Practice Test-4

Number of questions: 30 **Time Allowed: 30 mins.**

1. Anuva takes 20 min less to reach her office if her speed increases by 5 km/hr and takes 30 min more if her speed decreases by 5 km/hr, what is her original speed?
   (a) 20 km/hr (b) 30 km/hr
   (c) 25 km/hr (d) None of these
2. Three light signals change after every 24 sec, 30 sec and 42 sec respectively. If they all change simultaneously at 1 : 30 : 00 hour, then at what time they again change simultaneously?
   (a) 1 : 45 : 00 (b) 1 : 44 : 00
   (c) 1 : 44 : 30 (d) 1 : 45 : 30
3. The adjacent sides of a parallelogram are a and b and the perpendicular distance between the parallel sides of length a is d. The perpendicular distance between the parallel sides of length b is equal to
   (a) $\frac{ab}{d}$ (b) $\frac{ad}{b}$
   (c) $\frac{bd}{a}$ (d) None of these
4. The length of the shadow of a tree extends by 20 m when the angle of elevation of the sun with respect to the top of the tree decreases from 45° to 30°. Find the height of the tree.
   (a) 20 m (b) 26.39 m
   (c) 27.32 m (d) None of these
5. In how many ways, can five-digits even numbers be formed using the digits 3, 2, 5, 7, 6 exactly once and also when repetition of digits is allowed?
   (a) 48, 256 (b) 48, 1250
   (c) 24, 256 (d) 24, 512
6. $11^2 + \left(\frac{11^4}{11^3}\right) - 11 + \left(\frac{1}{2}\right) \times 11^2 = ?$
   (a) 302.5 (b) 281.5
   (c) 1211 (d) 181.5
7. Find the roots of the quadratic equation, $x^2 - 7x + 12 = 0$.
   (a) 3, 4 (b) 2, 3
   (c) 6, 2 (d) 1, 12
8. Lata has the same number of sisters as she has brothers, but her brother, Shyam has twice as many sisters as he has brothers. How many children are there in the family?
   (a) 7 (b) 8
   (c) 5 (d) 6
9. What is the smallest three-digit number which when divided by 6 leaves a remainder of 5 and when divided by 5 leaves a remainder of 3?
   (a) 125 (b) 209
   (c) 137 (d) 113
10. What is the value of 397 × 397 + 104 × 104 + 397 × 208?
    (a) 2,50,001 (b) 2,51,001
    (c) 2,60,101 (d) None of these
11. A boat takes 20 min and 30 min to cover a particular distance downstream and upstream respectively. If the speed of the boat in still water is 20 m/s, find the speed of the stream.
    (a) 4 km/hr (b) 8 m/s
    (c) 12 m/s (d) 4 m/s
12. An equilateral triangle has side 8 cm. The mid-points of the sides of this triangle are joined to form another triangle. Then, the mid-points of that triangle are joined to form yet another triangle. This process is repeated infinite number of times. Find the sum of the perimeters and that of the areas of all such triangles formed.
    (a) 48 cm, $\frac{64}{\sqrt{3}}$ cm^2 (b) 24 cm, $\frac{48}{\sqrt{3}}$ cm^2
    (c) 48 cm, $\frac{48}{\sqrt{3}}$ cm^2 (d) None of these
13. Five men take as much time to do a job as 10 women take. If 6 men take 10 days to complete a job working 4 hours per day, how much time would 10 women take to do a job twice as much as the former working 6 hr a day?
    (a) 12 days
    (b) 14 days
    (c) 16 days
    (d) 18 days

14. A and B can do a piece of work in 45 days and 40 days respectively. They began to do the work together but A leaves after some days and then B completed the remaining work in 23 days. Find the number of days after which A left the work.
    (a) 6 days (b) 8 days
    (c) 3 days (d) 9 days

15. If 3 men, or 4 boys, or 6 women take 10 days to do a job, how much time would they take to complete the same job working together?
    (a) $\frac{10}{3}$ days (b) 4 days
    (c) $\frac{11}{3}$ days (d) None of these

