IMORTAN T QUESTIONS

1. In a survey of political preferences, 78% of those asked were in favour of at least one of the proposals:

I, II and III. 50% of those asked favoured proposal I, 30% favoured proposal II and 20% favoured proposal III. If 5% of those asked favoured all three of the proposals, what percentage of those asked favoured more than one of the three proposals?

(A) 10 (B) 12

(C) 17 (D) 22

Ans. [C]

Let 'a' be the percentage of people who favoured exactly one proposal, 'b' be the percentage of people who favoured exactly by two proposals and 'c' be the percentage of people who favoured exactly three proposals.

$a + b + c = 78$ _ (i)

$a + 2b + 3c = 100$ _ (ii)

(ii) – (i) implies $b + 2c = 22$

Since $c = 5$, $b = 12$

Required percentage $= b + c = 12 + 5 = 17\%$.

2. If $n^2 = 12345678987654321$, what is n?

(A) 12344321

(B) 1235789

(C) 111111111

(D) 11111111

Ans. [C]

The square root is 111111111.

3. There is a square field of side 500 m long each. It has a compound wall along its perimeter. At one of its corners, a triangular area of the field is to be cordoned off by erecting a straight-line fence. The compound wall and the fence will form its borders. If the length of the fence is 100 m, what is the maximum area that can be cordoned off?

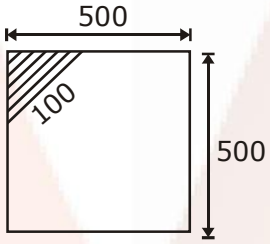
(A) 2,500 sq m

(B) 10,000 sq m

(C) 5,000 sq m

(D) 20,000 sq m

Ans. [A]



Area of shaded region

$= \frac{1}{2} \times \frac{100}{\sqrt{2}} \times \frac{100}{\sqrt{2}} = 2,500$ sq.m

Area of a Δ is maximum when it is an isosceles Δ.

So perpendicular sides should be of length $\frac{100}{\sqrt{2}}$.

4. If there are 10 positive real numbers $n_1 < n_2 < n_3 ... < n_{10}$, how many triplets of these numbers (n_1, n_2, n_3), (n_2, n_3, n_4), ... can

be generated such that in each triplet the first number is always less than the second number, and the second number is always less than the third number?

(A) 45 (B) 90

(C) 120 (D) 180

Ans. [C]

5. On a straight road XY, 100 m long, five heavy stones are placed 2 m apart beginning at the end X. A worker, starting at X, has to transport all the stones to Y, by carrying only one stone at a time. The minimum distance he has to travel is

(A) 472 m (B) 422 m

(C) 744 m (D) 860 m

Ans. [D]

For the first stone, he will cover 100 m.

For second, 200 – 4 = 196 m

For third, 200 – 8 = 192 m

For fourth, 200 – 12 = 188 m

For fifth, 200 – 16 = 184 m

Hence, total distance = 860 m

6. Number S is obtained by squaring the sum of digits of a two-digit number D. If difference between S and D is 27, then the two-digit number D is

(A) 24 (B) 54

(C) 34 (D) 45

Ans. [B]

7. Neeraj has agreed to mow a lawn, which is a 20 m × 40 m rectangle. He mows it with 1 m wide strip.

If Neeraj starts at one corner and mows around the lawn toward the centre, about how many times would he go round before he has mowed half the lawn?

(A) 2.5 (B) 3.5

(C) 3.8 (D) 4

Ans. [C]

3 Area = 40 × 20 = 800

If 3 rounds are done, area = 34 × 14 = 476

⇒ Area > 3 rounds

If 4 rounds ⇒ Area left = 32 × 12 = 347

Hence, area should be slightly less than 4 rounds.

8. At a bookstore, 'MODERN BOOK STORE' is flashed using neon lights. The words are individually flashed at the intervals of $2\frac{1}{2}$s, $4\frac{1}{4}$s and $5\frac{1}{8}$s respectively, and each word is put off after a second.

