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Reasoning and Aptitude

CIVIL ENGINEERING

Date of Test : 20/07/2026

ANSWER KEY ➤

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

DETAILED EXPLANATIONS

1. (b)

Since '6' and '7' have been used in the product of 53 and 22, the numbers have to be using base '8' or '9'.

If we try with base '8', $(53)_8 = 8 \times 5 + 3 = (43)_{10}$

$$(22)_8 = 8 \times 2 + 2 = (18)_{10}$$

$$43 \times 18 = (774)_{10}$$

whereas, $(1276)_8 = 512 \times 1 + 64 \times 2 + 8 \times 7 + 6 = (702)_{10}$ which is NOT = 774

If we try with base '9', $(53)_9 = 9 \times 5 + 3 = (48)_{10}$

$$(22)_9 = 9 \times 2 + 2 = (20)_{10}$$

$$48 \times 20 = (960)_{10}$$

whereas, $(1276)_9 = 729 \times 1 + 81 \times 2 + 9 \times 7 + 6 = (960)_{10}$

Converting $(4371)_9 = 4 \times (729) + 3 \times (81) + 7 \times (9) + 1 = 3223$.

2. (d)

Being opposite in degree of measure, Sip is small quantities and gulp is take in large quantity. Similarly for drizzle and rain!

3. (d)

$$\begin{aligned} \text{Since } \left(x - \frac{1}{x}\right) &= 3\left(x - \frac{1}{x}\right)^2 = x^2 + \frac{1}{x^2} - 2 = 9 \text{ leading to } x^2 + \frac{1}{x^2} = 11 \\ \left(x^3 - \frac{1}{x^3}\right) &= \left(x - \frac{1}{x}\right)\left(x^2 + \frac{1}{x^2} + 1\right) = 3 \times 12 = 36 \end{aligned}$$

4. (b)

$$\begin{aligned} \text{Let, } \text{Jyoti's age} &= x \\ \text{Jyoti's mother's age} &= 6x \\ \therefore 3(x + 5) &= 6x \\ 3x + 15 &= 6x \\ 3x &= 15 \\ x &= 5 \end{aligned}$$

5. (b)

The word WORKSPACE contains 9 different letters.

When the vowels (OAE) are always together. They can be supposed to form one letter.

Then, we have to arrange the letters WRKSPC (OAE).

Now, 7 letters can be arranged in $7! = 5040$ ways.

The vowels (OAE) can be arranged among themselves in $3! = 6$ ways.

$$\therefore \text{ Required no. of ways} = (5040 \times 6) = 30240$$

6. (c)

$$\text{L.C.M of } 5, 6, 7, 8 = 840$$

$$\therefore \text{ Required number is of the form } 840k + 3$$

Least value of k for which $(840k + 3)$ is divisible by 9 is $k = 2$.

$$\therefore \text{ Required number} = 840 \times 2 + 3 = 1683$$

7. (b)

$$y = \sqrt{8 + 2\sqrt{8 + 2\sqrt{8 + \dots\infty}}}$$

$$y = \sqrt{8 + 2y}$$

Squaring both sides

$$y^2 = 8 + 2y$$

$$y^2 - 2y - 8 = 0$$

$$(y + 2)(y - 4) = 0$$

$$y = 4, -2$$

y can't be negative, so $y = 4$

8. (c)

One clock shows 10 pm (on 21st Jan, 2010)

One clock gains = 2 min

Other clock loses = 5 min

Time period between 10 pm and 4 pm = 18 hrs

$\therefore$ Required difference = $(2 \times 18 + 5 \times 18)$ min = 126 min

9. (b)

$$P = \text{Rs. } 600$$

$$A = \text{Rs. } 720$$

$$T = 4 \text{ years}$$

$$R = ?$$

$$R = \frac{\text{S.I.} \times 100}{P \times T} = \frac{120 \times 100}{600 \times 4} = 5\%$$

At 7% rate,

$$\text{S.I.} = \frac{600 \times 7 \times 4}{100} = 168$$

$$A = 600 + 168 = 768$$

10. (b)

The number of polygons = ${}^nC_2 - n$, where n is number of sides

$${}^nC_2 - n = 170$$

$$\frac{(n)(n-1)}{1.2} - n = 170$$

$$n^2 - n - 2n = 340$$

$$n^2 - 3n - 340 = 0$$

$$n = 20, -17$$

n can't be negative, so $n = 20$

11. (b)

A very simple question!