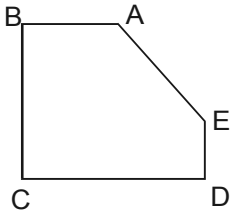
16. The third term of an arithmetic progression (AP) is 11 and the sixth term is 23. What is the 12th term? Find the sum of all the 12 terms.
    (a) 250 (b) 300
    (c) 354 (d) 350

17. If $\sec\theta + \tan\theta = 2$, then which of the following is true?
    (a) $5\cos^2\theta - 4\cos\theta = 0$
    (b) $4\cos^2\theta = 5\cos\theta$
    (c) $5\cos\theta = 4\sin\theta$
    (d) None of these

18. If (x + 2) is a factor of $x^4 - 4x^2 + 2ax + 3$, what is the value of a?
    (a) $-\frac{4}{3}$ (b) $-\frac{3}{4}$
    (c) $\frac{4}{3}$ (d) $\frac{3}{4}$

19. If 3 men or 5 women or 8 boys can finish a work in 38 days, then the number of days taken by 6 men, 10 women and 6 boys to finish the work is
    (a) 70 days (b) 20 days
    (c) 10 days (d) 8 days

20. The given figure is a plane of a field and the angles at B, C and D are all right angles.



    If AB = 15 m, BC = 30 m, CD = 22 m and DE = 6 m, the perimeter of the field is
    (a) 89 m (b) 98 m
    (c) 102 m (d) 80 m

21. After a conditioning camp of the Indian Cricket team, the final team of 11 players out of a total of 15 players is to be decided such that two players — Sehwag and Dravid are always chosen. Find the total number of ways the final team can be selected.
    (a) 312 (b) 1365
    (c) 715 (d) 1005

22. Six strings of a violin start vibrating simultaneously and they vibrate at 3, 4, 5, 6, 10 and 12 times in a minute. After how much time will all six of them vibrate together? How many times will they vibrate together in 30 min?
    (a) 60 min, 31 times
    (b) 60 sec, 31 times
    (c) 60 sec, 30 times
    (d) 120 sec, 31 times

23. P is any point on a circle whose centre is O. A chord which is parallel to the tangent at P bisects OP. If the length of the chord is 12 cm, the radius of the circle is
    (a) 4 cm (b) $4\sqrt{3}$ cm
    (c) 3 cm (d) $2\sqrt{5}$ cm

24. A can complete a task in 10 days while B can complete it in 15 days. If they work together for 6 days, what fraction of the work will be left?
    (a) $\frac{3}{5}$th (b) $\frac{2}{5}$th
    (c) $\frac{1}{6}$th (d) Work is completed

25. Sam can row 18 km travelling downstream in 4 hr. His return journey takes 12 hr. What is the speed of the current?
    (a) 1.5 km/hr (b) 3 km/hr
    (c) 5 km/hr (d) 6 km/hr

26. The radii of two cylinders are in the ratio of 2 : 3 and their heights are in the ratio of 5 : 3. Find the ratio of their volumes.
    (a) 10 : 9 (b) 3 : 7
    (c) 4 : 9 (d) 20 : 27

27. There are 5 boys and 3 girls. In how many ways can they be seated in a row so that all the three girls don't sit together?
    (a) 8! × 3! × 2! (b) 6! × 50!
    (c) 49 × 50! (d) 50 × 6!
28. A merchant has 100 kg of sugar, part of which he sells at 7% profit and the rest at 17% profit. He gains 10% on the whole. How much is sold at 17% profit?
    (a) 70 kg (b) 50 kg
    (c) 35 kg (d) 30 kg
29. Mohan Kumar is 8 km ahead of Ram chand. The speeds of Mohan Kumar and Ram Chand are 4 km/hr and 6 km/hr respectively. Ram Chand will overtake Mohan Kumar in:
    (a) 2 hrs (b) 1 hr 20 min
    (c) 4 hrs (d) 48 min
30. At an election in which there are only 2 candidates, a candidate, who gets 62% of the total votes polled, is elected by a majority of 288 votes. The total number of votes is:
    (a) 456 votes (b) 744 votes
    (c) 912 votes (d) 1200 votes