The least time after which the full name of the bookstore can be read again is

(A) 49.5 s

(B 73.5 s

(C) 1744.5 s

(D) 855 s

Ans. [B]

Since each word is lit for a second, least time after which the full name of the bookstore can be read again

$$= \text{LCM}\left(\frac{5}{2}+1, \frac{17}{4}+1, \frac{41}{8}+1\right)$$

$$= \text{LCM}\left(\frac{7}{2}, \frac{21}{4}, \frac{49}{8}\right)$$

$$= \frac{\text{LCM}(7,21,49)}{\text{HCF}(2,4,8)} = \frac{49\times 3}{2} = 73.5\,\text{s}$$

9. After the division of a number successively by 3, 4 and 7, the remainders obtained are 2, 1 and 4 respectively. What will be the remainder if 84 divides the same number?

(A) 80 (B) 75

(C) 41 (D) 53

Ans. [D]

3(4(7x + 4) + 1) + 2 = 84x + 53

Therefore, remainder is 53.

10. It takes six technicians a total of 10 hr to build a new server from Direct Computer, with each working at the same rate. If six technicians start to build the server at 11 am, and one technician per hour is added beginning at 5 pm, at what time will the server be completed?

(A) 6.40 pm (B) 7 pm

(C) 7.20 pm (D) 8 pm

Ans. [D]

Total amount of work = 60 man-hours

From 11 am to 5 pm, 6 technicians = 36 man-hours

From 5 pm to 6 pm, 7 technicians = 7 man-hours

From 6 pm to 7 pm, 8 technicians = 8 man-hours
From 7 am to 8 pm, 9 technicians = 9 man-hours
Total = 60 man-hours

11. Three small pumps and a large pump are filling a tank. Each of the three small pump works at $\frac{2}{3}$ the rate of the large pump. If all four pumps work at the same time, they should fill the tank in what fraction of the time that it would have taken the large pump alone?

(A) $\frac{4}{7}$ (B) $\frac{1}{3}$

(C) $\frac{2}{3}$ (D) $\frac{3}{4}$

Ans. [B]

Three small pumps = Two large pumps
Three small + One large pumps = Three large pump
$\frac{1}{3}$rd of total time is taken by the large pump alone.

12. Two towns A and B are 100 km apart. A school is to be built for 100 students of town B and 30 students of Town A. Expenditure on transport is Rs. 1.20 per km per student. If the total expenditure on transport by all 130 students is to be as small as possible, then the school should be built at

(A) 33 km from Town A

(B) 33 km from Town B

(C) Town A

(D) Town B

Ans. [D]

13. A water tank has three taps A, B, and C. A fills four buckets in 24 minutes, B fills 8 buckets in 1 hour and C fills 2 buckets in 20 minutes. If all the taps are opened together a full tank is emptied in 2 hours. If a bucket can hold 5 litres of water, what is the capacity of the tank?

(A) 120 litres

(B) 240 litres

(C) 180 litres

(D) 60 litres

Ans. [B]

Since a bucket holds 5 litres of water, water discharged in one minute by tap A, B and C is $\frac{5}{6}$ liters, $\frac{2}{3}$ liters and $\frac{1}{2}$ liters

If A, B and C are all opened simultaneously, total discharge in one minute = $\left(\frac{5}{6}+\frac{2}{3}+\frac{1}{2}\right)=2$ liters

So in 2 hours, the discharge would be 240 litres, that is the capacity of the tank.

14. A man buys spirit at Rs. 60 per litre, adds water to it and then sells it at Rs. 75 per litre. What is the ratio of spirit to water if his profit in the deal is 37.5%?

(A) 9: 1 (B) 10: 1

(C) 11: 1 (D) None of these

Ans. [B]

15. There is a leak in the bottom of the tank. This leak can empty a full tank in 8 hours. When the tank is full, a tap is opened into the tank which admits 6 litres per hour and the tank is now emptied in 12 hours. What is the capacity of the tank?

(A) 28.8 litres

(B) 36 litres

(C) 144 litres

(D) Cannot be determined

Ans. [C]

Since the leak can empty the tank in 8 hours, the rate of leak $= \frac{1}{8}$

And since the leak along with the tap can empty it in 12 hours, the equation can be rewritten as $\frac{1}{x} - \frac{1}{8} = \frac{1}{12}$ (where x is the time taken by the tap to fill the tank).

