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REASONING AND APTITUDE

EC & EE

Date of Test : 14/07/2024

ANSWER KEY ➤

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

DETAILED EXPLANATIONS

1. **(b)**

2. **(c)**

As code must include all the three letters then pattern of the code word is *ABCX* where *X* can be any letter out of *A, B,* and *C*. So we can have the code word consisting of letters:

ABCA;

ABCB;

ABCC.

We can arrange letters in each of above 3 cases in $\frac{4!}{2!}$ number of ways (as each case has 4 letters out of which one is repeated twice), so total number of code words is $3 \times \frac{4!}{2!} = 36.$

3. **(d)**

Initial solution is "half water/half alcohol mix" means it's 50% (0.5) alcohol solution.

Let the portion replaced be x and the volume of initial solution be 1 unit.

Then the amount of alcohol after removal of a portion will be $0.5\ (1 - x)$ and the amount of alcohol added will be $\mathbf{0.25}x$, so total amount of alcohol will be $(1 - x) + 0.25x$. On the other hand as in the end 30% alcohol solution was obtained then the amount of alcohol in the end was 0.3×1.

So $0.5\ (1 - x) + 0.25x = 0.3 \Rightarrow x = 0.8$, or 80%.

4. **(a)**

From figures, we conclude that 2, 3, 5 and 6 are adjacent to 1. Therefore, 4 lies opposite 1. Hence, when 4 is at the bottom, then 1 must be on the top.

5. **(c)**

Let the number of children in the lift is x

Now, $$\frac{6}{18} + \frac{10}{24} + \frac{x}{32} = 1$$

$$\frac{x}{32} = 1 - \frac{1}{3} - \frac{5}{12}$$

Maximum number of children that can board the lift $x = \frac{32}{4} = 8$ children

6. **(b)**

A careful look will tell you that each subsequent term is made by multiplying the digits of the number i.e. 77 is followed by $7 \times 7 = 49$ which is followed by $4 \times 9 = 36$ and that leads us to the next number being $3 \times 6 = 18$.

7. **(c)**

Let the cost price of article is CP

When 20% discount is given, SP becomes 80% of CP which is ₹24.

80% of CP = 24

$$\frac{80}{100}\text{CP} = 24$$

$$\frac{4}{5}\text{CP} = 24$$

$$\text{CP} = 24\times\frac{5}{4} = ₹30$$

Now if 30% discount is given SP becomes 70% of CP

$$\text{New selling price} = \frac{70}{100}\times 30 = ₹21$$

8. (d)

Using conventional approach, we can say that if all 3 pipes are opened simultaneously, in one hour they will fill up $\frac{1}{10}+\frac{1}{15}+\frac{1}{18}=\frac{9+6+5}{90}=\frac{20}{90}=2/9^{\text{th}}$ of the vessel. This leads to the entire vessel getting filled up in $\frac{9}{2}$ hours or 270 minutes .Time required to fill up 60% of the vessel will be 270 × 60% = 162 minutes.

9. (d)

In this coding language, the letters are written such that one letter from right end followed by one letter from left end.

DISTANCE = EDCINSAT
ACQUIRE = EARCIQU

10. (d)

95 + 20.5 = 115.5
115.5 + 22.5 = 138
138 + 24.5 = 162.5
162.5 + 26.5 = 189

11. (b)

The series will be of the form : 101, 104, 107.....995, 998.

It will have a total of 300 terms (999 – 100 + 1 = 900. Take $\frac{1}{3}$ of this, since only 1 term is there in every 3)

Now,

$$\text{Sum} = \frac{(1^{\text{st}}\text{ number} + n^{\text{th}}\text{ number})\times n}{2}$$

$$= \frac{(101+998)\times 300}{2}$$

$$= \frac{1099\times 300}{2}$$

$$= 164{,}850$$

12. (d)

There are a total of 18 shirts : 8 blue and 10 non blue.

P (selecting at least 1 blue shirt) = 1 – P (selecting no blue shirts)

Assuming no replacement

P (selecting first non-blue shirt) = $\frac{10}{18}$

P (selecting second non-blue shirt) = $\frac{9}{17}$

P (selecting no blue shirts) = $\frac{10}{18}\times\frac{9}{17}=\frac{10}{34}$

$\therefore$ P (selecting at least 1 blue shirt) = $1-\left(\frac{10}{34}\right)=\frac{24}{34}=\frac{12}{17}$

13. (a)

Milk = m litres;

Water = w litres;

Cost of $(m + w)$ litres = 6.4 m;

Selling price of $(m + w)$ litres = 8 $(m + w)$.

