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REASONING & APTITUDE

CIVIL ENGINEERING

Date of Test : 21/08/2022

ANSWER KEY >

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

DETAILED EXPLANATIONS

1. (b)

Let the distance between start point and end point be D km

∴ According to statement of question,

$$\frac{x}{10} - \frac{x}{15} = 2$$

$$x = 60 \text{ km}$$

By travelling at 10 km/h he reaches at 1 pm so, it takes 6 hour to cover 60 km and hence he started at 7 am; therefore, in order to cover the distance by 12 noon. i.e. in 5 hours he should travel at 12 kmph.

2. (a)

According to given data,

$$20 \times t + 12(10 - t) = 150$$

$$8t + 120 = 150$$

$$t = \frac{30}{8} = \frac{15}{4}$$

The ratio of distance,

$$20 \times \frac{15}{4} : 12 \times \left(10 - \frac{15}{4}\right)$$

$$75 : 75$$

$$1 : 1$$

3. (d)

By checking through options

For $x = 4$

$$\sqrt{4 \times 4 - 9} + \sqrt{4^2 + 3^2} = \sqrt{7} + 5$$

⇒ $x = 4$ is correct option

4. (b)

Let the cost prices are $x, 2x, 4x$

Let the quantities are $2y, 5y, 2y$

$$\text{Total cost price} = 2xy + 10xy + 8xy = 20xy$$

$$\begin{aligned} \text{Total profit} &= \frac{10}{100} \times 2xy + \frac{20}{100} \times 10xy + \frac{25}{100} \times 8xy \\ &= 0.2xy + 2xy + 2xy = 4.2xy \end{aligned}$$

$$\text{Profit percentage} = \frac{4.2xy}{20xy} \times 100 = 21\%$$

5. (b)

 ΔABC is similar to ΔDBE \Rightarrow If

$$DE = 0.65 AC$$

$$DB = 0.65 AB$$

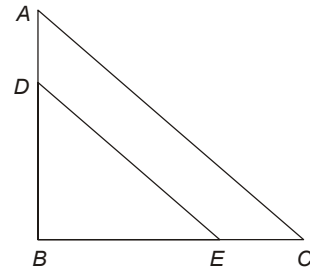
$$BE = 0.65 BC$$

$$\text{Initially area} = \frac{1}{2} \times AB \times BC = 34 \text{ cm}^2$$

$$\text{Changed area} = \frac{1}{2} \times BE \times DB = \frac{1}{2} \times 0.65AB \times 0.65BC$$

$$= \frac{1}{2} \times (0.65)^2 \times AB \times BC$$

$$= (0.65)^2 \times 34 = 14.365 \text{ cm}^2$$



6. (d)

$$\text{Volume of one tin} = \text{HCF}(140, 260, 320) = 20 \text{ litres}$$

$$\begin{aligned} \text{Total no. tins required} &= \frac{140}{20} + \frac{260}{20} + \frac{320}{20} \\ &= 7 + 13 + 16 = 36 \end{aligned}$$

7. (c)

Let the digits are x and y

According to given data,

$$10x + y - (10y + x) = x + y$$

$$9x - 9y = x + y$$

$$8x = 10y$$

$$4x = 5y$$

$$x = 5,$$

$$y = 4$$

$$\text{square of sum of digits} = (4 + 5)^2 = 81$$

8. (a)

Let the age of Rohini in 2014 is x years,His brother's age = $x - 6$ years

In 2004,

$$3(x - 6 - 10) = x - 10$$

$$3x - 48 = x - 10$$

$$2x = 38$$

$$x = 19$$

Rohini's age in 2014 is 19 years.

 \Rightarrow She was born in $2014 - 19 = 1995$

9. (a)

Let the weight of empty soda bottle is x gm and of soda of fully filled bottle is y gm

$$x + y = 1600$$

$$x + \frac{1}{3}y = 900$$

From here,

$$x = 550$$

$$y = 1050$$

Weight of empty soda bottle is 550 gm.

10. (d)

Minimum number of chocolates are possible when he purchase maximum number of costliest chocolate.

Thus, $2 \times 5 + 5 \times 2 = 20$

$$10 \times 10 = 100$$

\Rightarrow Total number of chocolates = $10 + 5 + 2 = 17$

11. (c)

$$C = \frac{A+D}{2}, D > B > C$$

$$B = \frac{A+E}{2}$$

$$A + D = 2C$$

$$A + E = 2B$$

Since $B > C \Rightarrow E > D$

$$C < B < D < E$$

Since C is average of A and D , so $A < C$

\Rightarrow The correct sequence is $A < C < B < D < E$

The middle number is B .