Answer Key

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

Explanations

1. c Since the distance remains constant, therefore we have

$D = ST$ … (i)

$D = (S + 5)\left(T - \frac{1}{3}\right)$ … (ii)

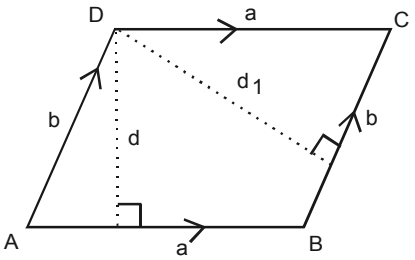
and $D = (S - 5)\left(T + \frac{1}{2}\right)$ … (iii)

(Where D is distance, S is original speed and T is original time.)

Solving them, we get S = 25 km/hr.

2. b The light signals will change after (LCM of 24, 30 and 42) or 840 seconds or 14 minutes after 1:30 or 1:44.

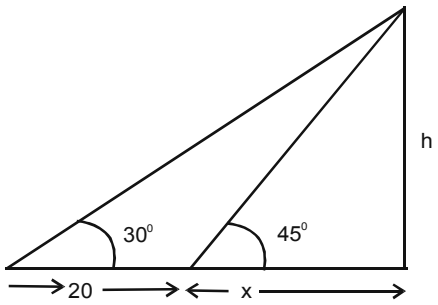
3. b



Area of the paralleogram = $ad = bd_1$

$\therefore d_1 = \frac{ad}{b}$

4. c



We have

$\tan 30^\circ = \frac{h}{20 + x}$ or $(20 + x)\frac{1}{\sqrt{3}} = h$

and $\tan 45^\circ = \frac{h}{x}$ or h = x

$\therefore (20 + h)\frac{1}{\sqrt{3}} = h$

$\therefore$ h = 27.32 m

5. b Since five-digit number is an even number, therefore unit place can be filled with any of the two numbers 2 or 6 and rest of the places can be filled in the manner 4 × 3 × 2 × 1

Thus, a five-digit even number using digits 3, 2, 5, 7, 6 exactly once can be formed in 2 × 4 × 3 × 2 × 1 = 48 ways.

And when repetition is allowed again unit place can be filled in two ways and rest of the places in 5 × 5 × 5 × 5 × 5.

Thus, with repetition, it can be formed in 5 × 5 × 5 × 5 × 2 = 1250 ways.

6. d Using BODMAS rule in the given expression

$11^2 + \left(\frac{11^4}{11^3}\right) - 11 + \left(\frac{1}{2}\right) \times 11^2$, we have

$= 11^2 + 11 - 11 + \frac{1}{2} \times 11^2$

$= 121 + \frac{1}{2} \times 121 = 121\left(1 + \frac{1}{2}\right) = 121 \times \frac{3}{2}$

$= \frac{363}{2} = 181.5$

7. a Given quadratic equation is

$x^2 - 7x + 12 = 0$

$\Rightarrow x^2 - 3x - 4x + 12 = 0$

$\Rightarrow x(x - 3) - 4(x - 3) = 0$

$\Rightarrow (x - 4)(x - 3) = 0 \Rightarrow x = 4$ or 3

8. a Let there be b brothers and s sisters in the family.

Lata has b brothers and (s – 1) sisters.

$\therefore b = s - 1$

$\Rightarrow s = b + 1$ … (i)

Her brother Shyam has (b – 1) brothers and s sisters.

$\therefore 2(b-1) = s$

or $2b - 2 = s$ … (ii)

Solving (i) and (ii), we get

$\Rightarrow b + 1 = 2b - 2 \Rightarrow b = 3$

and s = 3 + 1 = 4

Children in the family = 3 + 4 = 7

9. d When 5 divides a number it leaves a remainder of 3, last digit of the number has to be 8 or 3. Only one option has three as unit digit.

10. b The given expression of the form

$(397)^2 + (104)^2 + 2 \times 104 \times 397$

which is the formula of $(a + b)^2$.

