

CLASS TEST

S.No. : 02 GH1_ME_A_160519

Reasoning & Aptitude



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CLASS TEST 2019-2020

MECHANICAL ENGINEERING

Reasoning & Aptitude

Date of Test : 16/05/2019

Answer Key

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

DETAILED EXPLANATIONS

1. (a)

S1 is 'particular affirmative' type of statement whereas S2 is Universal affirmative. S1 & S2 combined lead to 'particular affirmative' i.e. 'some guitars are doors' which can also be interpreted as 'some doors are guitars' i.e. C1. Now S3 is also 'particular affirmative' and 'some doors are guitars' do not lead to any conclusion which means no conclusion can be made regarding tablets and guitars i.e. C3 is not possible. C2 is also NOT possible since no conclusion is possible regarding books and posters; hence only C1 follows leading to option (a).

2. (b)

Let us form equations based on the given information. If 'a', 'b', 'c' are the number of marbles in the 3 boxes respectively, we can write

$$a + b + c = 249 \quad \dots(1)$$

$$5 \times (a - 36) = b + 36 \text{ or } b = 5a - 216$$

...

and

$$b - 21 = 1.5 \times (c + 21)$$

...

Solving the 3 equations, we get

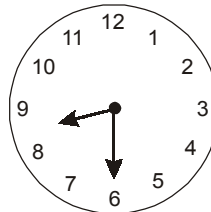
$$a = 69, b = 129 \text{ and } c = 51.$$

To get equal number of marbles in 'A' and 'B', we have to transfer from box 'B' and the number of marbles to be transferred = $\frac{129 - 69}{2} = 30$.

3. (b)

Because Sohan eats more than Mohan and Raghav eats more than Sohan. Hence, Rathav eats more than Mohan.

4. (c)



Angle between hour and minute hands = Angle between 6 and 7 + angle between 7 and 8 + angle between 8 and 8: 30

$$= 30^\circ + 30^\circ + 15^\circ = 75^\circ$$

5. (b)

The number of polygons = ${}^n C_2 - n$, where n is number of sides

$${}^n C_2 - n = 170$$

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

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

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

$$n = 20, -17$$

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

6. (d)

$$4 \text{ leaps of dog} = 5 \text{ leaps of cat}$$

$$5 \text{ leaps of dog} = \frac{25}{4} \text{ leaps of cat}$$

$$\frac{\text{speed of dog}}{\text{speed of cat}} = \frac{\frac{25}{4}}{6} = \frac{25}{24}$$

7. (a)

Formula $a\left(\frac{a-b}{a}\right)^n$

$$\text{Amount of milk left} = 90\left(\frac{90-9}{90}\right)^3 = 90\left(\frac{81}{90}\right)^3 = 65.61\text{kg}$$

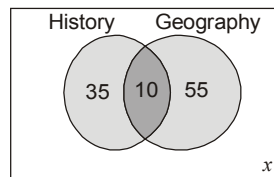
8. (a)

$$122 = 11^2 + 1$$

$$82 = 9^2 + 1$$

$$50 = 7^2 + 1$$

9. (c)



$$x = 150 - 35 - 10 - 55 = 50$$

10. (a)

$$\frac{1}{1+\sqrt{2}} + \frac{1}{\sqrt{2}+\sqrt{3}} \dots\dots\dots \frac{1}{\sqrt{15}+\sqrt{16}}$$

Rationalising each term

$$= \frac{1-\sqrt{2}}{1-2} + \frac{\sqrt{2}-\sqrt{3}}{2-3} + \frac{\sqrt{3}-\sqrt{4}}{3-4} \dots\dots\dots \frac{\sqrt{15}-\sqrt{16}}{15-16}$$

$$= -1[1-\sqrt{2} + \sqrt{2}-\sqrt{3} \dots\dots\dots + \sqrt{15}-\sqrt{16}] = -1[1-4] = 3$$

11. (a)

First hour Radha mows 1/4th of the field

Second hour Meera mows 1/6th of the field

$$2 \text{ hours} \left(\frac{1}{4} + \frac{1}{6}\right) = \frac{5}{12} \text{ of the field is mown}$$

$$\text{In 4 hours } \frac{5}{12} \times 2 = \frac{5}{6} \text{ of the field is mown}$$

$$\text{Rest work} = 1 - \frac{5}{6} = \frac{1}{6}$$

Radha will finish the mow of $\frac{1}{6} \div \frac{1}{4} = \frac{1}{6} \times 4 = \frac{2}{3}$

$$\text{total hours} = 4\frac{2}{3} \text{ hr}$$

12. (b)

Based on information given, a medium cartridge can print $3 * 600/2$ i.e. 900 pages and a large cartridge can print $3 * 900/2$ i.e. 1350 pages. Difference in the number of pages that can be printed by a large and a small cartridge is $1350 - 600 = 750$ pages

13. (b)

Let the original set of numbers start with 'p' and the last number will be $p + N - 1$.