Using the property that the length of a tangents from an external point to the same circle are equal in length, we can write

$$BS = BR;$$

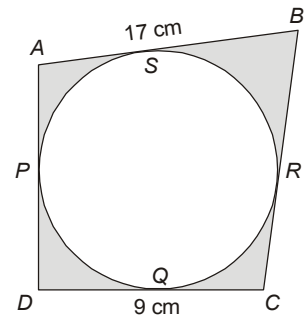
$$CR = CQ;$$

$$DQ = DP;$$

$$AP = AS$$

$$\begin{aligned} AB + BC + CD + DA &= 17 + (BR + RC) + 9 + (PD + PA) \\ &= 26 + (BS + SA) + (CQ + DQ) \end{aligned}$$

$$\begin{aligned} \text{(replacing } BR \text{ with } BS; AP \text{ with } AS; DP \text{ with } DQ \text{ and } CR \text{ with } CQ \text{ being equal)} \\ &= 26 + 17 + 9 = 52 \text{ cm} \end{aligned}$$



12. (d)

'd' i.e. 34

$$N = 126! - 125! = (125!) \times (126 - 1) = 125 \times 125!$$

The number of zeros at the end of N is dependent on the number of times '5' comes in the expansion of $125!$ which is equal to INTEGER value of $\frac{125}{5} + \frac{25}{5} + \frac{5}{5} = 25 + 5 + 1 = 31$ PLUS 3 more 5's since $125 = 5^3$ which gives total number of 5's as $31 + 3 = 34$ which is the number of Zeros at the end of N .

13. (c)

When we want to paint the surfaces of the cube, we are working with the total surface area of all 6 faces. In case of cube of 125 cc volume, each side is 5 cm long. This means that 2 liters of paint is required to cover an area of $6 \times (5 \times 5) = 150$ square cm.

In the second case, the total surface area to be covered is the total surface area of 125 cubes each with a volume of 1 cc i.e. a cube with each side 1 cm long. Total area to be painted in this case is $125 \times (1 \times 1) = 125$ square cm. Additional area to be painted is $750 - 150 = 600$ square cm which is 4 times the earlier area. This means that we need 4×2 liters = 8 liters as additional quantity of paint required to be used i.e. option (c).

14. (a)

	American	Chinese	Mediterranean	Continental
A	y	y		
B	y		y	
C		y	y	y
D	y	y		y

B and C feel sick and both of them ate Mediterranean. So, it must be Mediterranean which made them sick.

15. (a)

Given $AB \parallel DE$
 $\Rightarrow \angle B = \angle D$
 and $\angle A = \angle E$
 $\therefore \Delta ABC \sim \Delta EDC$ (AAA similarity)

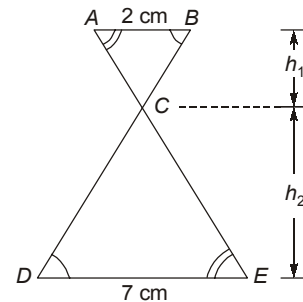
$$\Rightarrow \frac{h_1}{h_2} = \frac{AB}{DE} = \frac{2}{7}$$

and $h_1 + h_2 = 7.2 \text{ cm}$ (given)
 $\therefore h_1 = 1.6 \text{ cm}$ and $h_2 = 5.6 \text{ cm}$

$$\text{Area of } \Delta ABC = \frac{1}{2} \times 2 \times 1.6 = 1.6 \text{ cm}^2$$

$$\text{Area of } \Delta EDC = \frac{1}{2} \times 7 \times 5.6 = 19.6 \text{ cm}^2$$