Thus, the given expression

$= (397 + 104)^2 = (501)^2 = 251, 001.$

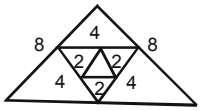
11. d Here, we have $\frac{20+v}{20-v}=\frac{30}{20}$

(where v is speed of the stream)

or 40 + 2v = 60 – 3v

or v = 4 m/s.

12. a The required figure is shown below:



Perimeter of all the triangles are 24, 12, 6, 3, ... and so on. We have that the series so obtained is in GP with common ratio $\frac{1}{2}$. Thus sum of the perimeter upto infinity = $\frac{24}{1-\frac{1}{2}}=48$ cm.

Areas of all the equilateral triangles so formed $\frac{\sqrt{3}}{4}\times 64, \frac{\sqrt{3}}{4}\times 16, \frac{\sqrt{3}}{4}\times 4$ ... and so on.

i.e. $16\sqrt{3}, 4\sqrt{3}, \sqrt{3}, \ldots$ and so on, which is again a series in GP with common ratio $\frac{1}{4}$.

Thus the sum of areas of all the triangles upto infinity

$$=\frac{a}{1-r}=\frac{16\sqrt{3}}{1-\frac{1}{4}}=\frac{64\sqrt{3}}{3}=\frac{64}{\sqrt{3}}\text{ cm}^2$$

13. c 6 men = 12 women

Number of women-hours of first job = 12 × 10 × 4 = 480

Number of women-hours of second job = 480 × 2 = 960

$\therefore$ Time taken by 10 women working 6 hr a day to finish the second job = $\frac{960}{10\times 6}=16$ days.

14. d A's one day work $=\frac{1}{45}$

B's one day work $=\frac{1}{40}$

Together they will do $=\frac{1}{40}+\frac{1}{45}=\frac{17}{360}$ work in one day

Let them work together for x days, then

the work done $=\frac{17}{360}\times x$

So, the remaining work $=1-\frac{17x}{360}=\frac{360-17x}{360}$.

Now B completes the remaining work in 23 days.

Thus, by convention, we have

23 days $\longrightarrow \frac{360-17x}{360}$

1 day $\longrightarrow \frac{1}{40}$

$\therefore \frac{23}{40}=\frac{360-17x}{360}$

$\Rightarrow 23\times 9=360-17x \Rightarrow x=9$ days.

15. a Three men can do the work in 10 days.

Four boys can also do the work in 10 days.

Six women can do the work in 10 days.

Hence, if all three groups work together, they will finish the work in $\frac{10}{3}$ days.

16. b Let a be the first term and d be the common difference of an AP.

Thus, third term is a + 2d = 11 … (i)

and sixth term is a + 5d = 23 … (ii)

Subtracting (i) from (ii), we get

3d = 12 $\Rightarrow$ d = 4

$\therefore$ a = 3

Now, 12th term = a + 11d = 3 + 44 = 47

Sum = $S_n=\frac{12}{2}(6+11\times 4)=6\times 50=300$.

17. a $\frac{1+\sin\theta}{\cos\theta}=2$

$\therefore 1+\sin\theta=2\cos\theta$ or $\sin\theta=2\cos\theta-1$

$\therefore \sin^2\theta=4\cos^2\theta-4\cos\theta+1$

or $1-\cos^2\theta=4\cos^2\theta-4\cos\theta+1$

or $5\cos^2\theta-4\cos\theta=0$.

18. d $a=\frac{3}{4}$. Using the remainder theorem,

f(–2) = 0 $\Rightarrow$ 16 –16 – 4a + 3 = 0 $\Rightarrow a=\frac{3}{4}$

19. d If 3 men can finish the job in 38 days,

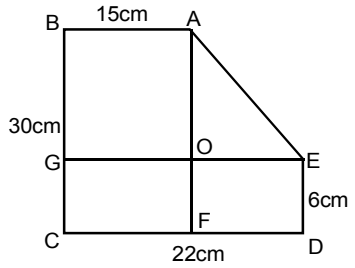
then 1 man in 1 day can do $\frac{1}{3\times 38}$ work.

Similarly, 1 woman in 1 day can do $\frac{1}{5\times 38}$ work

and 1 boy in 1 day can do $\frac{1}{8\times 38}$ work.

