Practice Test-5

1. Find the 100th term of the following given series,
   1, 2, 4, 7, 11, 16, 22, 29, 37, 46 ....
   (a) 5050   (b) 5051
   (c) 4951   (d) 4950

2. If x : y = 4 : 5, find the value of $\dfrac{(11x+13y)}{(11x-13y)}$.

   (a) $-\dfrac{109}{21}$ (b) $\dfrac{104}{21}$

   (c) $\dfrac{109}{21}$ (d) None of these

3. The L.C.M. of 2 numbers of three digits each is 1740 and the H.C.F. is 290. The two numbers are
   (a) 290, 870   (b) 290, 580
   (c) 580, 870   (d) 290, 1160

4. The ratio between the length and breadth of a rectangular field is 5 : 4. If the breadth is 20 m less than the length, find the perimeter of the field.
   (a) 260 m   (b) 360 m
   (c) 280 m   (d) 180 m

5. f(x) is defined as

   $f(x) = x+1 \quad 0 < x < 4$
   $\quad\quad = 2x+1 \quad 4 \le x < 8$
   $\quad\quad = x^2+1 \quad 8 \le x < \infty$

   Find f(f(x)) for x = 5.
   (a) 120   (b) 122
   (c) 125   (d) None of these

6. A sum of money is divided among A, B and C such that, for each two rupee, A gets one rupee, B gets 65 paise and C gets 35 paise. If C's share is Rs. 560, the sum is
   (a) Rs. 2,400   (b) Rs. 2,800
   (c) Rs. 3,200   (d) Rs. 3,600

7. Two trains 200 km apart start from opposite directions at the same time. They cross each other at a distance of 110 km from one of the stations. What is the ratio of their speeds?
   (a) 11 : 20
   (b) 9 : 20
   (c) 11 : 9
   (d) 10 : 11

8. The second term of a geometric progression (GP) is 27 and the third term is 9. Find the sixth term and the sum of all the six terms.

   (a) $\dfrac{1}{3}$, 121   (b) $\dfrac{1}{3}$, $\dfrac{364}{3}$

   (c) $\dfrac{1}{9}$, $\dfrac{364}{3}$ (d) $\dfrac{1}{9}$, 121

9. Walking at $\dfrac{6}{7}$ of his usual speed, Shyam is 25 min late. What is his usual time?

   (a) $1\dfrac{1}{2}$ hr   (b) $2\dfrac{1}{2}$ hr

   (c) $1\dfrac{6}{7}$ hr   (d) 3 hr

10. A bag contains 25 paisa, 10 paisa and 5 paisa coins in the ratio of 1 : 2 : 3. If their total value is Rs. 45, the number of 10 paisa coins is
    (a) 75
    (b) 150
    (c) 200
    (d) 225

11. If a boy walks from his house to his school at the rate of 4 km/hr, he reaches the school 10 min earlier than the scheduled time. However, if he walks at the rate of 3 km/hr, he reaches the school 10 min late. Find the distance of the school from his house.
    (a) 6 km
    (b) 4.5 km
    (c) 4 km
    (d) None of these

12. A television survey gives the following data for TV channel viewing: 60% watch *Zee*, 50% watch *Sony*, 50% watch *Star Plus*; 30% watch *Zee* and *Sony*, 20% watch *Sony* and *Star Plus*, 30% watch *Star Plus* and *Zee*. 10% do not view any channels. Find out what per cent view *Zee*, *Sony* and *Star Plus*, what per cent view exactly two channels and what per cent watch only channel *Zee*.
    (a) 10%, 50%, 20%
    (b) 10%, 10%, 10%
    (c) 10%, 50%, 10%
    (d) None of these

13. Identify the correct relation :

    (a) $\cos 2\theta = \dfrac{2\tan\theta}{1-\tan^2\theta}$

    (b) $\cos 2\theta = \dfrac{2\tan\theta}{1+\tan^2\theta}$

    (c) $\cos 2\theta = \dfrac{1+\tan^2\theta}{1-\tan^2\theta}$

    (d) $\cos 2\theta = \dfrac{1-\tan^2\theta}{1+\tan^2\theta}$

14. The present cost of Bajaj Motorcycle is Rs. 50,000. What will be its value after 3 years if the cost increases every year by 10%?