$\therefore$ Sum of areas of ΔABC and $\Delta EDC = 21.2 \text{ cm}^2$



16. (a)

Let the mileage of Jagan's car be n km/liter of petrol when driven in the city and $(n + 3)$ km/liter when driven on the highway. Translating the given information in to an equation, we can write

$$\frac{42}{n+3} + \frac{77}{n} = 10$$

$$\Rightarrow 42n + 77n + 231 = 10n^2 + 30n$$

$$\text{or } 10n^2 - 89n - 231 = 0 \text{ which gives } n = 11 \text{ or } -2.1$$

Hence we can say that Jagan's car runs 11 km/liter in the city.

17. (c)

A question on P and C!

The number of handshakes in a room with ' n ' persons present is given by $n(n-1)/2$

$276 = n(n-1)/2$ i.e. $552 = n(n-1)$ which is the product of 2 consecutive integers. The value of ' n ' can be an integer which is close to $\sqrt{552}$ which is between 23 and 24 leading to 24 as the required answer.

18. (b)

Mercury and Zinc - both are metals.

19. (a)

The given system of equations can be interpreted as 4 possible pairs of linear equations, namely:

$x + 3y = 7$ and $2x + y - 10 = 3$ for $x \geq 0$ and $y \geq 10$ which leads us to get $y = 1/5$ i.e. NOT VALID

$-x + 3y = 7$ and $2x + y - 10 = 3$ for $x \leq 0$ and $y \geq 10$ which leads us to get $y = 27/7$ i.e. NOT VALID

$x + 3y = 7$ and $2x - (y - 10) = 3$ for $x \geq 0$ and $y \leq 10$ which leads us to get $x = 4$ i.e. NOT VALID

$-x + 3y = 7$ and $2x - (y - 10) = 3$ for $x \leq 0$ and $y \leq 10$ which leads us to get $y = 7/5$ and $x = -14/5$ which is the ONLY valid solution.

20. (b)

Volume of water flowing through the pipe in 1 sec

$$= 5 \times 30 \times 100 = 15000 \text{ cm}^3/\text{sec}$$

$$1000 \text{ cm}^3 = 1 \text{ L}$$

Volume of water flowing through pipe in 60 sec = 1 min = $15 \times 60 = 900$ L

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

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

The answer is (b).

22. (d)

Total possible outcomes = ${}^{27}C_2$

Favorable outcomes = Selecting any two authors $\times$ Selecting one book of each author

$$= {}^3C_2 \times {}^9C_1 \times {}^9C_1$$

$$\text{Probability} = \frac{3 \times 9 \times 9}{27 \times \frac{26}{2}} = \frac{9}{13}$$

23. (b)

$$\text{Man} \times \text{Day} = \text{Man} \times \text{Day}$$

$$20 \times 30 = 600$$

Let workers leave after x days then

$$20x + 15(35 - x) = 600$$

$$20x + 525 - 15x = 600$$

$$5x = 75$$

$$x = 15$$

24. (a)

$$\text{Average speed} = \frac{\text{Distance Covered}}{\text{Time Taken}}$$

$$\begin{aligned}
 &= \frac{\frac{D}{3} + \frac{D}{3} + \frac{D}{3}}{\frac{D}{3} \times \frac{1}{20} + \frac{D}{3} \times \frac{1}{10} + \frac{D}{3} \times \frac{1}{60}} \\
 &= \frac{3}{\frac{1}{20} + \frac{1}{10} + \frac{1}{60}} = \frac{3}{\frac{3+6+1}{60}} \\
 &= \frac{3 \times 60}{10} = 18 \text{ km/h}
 \end{aligned}$$

25. (c)

Let bus started with x number of passengers.

$$\text{After 1st stop, no. of passengers} = x - \frac{x}{5} + 40 = \frac{4x + 200}{5}$$

$$\text{After 2nd stop, no. of passengers} = \frac{4x + 200}{5} - \frac{4x + 200}{5 \times 2} + 30$$

