Practice Test-9

Number of questions: 25

1. ABCD is a face of cube which has area 36 m². Nine equal cylinders are cut through its length as shown in the figure. Find the volume of the remaining portion.



- (c) $22.5(2-\pi)m^3$ (d) None of these
- 2. 5% income of P is equal to 15% income of Q and 10% income of Q is equal to 20% income of R. If the income of R is Rs.4,000, then the total income of P, Q and R is

(a) Rs. 12,000	(b) Rs. 18,000
(c) Rs. 24,000	(d) Rs. 36,000

3. O is the centre of a circle of radius r. AOB is a diameter and circles are drawn on OA and OB as diameters. If a circle is drawn to touch these three circles, its radius is

(a)	$\frac{2r}{3}$	(b) <u>r</u>
(C)	<u>r</u> 4	(d) $\frac{r}{3}$

4. A man can travel a certain distance at a speed of 25 km/hr by motorcycle. He travels back the same distance at a speed of 10 km/hr. What is his average speed for the entire trip?

(a)
$$10\frac{1}{7}$$
 km/hr (b) $12\frac{2}{5}$ km/hr
(c) 13 km/hr (d) $14\frac{2}{7}$ km/hr

5. A milkman mixed 1 : 4 solution of milk and water with another 1 : 2 solution of milk and water in the volume ratio 3 : 2. If the profit earned by selling the first solution was 20% and the mixture was sold at the same price. What is the profit/loss percentage? You have to assume that water comes free of cost.

(c) 6.25% loss (d) None of these

- Time Allowed: 25 mins.
- 6. A production unit produces 10 articles of which 4 are defective. A quality inspector allows release of the products if he finds none out of the 3 articles he chooses at random to be defective. In how many ways can he select 3 articles such that he clears the release?

(a)	10	(b)	20
(_ \	0	(a)	400

- (c) 6! (d) 120
- 7. A boat covers 12 km upstream and 24 km downstream in 6 hr while it covers 24 km upstream and 12 km downstream in 9 hr. Find the speed of the current.
 - (a) 7.5 km/hr (b) 12 km/hr
 - (c) 9 km/hr (d) 4.5 km/hr
- 8. Two numbers x and y are such that when divided by 6, they leave remainders 4 and 5 respectively. Find the remainder when $x^3 + y^3$ is divided by 6.
 - (a) 5 (b) 4
 - (c) 3 (d) None of these
- In the given figure, ABCD is a square with RC = 4 cm, AP = 2 cm and the area of the shaded portion is 88 cm². The side of the square ABCD is



- 10. The wheel of an engine 25 decimetres in circumference makes 10 rotations in 4 sec. Find the speed of the wheel.
 - (a) 16 km/hr (b) 24.5 km/hr
 - (c) 32.8 km/hr (d) 22.5 km/hr
- 11. Machines A and B produce 8,000 clips in 4 hr and 6 hr respectively. They work alternately for 1 hr. A starts first, then 8,000 clips will be produced in
 - (a) 4.33 hr
 - (b) 4.66 hr
 - (c) 5.33 hr
 - (d) 5.66 hr

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12. A cross section of the bottom platform of a flag staff is given in this figure. The width of each step is 30 cm and the height is 15 cm. The area of the cross section is



13. In an urn there are 6 red, 4 black and 3 white balls. Three balls are drawn out of it simultaneously. What is the probability that all the three are of the same colour?

(a)	20 286	(b)	9 44
(c)	7 220	(d)	25 286

14. The table below shows the percentage change in the bottom line of five companies.

Company	1992-93	1993-94
A	10	-10
В	-20	9
С	5	12
D	-7	-15
E	17	_

Which company has the maximum percentage decrease in sales from 1992 to 1994?

(a) A	(b) B
(c) C	(d) D

15. A can complete a piece of work in 10 days which B alone can do in 12 days. In how many days can both complete it working together?

(a)	11 days	(b)	15 days
(c)	$\frac{60}{11}$ days	(d)	8 days

- 16. A sum of money placed at compound interest doubles itself in 5 years. In how many years it will amount to eight times itself?
 - (a) 10 yr 8 months (b) 15 yr
 - (c) 12 yr (d) Cannot be determined
- 17. Due to an increase of 30% in the price of eggs, 3 eggs less than the previous amount are available for Rs.7.80. Find the present rate of eggs per dozen.