12. (a)

Let the weights are x_1, x_2, x_3 and x_4

Possible pairs,

$$x_1 - x_2, x_1 - x_3, x_1 - x_4,$$

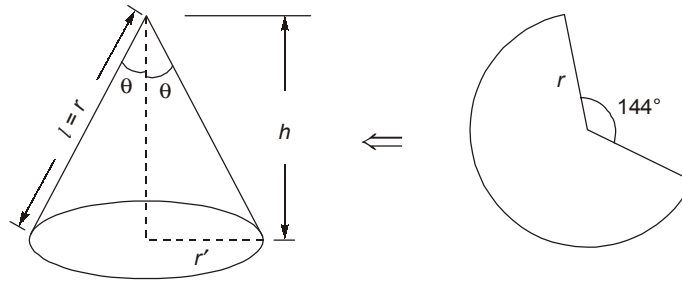
$$x_2 - x_3, x_2 - x_4,$$

$$x_3 - x_4,$$

$$\therefore \text{Average weight} = \frac{63 + 61 + 62 + 63 + 64 + 66}{6} = 62.5 \text{ gm}$$

But each envelope is added twice so. average weight = $\frac{62.5}{2} = 31.25$ gm

13. (c)

Height of cone formed be h

Slant height of cone so formed = radius of given circle

$$\Rightarrow l = r$$

Now circumference of base of cone = Circumference of given sector of circle

$$\Rightarrow 2\pi r' = 2\pi r \times \frac{360^\circ - 144^\circ}{360^\circ}$$

$$\Rightarrow r' = \frac{3}{5}r$$

$$\text{Now vertex angle} = 2\theta = 2\sin^{-1}\left[\frac{r'}{l}\right] = 2\sin^{-1}\left[\frac{3}{5}\right]$$

14. (a)

$$\begin{aligned} \text{Ratio of profit} &= 26000 \times 12 : 16000 \times 9 : 25000 \times C \\ &= 312 : 144 : 25C \end{aligned}$$

$$C\text{'s share} = \frac{25C}{312 + 144 + 25C} = \frac{3825}{15453}$$

From here, $C = 6$ $\Rightarrow C$ joined 3 months later than B joined.

15. (b)

Let total number of person = n Total number of handshakes = nC_2

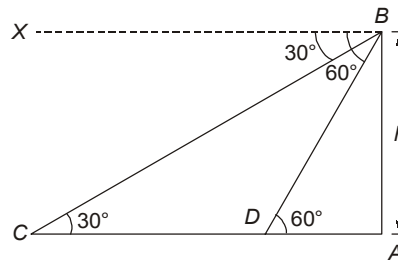
$$= \frac{n(n-1)}{2} = 78$$

$$n^2 - n - 156 = 0$$

$$n = 13, -12$$

 $\therefore n$ can't be negative, $n = 13$

16. (a)



From figure, $\tan 30^\circ = \frac{h}{AC}$
 $AC = h\sqrt{3}$... (i)

$\tan 60^\circ = \frac{h}{AD}$
 $AD = \frac{h}{\sqrt{3}}$... (ii)

Also, $CD = AC - AD$
 $= h\sqrt{3} - \frac{h}{\sqrt{3}} = \frac{2h}{\sqrt{3}}$

Time taken to cover CD is 10 min,

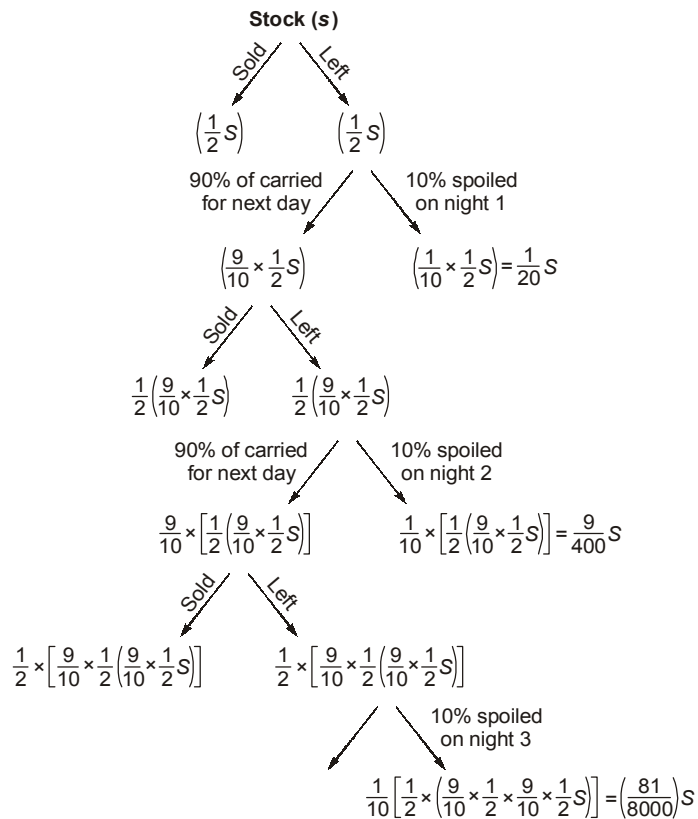
we know speed = $\frac{\text{Distance}}{\text{time}}$