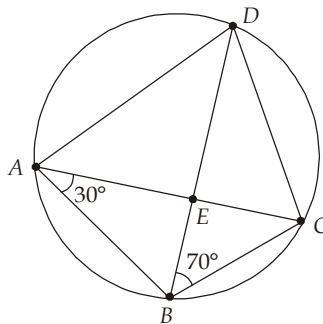
$$\frac{4x + 200}{5 \times 2} + 30 = 70$$

$$\frac{4x + 200}{10} = 40$$

$$4x = 400 - 200$$

$$x = 50$$

26. (a)



$$\angle CAD = \angle DBC = 70^\circ \quad (\text{Angles in the same segment})$$

$$\begin{aligned} \therefore \angle DAB &= \angle CAD + \angle BAC \\ &= 70^\circ + 30^\circ \\ &= 100^\circ \end{aligned}$$

$$\text{But, } \angle DAB + \angle BCD = 180^\circ \quad (\text{Opposite angle of cyclic quadrilateral})$$

$$\text{So, } \angle BCD = 180^\circ - 100^\circ = 80^\circ$$

$$\text{Now, we have } AB = BC$$

$$\text{Therefore, } \angle BCA = 30^\circ$$

$$\text{Again, } \angle DAB + \angle BCD = 180^\circ \quad (\text{Opposite angle of cyclic quadrilateral})$$

$$100^\circ + \angle BCA + \angle ECD = 180^\circ$$

$$100^\circ + 30^\circ + \angle ECD = 180^\circ$$

$$\angle ECD = 50^\circ$$

27. (d)

100 years contain 5 odd days

$\therefore$ Last day of 1st century is Friday

200 years contain $5 \times 2 = 3$ odd days

$\therefore$ Last day of 2nd century is Wednesday

300 years contain $5 \times 3 = 15 = 1$ odd day

Last day of 3rd century is Monday

400 years contain odd day

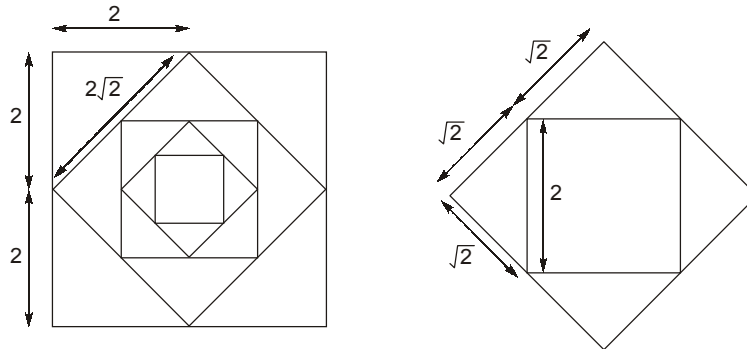
∴ Last day of 4th century is Sunday

This cycle is repeated

∴ Last day of century can not be Tuesday, Thursday or Saturday.

28. (b)

Outer most square area = 16



$$\text{Area} = (2\sqrt{2})^2 = 4 \times 2 = 8 \text{ units}$$

$$\text{Area of inner square} = 2 \times 2 = 4 \text{ units}$$

$$\text{Area} = 16 + 8 + 4 + 2 + 1 + \dots$$

$$\frac{16}{1 - \frac{1}{2}} = 32 \text{ square units}$$

$$= 32$$

29. (d)

Suppose the present day of Shyam and Puneet is X and Y.

$$\text{Then, } \frac{X-6}{Y-6} = \frac{6}{5} \quad \dots(i)$$

$$\frac{X+4}{Y+4} = \frac{11}{10} \quad \dots(ii)$$

By solving (i) and (ii)

$$Y = 16, X = 18$$

Ratio of their present age

$$X : Y \Rightarrow 18 : 16$$

$$\Rightarrow 9 : 8$$

30. (d)