(a) Rs. 9.16	(b) Rs. 6.72

(c) Rs. 9.36 (d) Rs. 9.62

 A sum of money is sufficient to pay A's wages for 21 days and B's wages for 20 days. It is then sufficient to pay the wages of both for

(a) 10.24 days
(b) 14 days
(c) 12.25 days
(d) 24.5 days
19.
$$\begin{cases} \frac{2x^2 + 4}{3} \\ \frac{3}{2} \end{cases} + \frac{2}{6} \div \frac{1}{3} = \frac{23}{3}, \text{ what is the value of } \\ x? \\ (a) - 1 \\ (b) 4 \end{cases}$$

- (c) -2 (d) None of these
- 20. The distance between the centres of two circles with radii 9 cm and 4 cm is 13 cm. The length of a direct common tangent between them is
 - (a) 10 cm (b) 12 cm
 - (c) 11 cm (d) 10.5 cm
- 21. A and B are moving on a circular track of length 200 m in the same direction. Find the time after which they would be together again. Speed of A is 23 m/s and that of B is 30 m/s. Assume that they start racing simultaneously from the starting point.

(a)
$$28\frac{5}{7} \sec$$
 (b) $28\frac{4}{7} \sec$
(c) $27\frac{4}{7} \sec$ (d) $26\frac{4}{7} \sec$

- 22. Two trains are running on parallel tracks and they travel at the rates of 25 miles/hr and 30 miles/hr. If the first train leaves an hour earlier than the second train, how long will it take for the second train to catch up with the first train?
 - (a) 3 hr (b) 11 hr
 - (c) 6 hr (d) 4.75 hr
- 23. A man 50 years old has 8 sons born at equal intervals. The sum of the age of the father and sons is 186 years. What is the age of the eldest son if the youngest is 3 year old?
 - (a) 33 years (b) 28 years
 - (c) 31 years (d) 29 years
- 24. A.M. between the roots of a quadraic equation is 8 and G.M. is 5, then the equation is
 - (a) $x^2 + 16x 25 = 0$ (b) $x^2 8x + 5 = 0$
 - (c) $x^2 16x + 25 = 0$ (d) $x^2 16x 25 = 0$
- 25. Vimla and Surjeet jointly started a business by investing Rs.9,000 and Rs.10,500, respectively. After 4 months, Jaya joined their business by investing Rs.12,500 but Surjeet withdraws Rs.2,000. At the end of the year there was a profit of Rs.4,770. Find the share of Jaya.
 - (a) Rs. 1500 (b) Rs.1375
 - (c) Rs. 1620 (d) Rs. 1650

A.	Ans	wer l	Key						
1. (d)	2. (d)	3. (d)	4. (d)	5. (b)	6. (b)	7. (d)	8. (c)	9. (c)	10. (d)
11. (b)	12. (c)	13. (d)	14. (d)	15. (c)	16. (b)	17. (c)	18. (a)	19. (d)	20. (b)
21. (b)	22. (c)	23. (c)	24. (c)	25. (a)					

Explanations

- 1. d The given figure out of which cylinders have been cut is a cube.
 - : The remaining volume
 - = Volume of cube 9 × (Volume of cylinder)

$$= 6^3 - 9 \times \pi \times 1 \times 1 \times 6 = 216 - 54 \times \pi$$

- $= 9(24 6\pi)$.
- 2. d According to the question

 $\frac{5}{100}P = \frac{15}{100}Q \qquad ... (i)$ and $\frac{10Q}{100} = \frac{20}{100}R \qquad ... (ii)$ Given that income of R = Rs. 4,000 From (ii), we have Q = 2 × 4000 = Rs. 8,000

$$\therefore$$
 Income of P = 3Q

Their total income



Let x be the radius of the circle which touches these three circles.

The radius of the circle on OB as diameter is $\frac{r}{2}$.

PO is perpendicular to OB.

Let R be the centre of the circle on OB as diameter. $PR^2 = OP^2 + OR^2$

$$\left(\frac{r}{2} + x\right)^2 = (r - x)^2 + \left(\frac{r}{2}\right)^2 \Rightarrow \frac{r^2}{4} = \left(\frac{r}{2} + x\right)^2 - (r - x)^2$$
$$\Rightarrow -r^2 + 3rx = 0 \Rightarrow -r + 3x = 0 \Rightarrow x = \frac{r}{3}.$$

4. d Average speed = $\frac{\text{Total distance travelled}}{\text{Total time taken}}$

Let d km be the certain distance travelled by a man.

:. Average speed =
$$\frac{2d}{\frac{d}{25} + \frac{d}{10}} = \frac{2d}{\frac{2d + 5d}{50}} = \frac{2d \times 50}{7d}$$

= $\frac{100}{7} = 14\frac{2}{7}$ km/hr.