$\therefore S = \frac{\frac{2h}{\sqrt{3}}}{10} = \frac{h}{5\sqrt{3}}$

\therefore time taken to cover, $AD = \frac{(\text{Distance } AD)}{\text{Speed}} = \frac{\left(\frac{h}{\sqrt{3}}\right)}{\left(\frac{h}{5\sqrt{3}}\right)} = 5 \text{ minutes}$

17. (b)

Let the stock that the seller has be 'S'. Then according to question, he sells half the stock and from the rest half 10% gets spoiled in overnight and then he is left only with the 90% of the half of the stock to be carried over for the next day.



Then according to question.

$$\frac{1}{20}S + \frac{9}{400}S + \frac{81}{8000}S = 1983$$

$$S = 24000$$

18. (b)

Marks in physics = 80

Marks in chemistry = 66

$$\text{Total marks required} = \frac{80}{100} \times (100 + 100 + 200) = 320$$

$$\begin{aligned} \text{Total marks in maths} &= 320 - 80 - 66 \\ &= 174 \end{aligned}$$

$$\% \text{ marks in maths} = \frac{174}{200} \times 100 = 87\%$$

19. (b)

Let Shahid's salary be S and Meera's salary be M .

According to question, $S + M = 28000$... (i)

Then Shahid's salary increases by 25%, the new salary becomes $1.25 S$ and Meera's salary increases by 12.5% then new salary become $1.125 M$.

Also it is given that new salary of Meera is 120% of new salary of Shahid.

$$1.125 M = 1.20 (1.25) S$$

$$M = \frac{120 \times 125 \times 1000 \times S}{100 \times 100 \times 1125} = \frac{4}{3} S$$

From equation (i),

$$\frac{4}{3} S + S = 28000$$

$$S = 12000$$

$$\begin{aligned} \therefore \text{New salary of Shahid} &= 1.25 S = 1.25 \times 12000 \\ &= ₹15000 \end{aligned}$$

20. (c)

Let the income of Anil and Mukesh be A and M respectively

\therefore According to question,

$$(A)_E + (M)_E = 8000 \quad \dots (i)$$

$$\text{Saving of Anil} = A - (A)_E$$

$$\therefore A - (A)_E = (M)_E$$

$$A = (M)_E + (A)_E$$

$$A = ₹8000 \quad \text{from (i),}$$

$$\therefore M = ₹12000 \quad \left(\because \frac{A}{M} = \frac{2}{3} \right)$$

$$\therefore \text{Total salary} = ₹20000$$

$$\begin{aligned} \text{Total saving} &= \text{Total salary} - \text{total expenditure} \\ &= ₹20000 - ₹8000 = ₹12000 \end{aligned}$$

21. (b)

A 4 O'clock, the hands of the watch are 20 minute spaces apart.

To be in opposite directions, they must be 30 min spaces apart.

\therefore Minute hand will have to gain 50 minute spaces

55 minute spaces are gained in 60 min

$$50 \text{ minute space are gained in } \left(\frac{60}{55} \times 50 \right) \text{ min or } 54 \frac{6}{11} \text{ min}$$

$$\therefore \text{Required time} = 54 \frac{6}{11} \text{ min past 4}$$

The answer is (b).

22. (d)

There is an increase in gold reserves during the years 1982-1983, 1984-1985, 1986-1987, 1987-1988 as compared to previous year as shown by bar-graph.

The percentage increase in reserves during these years compared to previous year are:

$$\text{For 1982-1983} = \left[\frac{(3720 - 2640)}{2640} \times 100 \right] \% = 40.91\%$$

$$\text{For 1984-1985} = \left[\frac{(3360 - 2520)}{2520} \times 100 \right] \% = 33.33\%$$

$$\text{For 1986-1987} = \left[\frac{(4320 - 3120)}{3120} \times 100 \right] \% = 38.46\%$$

$$\text{For 1987-1988} = \left[\frac{(5040 - 4320)}{4320} \times 100 \right] \% = 16.67\%$$

Clearly, the percentage increase over previous year is highest for 1982-1983.

The answer is (d).