Given that 6.4 m × 1.375 = 8 $(m + w)$ $\Rightarrow \frac{w}{m}=\frac{1}{10}$.

14. (b)

Since the two semi circles are congruent, they intersect at the top of the arc.

We can divide this into 3 regions

I. A quarter circle with radius 2 (Area = $\frac{\pi\times2\times2}{4}=\pi$)

II. A square with side 2 (Area = 2 × 2 = 4)

III. Another quarter circle with radius 2 (Area = $\frac{x\times2\times2}{4}=\pi$)

Total = 4 × 4 = 16

Shaded Area = Total Area – I – II – III

$\therefore$ Shaded Area = 16 – π – 4 – π = 12 – 2π

15. (d)

Let the weight of 24% solution used be x grams, weight of alcohol in it would be 0.24x.

As in final solution strength decreased by $\frac{1}{3}$ thus it became $24\times\frac{2}{3}=16\%$.

Set the equation : 0.24x = 0.16 $(x + 200)$, the weight of 16% alcohol in $(x + 200)$ grams of new solution comes only from (equal to) 24% alcohol in x grams of strong (initial) solution, as there is 0 grams of alcohol in water (0% alcohol solution)

$\Rightarrow$ 0.08x = 32

$\Rightarrow$ x = 400

16. (d)

Option (d) i.e. 'stalking' here refers to a silent approach of the lioness towards the 3 month old kid. She straight away walked up to the kind once the kid started crying (bleating) giving up all caution.

17. (b)

C1 – P5 – SUN
C2 – P3 – TUE
The sequence of programs based on channels is C7-C3-C4-C6
Since neither C7 nor C3 telecasts on MON, the only channel left is C5 which telecasts a program on MON.
P1 is followed by P6 and C4 telecasts neither P1 nor P6 implies that C4 telecasts P4 and the days for C7-C3-C4-C6 are Wed/THU/FRI/SAT.

18. (c)

Lets assume $|x-2| = m$
Now $m^2 + m - 2 = 0$
$\Rightarrow (m-1)(m+2) = 0$
only admissible value is $m = 1$ ($\because m = -2$ as $m \geq 0$)
$\Rightarrow |x-2| = 1$
Now $x = 3, 1$
Now sum of real roots $= 3 + 1 = 4$

19. (b)

Given, $3^a = 4$, means $4^b = (3^a)^b = 3^{ab}$; likewise keep replacing successive values.
We will end up getting $3^{abcdef} = 9 = 3^2$ or $abcdef = 2$.

20. (b)

The angle traversed by hour hand
$= 6 \times 30° + 15° = 195°$
The angle traversed by minute hand
$= 6 \times 360° + 180° = 2340°$

$$\text{Ratio} = \frac{2340}{195} = 12$$

21. (c)

Let the total number of voter $= x$

Among these voters $\frac{4x}{5}$ wants to vote for person A and $\frac{x}{5}$ wants to vote for person B.

On election days,

Total number of voters who vote for person $A = \frac{4x}{5} \times 0.9 = \frac{3.6x}{5}$

Total number of voters who vote for person is $= \frac{x}{5} \times 0.8 = \frac{0.8x}{5}$

$\therefore \quad \frac{3.6x}{5} = 216$

$$x = 300$$

So, on election day total number of votes polled

$$= \frac{3.6x}{5} + \frac{0.8x}{5}$$

$$= \frac{3.6\times300}{5} + \frac{0.8\times300}{5} = 216 + 48 = 264$$

22. (c)

When the grapes become dry, then the weight of their water part gets reduced, but weight of other parts remains the same.

Let the weight of dry grapes is x kg.

then $20 \times 0.1 = x \times 0.8$

$$x = \frac{2}{0.8}$$

$$x = 2.5 \text{ kg}$$

23. (c)

Let the length of the middle sized piece is x cm.

