sum is 180.

Answer: (B)

Go Back to Question 26

Q27.

Solution

Concept: Profit percentage is calculated as $\frac{\text{Profit}}{\text{CP}} \times 100\%$.

Solution:

(a) Cost Price = |400, Profit = |100.

(b) Profit% = $\frac{100}{400} \times 100 = 25\%$.

Final Answer: The profit percentage is 25%.

Answer: (B)

Go Back to Question 27

Q28.

Solution

Concept: When a discount is given, the selling price is the marked price minus the discount amount.

Solution:

(a) Marked price = |500, Discount = 10%.

(b) Discount amount = $0.10 \times 500 = |50$.

(c) Selling price = $500 - 50 = |450$.

Final Answer: The selling price is ₹450.

Answer: (C)

Go Back to Question 28

Q29.

Solution

Concept: Exponential equations: Express both sides as powers of the same base.

Solution:

(a) Given: $2^x = 32$.

(b) $32 = 2^5$ (since $2 \times 2 \times 2 \times 2 \times 2 = 32$).

(c) Therefore, $2^x = 2^5$, so $x = 5$.

Final Answer: The value of x is 5.

Answer: (B)

Go Back to Question 29

Q30.

Solution

Concept: A number is a factor of another if it divides the number evenly with no remainder.

Solution:

(a) Check which number is divisible by 8.

(b) $16 \div 8 = 2$ (divisible)

(c) $18 \div 8 = 2.25$ (not divisible)

(d) $22 \div 8 = 2.75$ (not divisible)

(e) $26 \div 8 = 3.25$ (not divisible)

(f) Therefore, 16 has 8 as a factor.

Final Answer: The number is 16.

Answer: (A)

Go Back to Question 30

Answer Key

Q	Ans	Q	Ans	Q	Ans	Q	Ans	Q	Ans
1	A	2	B	3	B	4	B	5	C
6	B	7	A	8	B	9	A	10	C
11	C	12	A	13	A	14	B	15	B
16	B	17	B	18	C	19	B	20	C
21	B	22	D	23	A	24	A	25	B
26	B	27	B	28	C	29	B	30	A