    (a) Rs. 65,000   (b) Rs. 60,000

    (c) Rs. 66,550   (d) Rs. 66,650

15. A ball is thrown up from a height of 5 m. It reaches a height of 20 m from the ground and returns to the ground. Every bounce reduces the subsequent height reached by 25%. Find the total distance covered by the ball before it finally comes to rest

    (a) 150 m   (b) 155 m

    (c) $167\dfrac{2}{3}$ m   (d) 180 m

16. The ages of A and B are in the ratio 9 : 4. Seven years hence the ratio will be 5 : 3. The present ages of A and B respectively be

    (a) 9 years, 4 years

    (b) 18 years, 8 years

    (c) 27 years, 12 years

    (d) None of these

17. Walking at $\dfrac{3}{4}$ of his usual speed, a man is late by 2.5 hr only. Find his usual time.

    (a) $7\dfrac{1}{2}$ hr   (b) $3\dfrac{1}{2}$ hr

    (c) $3\dfrac{1}{4}$ hr   (d) $\dfrac{7}{8}$ hr

18. If $x = 2 + 2^{2/3} + 2^{1/3}$, then what is the value of $x^3 - 6x^2 + 6x$?

    (a) 6   (b) 12

    (c) 4   (d) 2

19. A 200 L solution of alcohol and water contains $\dfrac{1}{4}$th of alcohol. Find the new percentage of alcohol, if 50 L of the original solution is replaced by 50 L of alcohol.

    (a) 43.75%   (b) 50%

    (c) 66.66%   (d) 80%

20. If $x : y = 2 : 5$, then $(3x + 4y) : (4x + 5) = ?$

    (a) 16 : 23

    (b) 26 : 33

    (c) 33 : 26

    (d) Can't be determined

21. In a class of 200 students 70 played cricket, 60 played hockey and 80 played football, 30 played cricket and football, 30 played hockey and football, 40 played cricket and hockey. Then find the maximum number of people playing all the three games and minimum number of people playing at least one game.

    (a) 200, 100   (b) 30, 110

    (c) 30, 120   (d) None of these

22. The entrance fee of a museum was reduced by 25%, but the daily turn out increased by 30%. What was the effect of this on the daily revenue?

    (a) 2% increase   (b) 2% decrease

    (c) 2.5% increase   (d) 2.5% decrease

23. If a solid sphere of radius 10 cm is moulded into 8 spherical solid balls of equal radius, then what is the radius of each such ball?

    (a) 5 cm   (b) 2.5 cm

    (c) 3.75 cm   (d) 10 cm

24. What is the least number which when divided by 18, 27 and 36 leaves the remainders 5, 14 and 23?

    (a) 108   (b) 113

    (c) 149   (d) 95

25. A train 108 m long moving at a speed of 50 km/hr crosses another train 112 m long coming from opposite direction in 6 sec. What is the speed of the second train?

    (a) 82 km/hr   (b) 48 km/hr

    (c) 66 km/hr   (d) 54 km/hr

26. A four-digit number is formed writing four of the five digits 0, 1, 2, 3 and 4. What is the probability that this number is not divisible by 3?

    (a) $\dfrac{2}{7}$ (b) $\dfrac{1}{3}$

    (c) $\dfrac{3}{8}$ (d) $\dfrac{5}{8}$

27. There are 13 couples, 5 single men and 7 single ladies in a party. Every man greets every lady once but no one greets his wife. How many greetings took place in the party?

    (a) 247   (b) 347

    (c) 360   (d) 191

28. If $\left[3^{m^2} \div \left(3^m\right)^2\right]^{\frac{1}{m}} = 81$, what is the value of m?

    (a) 3   (b) 6

    (c) –6   (d) –3

29. If 18 men and 10 boys can do in a day as much work as 10 men and 22 boys; how much should a man be paid a day if a boy is to get Rs. 5 a day?

    (a) Rs. 6   (b) Rs. $6\frac{1}{2}$

    (c) Rs. $7\frac{1}{2}$ (d) Rs. 8

30. A cask contains 3 parts wine and one part water. What part of the mixture must be drawn off and substituted by water so that the resulting mixture may be half wine and half water?