23. (d)

$$\begin{aligned} \text{Volume of the large cube} &= (6^3 + 8^3 + 10^3) \\ &= 216 + 512 + 1000 = 1728 \text{ cm}^3 \end{aligned}$$

Let the edge of the large cube be x

$$\text{So, } x^3 = 1728$$

$$\Rightarrow x = 12 \text{ cm}$$

$$\begin{aligned} \therefore \text{Required ratio} &= \left(\frac{6 \times 12^2}{6 \times (6^2 + 8^2 + 10^2)} \right) = \frac{12^2}{36 + 64 + 100} \\ &= \frac{144}{200} = 18 : 25 \end{aligned}$$

The answer is (d).

24. (b)

Female population below poverty line for Punjab = 2.1 million

Let the male population below poverty line for Punjab be x million

$$\text{Then } 5 : 6 = x : 2.1$$

$$\Rightarrow x = \frac{2.1 \times 5}{6} = 1.75 \text{ million}$$

$$\therefore \text{Population between poverty line for Punjab} = (2.1 + 1.75) \text{ million} = 3.85 \text{ million}$$

Let the population above poverty line for Punjab be y million.

Since, 35% of population of Punjab is below poverty line, therefore, 65% of the total population of Punjab is above poverty line i.e. the ratio of population below poverty line to that above poverty line for Punjab is 35 : 65.

$$\therefore 35 : 65 = 3.85 : y$$

$$\Rightarrow y = \frac{65 \times 3.85}{35} = 7.15$$

$$\therefore \text{Population above poverty line for Punjab} = 7.15 \text{ million.}$$

So, male population above poverty line for Punjab = $\left(\frac{6}{13} \times 7.15\right)$ million = 3.3 million

The answer is (b).

25. (b)

Simple interest for 2 years = ₹550

Simple interest for 1 year = ₹ $\frac{550}{2}$ = ₹275

For the first year, SI and CI are same

∴ Compound interest for 1st year = ₹275

₹(605 – 550) = ₹55 is the interest earned during the second year on ₹275

∴ Rate of interest = $\frac{55}{275} \times 100 = 20\%$ pa

Now,

Investment in simple interest bond,

$$SI = \frac{PRT}{100}$$

$$\Rightarrow 275 = \frac{P \times 20 \times 1}{100}$$

$$\Rightarrow P = ₹1375$$

$$\text{Total sum} = ₹(1375 \times 2) = ₹2750$$

26. (b)

PQR is an isosceles triangle

∴ $\angle RPQ = \angle RQP$

Also $\angle RPQ + \angle RQP = (180 - 64)^\circ$

⇒ $2\angle RPQ = 116^\circ$

⇒ $\angle RQP = 58^\circ$

RQS is a right isosceles triangle; hence

$$\angle RQS = \angle RSQ = \frac{(180 - 90)^\circ}{2} = 45^\circ$$

Note that

$$\angle RQP + \angle RQS + \angle SQT = 180^\circ$$

$$\Rightarrow 58^\circ + 45^\circ + \angle SQT = 180^\circ$$

$$\Rightarrow \angle SQT = 77^\circ$$

SQT is a right triangle, hence

$$\angle QST = 90 - 77 = 13^\circ$$

27. (c)

While typing from 1 to 500 :

(i) 9 single digit numbers : from 1 to 9

(ii) 90 two digit numbers : from 10 to 99

Each number requires 2 key strokes

∴ 180 keystrokes

(iii) 401 three digit numbers : From 100 to 500

Each number requires 3 key strokes

∴ 1203 keystrokes

$$\begin{aligned} \text{Total} &= 9 + 180 + 1203 \\ &= 1392 \end{aligned}$$

28. (a)

For the largest right circular cone to be fitted in a cube, the base of the cone will touch all the vertical faces of the cube.

∴ The diameter of base of cone = Side of cube = 20 cm

∴ Radius = 10 cm

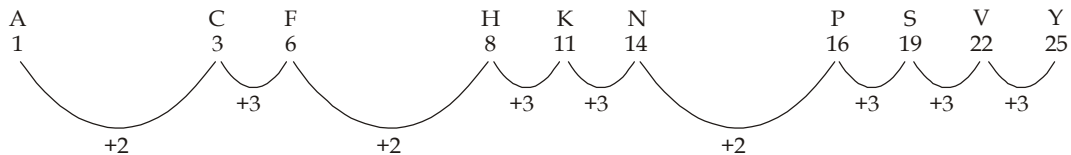
Height = 20 cm

$$\begin{aligned} \text{Volume} &= \frac{\pi r^2 h}{3} = \frac{1}{3} \times \pi \times 10^2 \times 20 \\ &= 2094.39 \text{ cm}^3 \end{aligned}$$

29. (c)

As water of a river flows, similarly water of a pool is stagnant. Option (c) is the most appropriate option. Though the other three options are close, but they are not used while talking about a still body of water like a pool.

30. (c)



So the required alphabets have to start with P and the common difference in terms is 3.

Hence, PSVY is the answer.

The answer is option (c).