Since the numbers are increased by 1, 2, 3,, N respectively, the gross addition to the original sum is

$$\frac{N(N+1)}{2} \text{ leading to increase in the average of the original numbers as } \frac{(N+1)}{2} = 24 \text{ (given) leading to } N$$

$$= 48 - 1 = 47$$

Since the last number in the revised list is $118 = (p + N - 1) + N$ and $N = 47$, we get $p = 118 - 93 = 25$

To find the 12th number in the original set of consecutive numbers starting with $p (= 25)$, we will add $(12 - 1)$ to 25 i.e. $= 25 + 12 - 1 = 36$.

14. (b)

$$\text{Price of 1 pencil} = ₹ P$$

Quantity bought before reduction = Q

$$PQ = 75$$

...(i)

$$\text{reduced price} = P - \frac{P \times 33.33}{100} = \frac{2}{3} P$$

$$\frac{2}{3} P(Q + 25) = 75$$

$$PQ + 25P = 75 \times \frac{3}{2}$$

$$25P = \frac{75}{2}$$

$$\text{Original price } P = \frac{3}{2} = ₹ 1.5$$

$$\text{Reduced price} = \frac{2}{3} \times P = ₹ 1$$

15. (c)

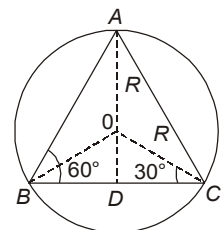
$$BD = CD = R \cos 30^\circ = R \times \frac{\sqrt{3}}{2}$$

$$BC = AB = CA = 2 \times CD$$

$$= 2R \times \frac{\sqrt{3}}{2} = R\sqrt{3}$$

$$\text{Area of triangle} = \frac{\sqrt{3}}{4} \times a^2 = \frac{\sqrt{3}}{4} \times (R\sqrt{3})^2$$

$$= \frac{3\sqrt{3}}{4} \times R^2$$



$$\text{Area of circle} = \pi R^2$$

$$\text{Ratio} = \frac{3\sqrt{3}}{4} \times R^2 : \pi R^2 = 3\sqrt{3} : 4\pi$$

16. (a)

From the given conditions, for the four positions available:

5 cannot come at the first place. So 6, 7 and 8 can appear there.

8 cannot come at the last place. So 5, 6 and 7 can appear there.

6 and 7 cannot immediately follow each other. So 67 and 76 is not allowed.

5 cannot be immediately followed by 7. So 57 is not allowed.

Let us list the possible numbers now 6875 possible, does not violate any condition

6587 possible, does not violate any condition

7586 possible, does not violate any condition

7856 possible, does not violate any condition

7865 possible, does not violate any condition

8756 possible, does not violate any condition

Hence, answer is (a). Total 6 numbers are possible.

17. (c)

$$x^{x\sqrt{x}} = (x\sqrt{x})^x$$

Taking Log both sides

$$x\sqrt{x} \text{ Log } x = x \text{ Log}(x\sqrt{x})$$

$$x\sqrt{x} \text{ Log } x = x \text{ Log } x^{3/2}$$

$$x^{3/2} \text{ Log } x = \frac{3x}{2} \text{ Log } x$$

$$\frac{2}{3} \frac{x^{3/2}}{x} = 1$$

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

$$x = \frac{9}{4} = 2.25$$

18. (d)

Let original workers be x

actual number of workers $x - 7$

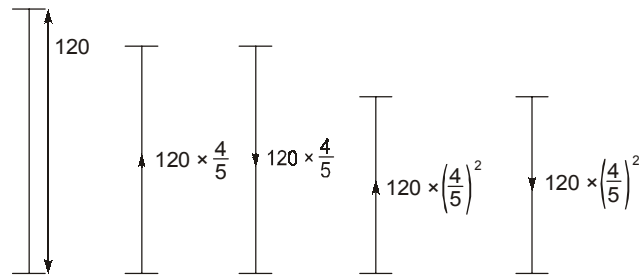
Man days required in both cases

$$x(24) = (x - 7)30$$

$$\Rightarrow x = 35$$

$$\text{Actual number of workers} = 35 - 7 = 28$$

19. (b)



$$\begin{aligned}
 \text{Total distance} &= 120 + 2 \times 120 \times \frac{4}{5} + 2 \times 120 \times \left(\frac{4}{5}\right)^2 + \dots + \infty \\
 &= 2 \times 120 + 2 \times 120 \times \left(\frac{4}{5}\right) + 2 \times 120 \times \left(\frac{4}{5}\right)^2 + \dots - 120 \\
 &= 2 \times 120 \left(1 + \frac{4}{5} \times \left(\frac{4}{5}\right)^2 + \dots + \infty \right) - 120 \\
 &= 2 \times 120 \times \frac{1}{1 - \frac{4}{5}} - 120 \\
 &= 1200 - 120 = 1080 \text{ m}
 \end{aligned}$$

20. (d)

RT, RO, RL, OL.