    (a) $\dfrac{1}{2}$

    (b) $\dfrac{5}{2}$

    (c) $\dfrac{1}{3}$

    (d) $\dfrac{3}{2}$

Answer Key

1. (c)	**2.** (a)	**3.** (c)	**4.** (b)	**5.** (b)	**6.** (c)	**7.** (c)	**8.** (b)	**9.** (b)	**10.** (b)
11. (c)	**12.** (c)	**13.** (d)	**14.** (c)	**15.** (b)	**16.** (b)	**17.** (a)	**18.** (d)	**19.** (a)	**20.** (d)
21. (c)	**22.** (d)	**23.** (a)	**24.** (d)	**25.** (a)	**26.** (d)	**27.** (b)	**28.** (b)	**29.** (c)	**30.** (c)

Explanations

1. c $t_1 = 1$

   $t_2 = 1 + 1$

   $t_3 = 1 + 1 + 2$

   $t_4 = 1 + 1 + 2 + 3$

   $\therefore t_n = 1 + \sum_{i=0}^{n-1} i$

   $\therefore t_{100} = 1 + \sum_{i=0}^{99} i = 1 + \dfrac{99 \times 100}{2} = 4951$

2. a Given that $\dfrac{x}{y} = \dfrac{4}{5}$

   Now $\dfrac{11x + 3y}{11x - 13y} = \dfrac{11\left(\dfrac{x}{y}\right) + 13}{11\left(\dfrac{x}{y}\right) - 13} = \dfrac{11 \times \dfrac{4}{5} + 13}{11 \times \dfrac{4}{5} - 13}$

   $= \dfrac{44 + 65}{44 - 65} = -\dfrac{109}{21}$.

3. c All the options have 290 as H.C.F, but only option (c) has 1740 as L.C.M.

4. b Let the length and breadth of a rectangular field be 5x and 4x. Also $4x = 5x - 20 \Rightarrow x = 20$ m

   $\therefore$ Length = 5 × 20 = 100 m

   Breadth = 4 × 20 = 80 m

   Thus the perimeter of the field = 2(100 + 80) = 360 m.

5. b f(5) = 2 × 5 + 1 = 11

   f(11) = 11^2 + 1 = 122

6. c Assume that the sum be x.

   The ratio's of A, B and C = 100 : 65 : 35 = 20 : 13 : 7

   Then,

   $x \times \dfrac{7}{40} = 560 \Rightarrow x = \dfrac{560 \times 40}{7} = 80 \times 40 = $ Rs. 3,200

7. c Let the time = t

   Speed of the first train = $\dfrac{110}{t}$ km/hr

   Speed of the second train = $\dfrac{90}{t}$ km/hr

   Ratio of speeds = $\dfrac{\dfrac{110}{t}}{\dfrac{90}{t}} = 11 : 9$.

8. b Let a be the first term and r be the common ratio of GP.

   Then second term is ar = 27   … (i)

   and the third term is ar^2 = 9   … (ii)

Using (i), in (ii), we get ar.r = 9 $\Rightarrow$ 27.r = 9

$\Rightarrow r = \dfrac{1}{3}$ and ar = 27 $\Rightarrow$ a = 81

Now, the sixth term = $ar^5 = 81 \times \dfrac{1}{3^5} = \dfrac{1}{3}$

Sum of six terms = $\dfrac{a(1 - r^n)}{1 - r} = \dfrac{81\left(1 - \dfrac{1}{3^6}\right)}{1 - \dfrac{1}{3}}$

$= \dfrac{728}{6} = \dfrac{364}{3}$.

9. b Let the usual speed be x km/hr and usual time be t hr.

   Distance travelled = xt

   According to the question, we have

   $xt = \dfrac{6}{7} x \left(t + \dfrac{25}{60}\right) \Rightarrow 7t = 6t + \dfrac{25}{10}$

   $\Rightarrow t = \dfrac{5}{2} = 2.5$ hr.

10. b If the number of coins is x, 2x and 3x, then the value of the coins, is

    x × 25 + 2x ×10 + 3x × 5 = 4500

                 60x = 4500

                   x = 75

               2x = 150

    Hence, the number of 10 paisa coins is 150.