Then, length of largest piece $= 3x$ cm

Length of shortest piece $= (3x - 46)$ cm

$\Rightarrow 3x + x + 3x - 46 = 80$

$\Rightarrow 7x = 126$

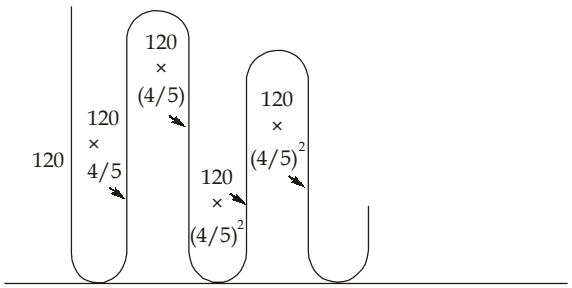
$\Rightarrow x = 18$

Length of the shortest piece $= 3x - 46$

$= 54 - 46 = 8$ cm

24. (c)

Initial height = 120 m



Total distance

$$= 120 + 2\times\left[120\times\frac{4}{5} + 120\times\left(\frac{4}{5}\right)^2 + 120\times\left(\frac{4}{5}\right)^3 \ldots\right]$$

$$= 120 + 2\times120\times\frac{4}{5}\left[1 + \left(\frac{4}{5}\right) + \left(\frac{4}{5}\right)^2 + \ldots\right]$$

$$= 120 + 192\times\frac{1}{1-\frac{4}{5}} = 120 + 192 \times 5 = 1080 \text{ meters}$$

25. (b)

$$\log_{10}^{\sqrt{x}} = \frac{1}{2}\log_{10}^{x}$$

$\therefore$ The equation becomes,

$$\log_{10}^{x} - \frac{1}{2}\log_{10}^{x} = 2\log_{x}^{10}$$

$$\Rightarrow \quad \frac{1}{2}\log_{10}^{x} = \frac{2}{\log_{10}^{x}}$$

$$\Rightarrow \quad \left(\log_{10}^{x}\right)^2 = 4$$

$$\Rightarrow \quad \log_{10}^{x} = 2 \text{ or } \log_{10}^{x} = -2$$

$$\Rightarrow \quad x = 100 \text{ or } x = \frac{1}{100}$$

From the given options x can taken the only value equal to 100.

26. (d)

Let equal sides of the isosceles triangle be x,

Then $x^2 + x^2 = 10^2$

$$x = 5\sqrt{2} \text{ cm}$$

So, $$\text{Final area} = 8 \times \left(\frac{1}{8} \times \pi \times 10^2 - \frac{1}{2} 5\sqrt{2} \times 5\sqrt{2}\right)$$

$$= \pi \times 10^2 - 4 \times 25 \times 2$$

$$= 100\pi - 200$$

$$\text{Area} = 114.16 \text{ cm}^2$$

27. (b)

We note that there are 3 consonants M, C and T and 3 vowels E, A and O. Since no two vowels have to be together the possible choice for vowels are the places marked as 'X'.

X M X C X T X,

These vowels can arranged in ${}^4P_3$ ways and 3 consonants can be arranged in 3! ways. Hence, the required number of ways = 3! × ${}^4P_3$

$$= 3! \times \frac{4!}{1!} = 144$$

28. (d)

$$\frac{2.32^3 + 1.44^3 + 2.88^3 - 3 \times 2.32 \times 1.44 \times 2.88}{2.32^2 + 1.44^2 + 4 \times 1.44^2 - 2 \times 1.44^2 - 2.32 \times 1.44 - 2.32 \times 2.88}$$

$$\frac{2.32^3 + 1.44^3 + 2.88^3 - 3 \times 2.32 \times 1.44 \times 2.88}{2.32^2 + 1.44^2 + 2.88^2 - 2.88 \times 1.44 - 2.32 \times 1.44 - 2.32 \times 2.88}$$

$$\Rightarrow \quad \frac{a^3 + b^3 + c^3 - 3abc}{a^2 + b^2 + c^2 - ab - bc - ca} = a + b + c$$

$$2.32 + 1.44 + 2.88 = 6.64$$

29. (a)

$$\text{man} \times \text{day} = 40 \times 400 = 16000$$

After 32 days $\Rightarrow$ $32 \times 400 = 12800$

So, Remaining, man × day $= 3200$

$\therefore$ $80 \times \text{Day} = 3200$

$\text{Day} = 40 \text{ days}$

30. (c)

$$\frac{\alpha}{\beta}+\frac{\beta}{\alpha} = \frac{\alpha^2+\beta^2}{\alpha\beta} = \frac{(\alpha+\beta)^2-2\alpha\beta}{\alpha\beta} = \frac{(\alpha+\beta)^2}{\alpha\beta}-2$$

$$= \frac{(12/8)^2}{a/8}-2 = \frac{144}{8a}-2 = \frac{18}{a}-2$$

Minimum value = -2 (When $a \to \infty$)

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