21. (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 = $15 \times 60 = 900 \text{ L}$

22. (a)

Average monthly income = ₹ 5000

Total monthly income of family of 10 = ₹ 50000

If two persons annual income increases by ₹ 60000 each, the monthly income of both increases by ₹ 5000 each.

So total monthly income now becomes ₹ 60000

So average monthly income now becomes = ₹ 6000

23. (b)

$$P(\text{A winning in 1}^{\text{st}} \text{ throw}) = \frac{1}{6}$$

$$P(\text{A winning in 3}^{\text{rd}} \text{ throw}) = \frac{5}{6} \cdot \frac{5}{6} \cdot \frac{1}{6}$$

$$P(\text{A winning in 5}^{\text{th}} \text{ throw}) = \frac{5}{6} \cdot \frac{5}{6} \cdot \frac{5}{6} \cdot \frac{5}{6} \cdot \frac{1}{6}$$

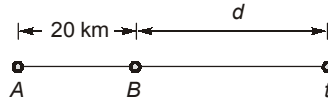
$$P(\text{A wins}) = \frac{1}{6} \left(1 + \left(\frac{5}{6}\right)^2 + \left(\frac{5}{6}\right)^4 + \dots \right)$$

$$= \frac{1}{6} \cdot \frac{1}{1 - \left(\frac{5}{6}\right)^2} = \frac{6}{11}$$

[infinite GP]

$$P(B \text{ wins}) = 1 - \frac{6}{11} = \frac{5}{11}$$

24. (c)



Let A overtake B after time t hours

$$\text{Distance travelled by A} = 45 \times t \text{ km}$$

$$\text{Distance travelled by B} = 36 \times t \text{ km}$$

so, $45 \times t = 36 \times t + 20$

$$9 \times t = 20$$

$$t = \frac{20}{9} \text{ hours}$$

\Rightarrow Distance travelled by A before he overtakes B is

$$= 45 \times t$$

$$= 45 \times \frac{20}{9} = 100 \text{ km}$$

25. (d)

Let side of square = x cm

Area $x^2 = 144$

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

$$\text{Perimeter of square} = 12 \times 4 = 48 \text{ cm}$$

The sides of rectangle are $5x$ and $11x$

$$\text{Perimeter of rectangle} = (5x + 11x) \times 2 = 48 \text{ cm} \quad [\because \text{length of wire is fixed}]$$

$$x = 1.5$$

$$\text{Area of rectangle} = 5 \times 1.5 \times 11 \times 1.5 = 123.75 \text{ cm}^2$$

26. (b)

If the number of rows and number of columns are to be equal, then the total number of trees should be a perfect square. As 1500 is not a perfect square, find a perfect square nearest to 1500. Its 1521, which is square of 39. So he needs to add 21 more trees to get 1521.

27. (b)

$$\text{Initial volume } V = \frac{1}{3} \pi r^2 h$$

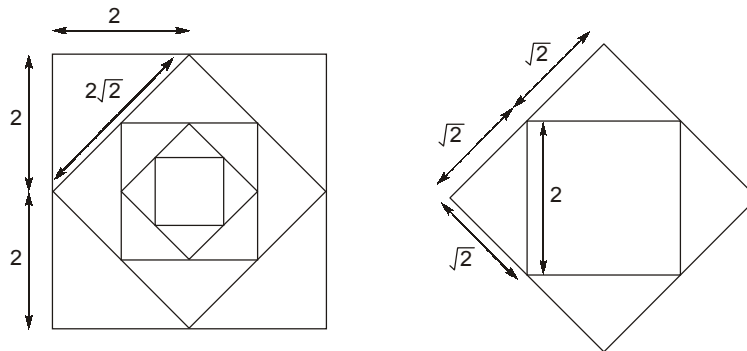
$$\text{Final volume} = \frac{1}{3} \pi \left(r - \frac{50}{100} r\right)^2 \left(h + \frac{200}{100} h\right) = \frac{1}{3} \pi \left(\frac{r}{2}\right)^2 \cdot 3h$$

$$= \frac{1}{3} \pi^2 h \cdot \frac{3}{4} = \frac{3}{4} V$$

$$\% \text{ decrease in volume} = \frac{V - \frac{3}{4} V}{V} \times 100\% = 25\%$$

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. (c)

Based on the constraints there could be two types of teams:

1. One with both Jhanvi and Sulochna.
2. One without either.

1. No. of ways to select team with both Jhanvi and Sulochna = 7C_3
 (Select the other three team members as Jhanvi and Sulochna are given) = 35.

2. No. of ways to select a team without Jhanvi and Sulochna. = ${}^7C_5 = 21$.

Total numbers of teams possible is 1 + 2.

Hence No. of teams = 35 + 21 = 56.

30. (d)

Simple LCM problem. Take the LCM of 12, 16, 24 and 30 which comes out to be 240 minutes i.e. 4 hours.
 Add to 6'o clock. The time is 10 : 00 hours.