11. c Let t be the usual time taken by a boy to reach school.
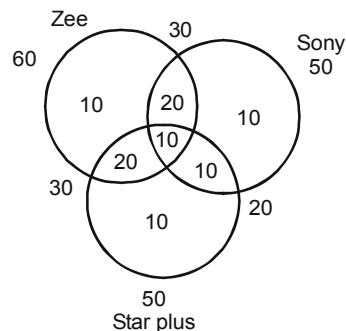
    Now according to the question

    $4\left(t - \dfrac{10}{60}\right) = 3\left(t + \dfrac{10}{60}\right)$

    $4t - \dfrac{4}{6} = 3t + \dfrac{3}{6}$; $t = \dfrac{7}{6}$

    Now distance travelled $= 4\left(\dfrac{7}{6} - \dfrac{1}{6}\right) = 4$ km

12. c Using Venn diagram, we have found that

Zee   30   Sony 50

60   10   20   10   10   20   10   30   20   10

50
Star plus

Since 10% do not watch any channel which means, 90% watch all the channels.

∴ Using $n(A \cup B \cup C) = n(A) + n(B) + n(C) - n(A \cap B)$
$$-n(A \cap C) - n(C \cap A) + n(A \cap B \cap C)$$

$90 = 60 + 50 + 50 - 30 - 30 - 20 + n(A \cap B \cap C)$

$\Rightarrow n(A \cap B \cap C) = 10$.

13. d The correct relation is

$$\cos 2\theta = \frac{1 - \tan^2 \theta}{1 + \tan^2 \theta}$$

14. c The value of Bajaj Motorcycle after 3 years is

$$= \text{Rs. } 50,000 \left(1 + \frac{10}{100}\right)^3$$

$$= \text{Rs. } 50,000 \left(\frac{11}{10}\right)^3 = \text{Rs. } 66,550.$$

15. b $-5 + 20 + 20 + 15 + 15 + 11.25 + 11.25 + ...$

$= -5 + 2\{20 + 15 + 11.25 + ... \}$

[∵ It reduces by 25%, hence common ratio of the infinite GP series = 0.75]

$$= -5 + 2 \times \frac{20}{1 - 0.75} = 155 \, \text{m}$$

16. b $\frac{9x + 7}{4x + 7} = \frac{5}{3}$

$\Rightarrow 27x + 21 = 20x + 35 \Rightarrow 7x = 14$

$\Rightarrow x = 2$

Hence, their present ages are 18 years and 8 years.

17. a Let the usual speed of a man be x km/hr and the time taken be t hours.

Since distance travelled = Speed × Time.

Now, according to the question, we have

$xt = \frac{3}{4}x(t + 2.5) \Rightarrow 4t = 3t + 7.5 \Rightarrow t = 7.5 \, \text{hr.}$

18. d Given that

$x = 2 + 2^{\frac{2}{3}} + 2^{\frac{1}{3}}$, and we need to find the value of $x^3 - 6x^2 + 6x$.

Consider $x = 2 + 2^{\frac{2}{3}} + 2^{\frac{1}{3}}$

$\Rightarrow x - 2 = 2^{\frac{2}{3}} + 2^{\frac{1}{3}}$

Taking cube to both sides, we get

$(x - 2)^3 = \left(2^{\frac{2}{3}} + 2^{\frac{1}{3}}\right)^3$

$\Rightarrow x^3 - 6x^2 + 12x - 8 = 2^2 + 3 \cdot 2^{\frac{4}{3}} \cdot 2^{\frac{1}{3}} + 3 \cdot 2^{\frac{2}{3}} \cdot 2^{\frac{2}{3}} + 2$

$\Rightarrow x^3 - 6x^2 + 12x - 14 = 6\left(2^{\frac{2}{3}} + 2^{\frac{1}{3}}\right)$

$\Rightarrow x^3 - 6x^2 + 12x - 14 = 6(x - 2)$

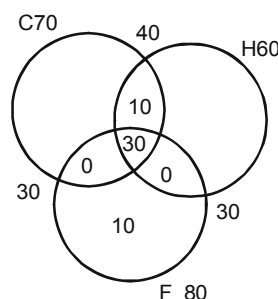$\Rightarrow x^3 - 6x^2 + 6x = 2.$

19. a Alcohol = 50 L, water = 150 L

Alcohol taken out $= \frac{50}{4} = 12.5 \text{L}$
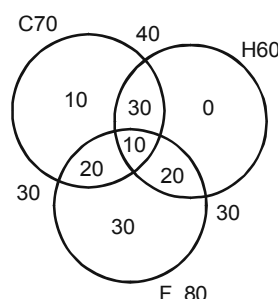
New alcohol = 50 − 12.5 + 50 = 87.5 L

Final alcohol percentage = $\frac{87.5}{200} \times 100 = 43.75\%$

20. d Given that $\frac{x}{y} = \frac{2}{5}$ and $\frac{3x + 4y}{4x + 5}$, from the given fraction we cannot determine the value of fraction, as when we divide with y, we do not have $\frac{x}{y}$ form in the denominator.