Volume of milk in first solution = 9 L Volume of milk in second solution = 10 L Suppose cost price of milk is Re. 1 per litre. ∴ Total cost of first solution = Rs. 9

SP of first solution = 9×1.2 = Rs. 10.8

SP of 1 litre of first solution = $\frac{10.8}{45}$ = Rs. 0.24 SP of all 75 L of solution = 75 × 0.24 = Rs. 18 CP of all 75 L of solution = Rs. 19

(Since there was only 19 L of milk in all.)

$$\therefore \text{ Loss percentage = } \frac{19-18}{19} \times 100 = 5.26\%$$

6. b Since out of 10 articles 4 are defective, i.e. 6 articles are not defective.Thus to clear the release an inspector will select

I hus to clear the release an inspector will select an article in ${}^{6}C_{3}$ ways = 20.

7. d Let the speed of boat = x km/hr and speed of current = y km/hr L

Now according to the question

$$\frac{12}{x-y} + \frac{24}{x+y} = 6 \qquad \dots (A)$$

$$\left[\text{Using Time} = \frac{\text{Distance}}{\text{Speed}} \right]$$

and
$$\frac{24}{x-y} + \frac{12}{x+y} = 9$$
 ... (B)

Put
$$\frac{1}{x-y} = u$$
 and $\frac{1}{x+y} = v$

I hen (A) and (B) becomes

$$12u + 24v = 6$$

 ... (i)

Solving (i) and (ii), we get

$$u = \frac{1}{3}, v = \frac{1}{12}$$

Now $\frac{1}{x - y} = \frac{1}{3}$ or $x - y = 3$

and
$$\frac{1}{x+y} = \frac{1}{12}$$
 or $x + y = 12$... (iv)

Solving (iii) and (iv), we get Speed of boat = 7.5 km/hr and speed of current = 4.5 km/hr.

8. c Suppose x =
$$6k_1 + 4$$
 and y = $6k_2 + 5$
x³ + y³ = $(6k_1 + 4)^3 + (6k_2 + 5)^3$
= 216 $k_1^3 + 432 k_1^2 + 288 k_1 + 64 + 216 k_2^3$

+ 540
$$k_2^2$$
 + 450 k_2 + 125

... (iii)

All terms involving k_1 and k_2 and their higher powers are divisible by 6. The constant term being 189 which when divided by 6 leaves the remainder 3.



Let the side of the square be x cm.

Then PD = x - 2 and DR = x - 4

$$\therefore x^2 - (x - 2) (x - 4) = 88$$
, i.e. $x^2 - (x^2 - 6x + 8)$
= 88 i.e. $6x = 96$, i.e. $x = 16$ cm

- 10. d 25 decimetres = 250 cm. In 10 revolutions, the wheel travels 250 \times 10 = 2,500 cm
 - \therefore In 4 s the wheel travels 2,500 cm

$$\therefore$$
 In 1 s, the wheel travels $\frac{2500}{4}$ cm

∴ In 3,600 s (or 1 hr) it travels

$$\frac{2,500}{4}$$
 × 3,600 = 22,50,000 cm/hr
or the speed is 22.5 km/hr

11. b In 1 hr machine A produces
$$\frac{8000}{4} = 2000 \text{ clips}$$

In 1 hr machine B produces $\frac{8000}{6} \text{ clips}$
 $2000 + \frac{8000}{6} + 2000 + \frac{8000}{6} + \left(\frac{8000}{6} \times \frac{1}{2000}\right) = 8000$
 $= 1 + 1 + 1 + 1 + \frac{4}{6} = 4.66 \text{ hr.}$

- 12. c It consists of three rectangles. The top most rectangle = $60 \times 15 \text{ cm}^2$ The rectangle below it = $120 \times 15 \text{ cm}^2$ The bottom most rectangle = $180 \times 15 \text{ cm}^2$ \therefore The total area of cross section = $(60 + 120 + 180)15 \text{ cm}^2 = 5,400 \text{ cm}^2$
- 13. d Ways of getting 3 balls out of 13 balls = ${}^{13}C_3$. Probability of getting 3 balls of red colour = $\frac{{}^6C_3}{{}^{13}C_3}$

Probability of getting 3 balls of black colour = $\frac{4C_3}{13C_3}$

Probability of getting 3 balls of white colour = $\frac{{}^{3}C_{3}}{{}^{13}C_{3}}$

... Probability of getting all the three balls of same

colour =
$$\frac{{}^{6}C_{3} + {}^{4}C_{3} + {}^{3}C_{3}}{{}^{13}C_{3}} = \frac{25}{286}$$
.

14. d Obviously D, since in both the years, negative growth is recorded.

15. c A's 1 day work =
$$\frac{1}{10}$$

B's 1 day work = $\frac{1}{12}$
(A + B)'s 1 day work = $\left(\frac{1}{10} + \frac{1}{12}\right) = \frac{11}{60}$ of entire job.

Both will finish the work in $\frac{60}{11}$ or $5\frac{5}{11}$ days.

16. b Let the prinicipal amount be Rs. p and rate of interest be r%.