Now 6 men, 10 women and 6 boys finish the work in 1 day = $\frac{6\times 1}{3\times 38}+\frac{10\times 1}{5\times 38}+\frac{6\times 1}{8\times 38}=\frac{1}{8}$

$\therefore$ In 8 days they will finish the work.

20. b 

Draw AF perpendicular to CD and EG perpendicular to BC meeting at O. Then AO = 24 m and EO = 7 m

$\therefore AE^2 = AO^2 + EO^2 = 24^2 + 7^2 = 625$

$\therefore AE = 25$ m.

Hence, the perimeter of the field is

= (15 + 30 + 22 + 6 + 25) m = 98 m.

21. c 11 players out of 15 are to be chosen. But 2 of them are fixed — Sehwag and Dravid.

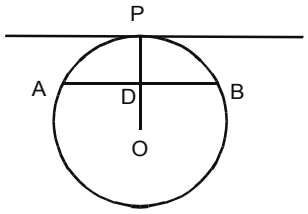
$\therefore$ Total number of ways = $^{15-2}C_{11-2} = {}^{13}C_9 = 715$.

22. b Six strings vibrate 3, 4, 5, 6, 10 and 12 times in a minute.

$\therefore$ These six strings vibrate every 20s, 15s, 12s, 10s, 6s and 5s.

LCM of 20, 15, 12, 10, 6 and 5 is 60.

$\therefore$ Every 60 sec they vibrate together and they will vibrate together 31 times in 30 minutes.

23. b 

Let r be the radius of the circle.

Then OD = $\frac{r}{2}$

$OB^2 = BD^2 + OD^2$

$r^2 = (6)^2 + \left(\frac{r}{2}\right)^2$, i.e. $\frac{3}{4}r^2 = 36$

$\therefore r^2 = 48$ or $r = 4\sqrt{3}$ cm.

24. d $\frac{1}{A} = \frac{1}{10}$ and $\frac{1}{B} = \frac{1}{15}$

In 1 day, part completed working together

$= \frac{1}{A} + \frac{1}{B} = \frac{1}{10} + \frac{1}{15} = \frac{3+2}{30} = \frac{5}{30} = \frac{1}{6}$

$\therefore$ In 6 days they will finish $6 \times \frac{1}{6} = 1$, i.e. whole work.

25. a Speed downstream = $\frac{18}{4}$ km/hr

Speed upstream = $\frac{18}{12}$ km/hr

Speed of the current

$= \frac{1}{2}$ (Speed downstream – Speed upstream)

$= \frac{1}{2}\left(\frac{18}{4} - \frac{18}{12}\right) = 1.5$ km/hr.

26. d The ratio of the volume of two cylinders

$= \frac{\pi(2r)^2\, 5h}{\pi(3r^2)3h} = \frac{4 \times 5}{9 \times 3} = \frac{20}{27}$.

27. d When there is no restriction 8 persons can be seated in 8! ways. But when all three girls sit together.

Consider the three girls as one, we have only 5 + 1 = 6 persons.

These 6 persons can be seated in 6! ways.

But there three girls can be arranged among themselves in 3! ways.

$\therefore$ Required number of ways in which all the three girls don't sit together = 8! – 6! × 3! = 6! (56 – 6) = 50 × 6!

28. d Let x be the quantity sold at 17% profit

By alligation,

$$\frac{\text{Quantity sold at 7\% gain}}{\text{Quantity sold at 17\% gain}} = \frac{\text{Price of sugar at 17\% – mean price}}{\text{Mean price – Price of sugar at 7\% gain}}$$

$$\frac{100 - x}{x} = \frac{17 - 10}{10 - 7}$$

$\therefore x = 30$ kg

29. c Distance to be covered = 8 km

Relative speed = 6 – 4 = 2km/hr

Time taken = $\frac{8}{2}$ = 4 hrs.

30. d Let the total votes polled be x.

$$\frac{62x}{100} - \frac{38x}{100} = 288$$

$$\frac{24x}{100} = 288$$

$$\therefore \quad x = \frac{288}{24} \times 100 = 1200 \text{ votes}$$