21. c For maximizing

For minimizing

Maximum number of people playing three games = 30

Minimum number of people playing at least one game = 120.

22. d Let the entrance fee be Rs. x and daily turn out be y. Now if entrance fee is reduced by 25%, then the resultant price be $\frac{3x}{4}$ and if daily turn out is increase by 30%, then the resultant effect will be $y + \frac{30y}{100} = \frac{13y}{10}$

So, the net effect on the daily receipts

$$= \frac{xy - \frac{3}{4}x\left(\frac{13y}{10}\right) \times 100}{xy}$$

$$= \frac{40 - 39}{40} \times 100 = 2.5\% \text{ decrease}.$$

23. **a** Volume of given solid sphere with radius 10 cm

$$= \frac{4}{3}\pi(10)^3$$

and volume of 8 moulded spherical balls of equal

radius, say, r = $8 \times \frac{4}{3}\pi r^3$

Now, according to the question, we have

$$\frac{4}{3}\pi(10)^3 = 8 \times \frac{4}{3}\pi r^3$$

$$\Rightarrow \frac{10^3}{8} = r^3 \Rightarrow \frac{10^3}{2^3} = r^3$$

$$\Rightarrow \frac{10}{2} = r \Rightarrow r = 5\,cm.$$

24. **d** Going with the options we have found that 95 is the number.

25. **a** Let the speed of the train be x km/hr.

Now, using the concept of relative speed, we have

$$\frac{\frac{108}{1000} + \frac{112}{1000}}{50 + x} = \frac{6}{3600}$$

$$\Rightarrow \frac{220}{(50 + x)1000} = \frac{1}{600}$$

$$\Rightarrow 132 = 50 + x \Rightarrow x = 82\ km/hr.$$

26. **d** We make a four-digit number with 0, 1, 2 and 3.

Number of such numbers is 3 × 3 × 2 = 18.

When we formed a four-digit number with 0, 2, 3 and 4.

Number of such number is 3 × 3 × 2 = 18.

It means 18 + 18 = 36 out of those 96 numbers will be divisible by 3.

$\Rightarrow$ 96 – 36 = 60 numbers will not be divisible by 3

$\therefore$ The required probability = $\frac{60}{96} = \frac{5}{8}$

27. **b** Any single man will have 13 + 7 = 20 options.

$\therefore$ Total number of greetings by single males

= 5 × 20 = 100

Any married man will have 12 + 7 = 19 options.

$\therefore$ Total number of greetings by married men

= 19 × 13 = 247

$\therefore$ Total number of greetings = 247 + 100 = 347

28. **b** $\left[3^{m^2} \div \left(3^m\right)^2\right]^{\frac{1}{m}} = 81$

$$\Rightarrow \left(3^{m^2-2m}\right)^{1/m} = 3^4$$

$$\Rightarrow 3^{m(m-2)\frac{1}{m}} = 3^4 \Rightarrow m - 2 = 4 \Rightarrow m = 6$$

29. **c** 18 men + 10 boys = 10 men + 22 boys

$\therefore$ 12 boys = 8 men

Money earned by 12 boys = Rs. 60 = Money earned by 8 men

$\therefore$ 1 man should be paid = $\frac{60}{8} = Rs.\ 7\frac{1}{2}$ a day

30. **c** Let the cask contain x L of mixture

Amount of wine = $\frac{3x}{4}$ and amount of water $\frac{x}{4}$

Let y L. of mixture be drawn off and replaced with water.

Wine left = $\frac{3x}{4} - \frac{3y}{4} = \frac{3}{4}(x - y)$

and water = $\frac{1}{4}x - \frac{1}{4}y + y = \frac{1}{4}x + \frac{3}{4}y$

$$= \frac{1}{4}(x + 3y)$$

$$\therefore \frac{3}{4}(x - y) = \frac{1}{4}(x + 3y)$$

$$\Rightarrow 3x - 3y = x + 3y$$

$$\Rightarrow 2x = 6y$$

$$\Rightarrow y = \frac{1}{3}x$$