A = Rs. 2p, n = 5 years and R =
$$r\%$$

$$A = P \left\{ 1 + \frac{r}{100} \right\}^{n}; 2p = p \left\{ 1 + \frac{r}{100} \right\}^{5}$$
$$2 = \left\{ 1 + \frac{r}{100} \right\}^{5}$$

Cubing the above equation we get

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$$(2)^{3} = \left\{ \left(1 + \frac{r}{100} \right)^{5} \right\}^{3}; 8 = \left\{ 1 + \frac{r}{100} \right\}^{15}$$

For amount to become 8 times of itself, it would require 15 years.

17. c Let the original rate be X paise per egg.

Number of eggs bought for Rs.7.80 =
$$\frac{1}{2}$$
 paise

New rate = (130% of X) paise per egg

$$=\frac{13X}{10}$$
 paise per egg.

Number of eggs bought for Rs.7.80

$$= \frac{780 \times 10}{13X} = \frac{600}{X}$$

$$\therefore \frac{780}{X} - \frac{600}{X} = 3 \text{ or } 3X = 180 \text{ or } X = 60.$$

So, present rate =
$$\left(\frac{13 \times 60}{10}\right)$$
 paise per egg.

= 78 paise per egg

- = Rs.9.36 per dozen
- 18. a Let total amount be Rs. x

A's wage per day is $\frac{x}{21}$. B's wage per day is $\frac{x}{20}$.

When working together wage paid per day to them

is
$$\frac{x}{20} + \frac{x}{21} = \frac{x \times 41}{420} \implies \frac{420}{41} = 10.24 \text{ days}$$

19. d Given expression is

$$\left[\frac{\left(2x^{2}+4\right)}{3}\right] + \frac{2}{6} \div \frac{1}{3} = \frac{23}{3}$$
$$\Rightarrow \frac{2x^{2}+4}{3} + \frac{2}{6} \times 3 = \frac{23}{3}$$
$$= \frac{2x^{2}+4+3}{3} = \frac{23}{3}$$
$$\Rightarrow 2x^{2} = 23 - 7 = 16 \Rightarrow x^{2} = 8 \Rightarrow x = \pm 2\sqrt{2}.$$

20. b



Let C and D be the centres of the two circles and let the direct common tangent be AB.

CA and DB are perpendicular to AB.

Draw DE perpendicular to CA.

- \therefore DEAB is a rectangle and CE = (9 4) cm = 5 cm,
- CD = 13 cm ∴ DE² = CD² – CE² = $13^2 - 5^2 = 144$ cm² DE = 12 cm Hence, AB = 12 cm.
- 21. b A and B will be together once if B takes a lead of exactly one round over A, i.e. B takes a lead of 200 m over A. Relative speed of B with respect to A = 30 - 23 = 7 m/s

$$\therefore \text{ Required time} = \frac{200}{7} = 28\frac{4}{7} \text{ sec}$$

- 22. c Let the time taken by first train be t hr.
 - Then the time taken by second train to catch up with the first train be (t 1)hr.

$$\therefore 30 (t - 1) = 25t$$

$$\Rightarrow 30t - 30 = 25t \Rightarrow 5t = 30$$

23. c Let the interval be x years

- = 50 + 3 + (x + 3) + (2x + 3) + (3x + 3) + (4x + 3)+ (5x + 3) + (6x + 3) + (7x + 3) = 186= 50 + 28x + 24 = 186 $\Rightarrow 28x = 112 \Rightarrow x = 4$ Age of oldest son = 7x + 3 = 31 years.
- 24. c Let a and b be the roots of a quadratic equation

then,
$$\frac{a+b}{2} = 8$$
 or $a + b = 16 \Rightarrow S = 16$
 $\sqrt{ab} = 5$ or $a.b = 25 \Rightarrow P = 25$
 \therefore Required equation is $x^2 - Sx + P = 0$
 $\Rightarrow x^2 - 16x + 25 = 0$

25. a Vimla invested Rs.9000 for 12 months.

Surjeet invested Rs.10500 for 4 months and Rs.8500 for 8 months.

Jaya invested Rs.12500 for 8 months.

:. Ratio of capitals of Vimla, Surjeet and Jaya

(12500 × 8)

- = 108000 : 110000 : 100000
- = 108 : 110 : 100 = 54 : 55 : 50.

Sum of the ratios = (54 + 55 + 50) = 159

 $\therefore \text{ Vimla's share} = \text{Rs.}\left(\frac{4770 \times \frac{54}{159}}{159}\right) = \text{Rs.}1620,$

Surjeet's share = Rs. $\left(\frac{4770 \times \frac{55}{159}}{159}\right)$ = Rs.1650, Jaya's share = Rs.[4770 - (1620 + 1650)] = Rs.1500.