Simplifying we get, This means that the tap can fill the tank in 24 hours.

Since the tap admits 6 litres per hour, it will admit

$(6 \times 24) = 144$ litres in 24 hours, which should be the capacity of the tank.

16. A dealer offers a cash discount of 20% and still makes a profit of 20%, when he further allows 16 articles to a dozen to a particularly sticky bargainer. How much percent above the cost price were his wares listed?

(A) 100% (B) 80%

(C) 75% (D) 66 2/3%

Ans. [A]

16 articles sold at priced 12 articles, is equivalent to discount of 25%+

Hence, shop keepers offer two discounts of 20% and 25% respectively and still makes a profit of 20%

If c is the cost price of an article and m is the marked price, then

$1.2 \times c = m \times \frac{3}{4} \times \frac{4}{5}$

$m = 2c$

This means that he had marked his goods 100% above his cost price

17. $2^{73} - 2^{72} - 2^{71}$ is the same as

(A) 2^{69} (B) 2^{70}

(C) 2^{71} (D) 2^{72}

Ans. [C]

$2^{73} - 2^{72} - 2^{71}$

$= 2^{71} (22 - 2 - 1)$

$= 2^{71} (4 - 2 - 1) = 2^{71}$.

18. The number of integers n satisfying $-n + 2 \geq 0$ and $2n \geq 4$ is

(A) 0 (B) 1

(C) 2 (D) 3

Ans. [C]

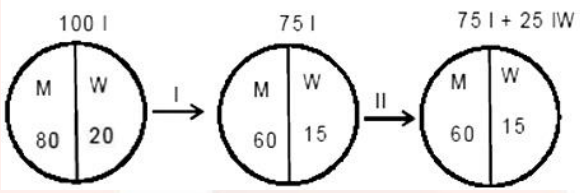
The two equations can be simplified into $n \leq 2$ and $n \geq 2$. The only value that satisfies both these conditions is $n = 2$.

19. A milkman mixes 20 litres of water with 80 litres of milk. After selling one-fourth of this mixture, he adds water to replenish the quantity that he had sold. What is the current proportion of water to milk?

(A) 2: 3 (B) 1: 2

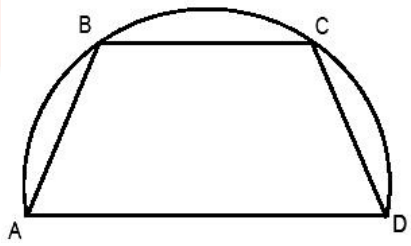
(C) 1: 3 (D) 3: 4

Ans. [A]



The diagram is self explanatory. Removal of 25 litres at stage I will result in volume of milk being reduced by 80% of 25 lit i.e. 20 lit and volume of water being reduced by the remaining 5 lit. So M = 60 lit and W = 15 lit. Addition of 25 lit water will finally given M = 60 lit and W = 40 M. Hence the ratio of W and M = 40 : 60 = 2 : 3.

20. On a semicircle with diameter AD, chord BC is parallel to the diameter. Further, each of the chords AB and CD has length 2, while AD has length 8. What is the length of BC?



(A) 7.5

(B) 7

(C) 7.75

(D) None of the above

Ans. [B]

$$\frac{1}{2} \times AB \times BD = \frac{1}{2} \times AD \times BE$$

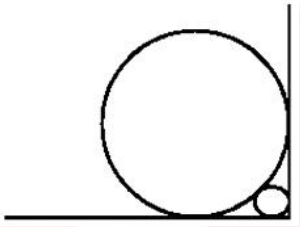
$$2\sqrt{8^2 - 2^2} = 8 \times BE$$

$$BE = \frac{\sqrt{60}}{4} = \frac{\sqrt{15}}{2}$$

$$AE = \sqrt{2^2 - \left(\frac{\sqrt{15}}{2}\right)^2} = \sqrt{4 - \frac{15}{4}} = \frac{1}{2}$$

$$BC = EF = 8 - \left(\frac{1}{2} + \frac{1}{2}\right) = 7$$

21. A circle with radius 2 is placed against a right angle. Another smaller circle is also placed as shown in the adjoining figure. What is the radius of the smaller circle?



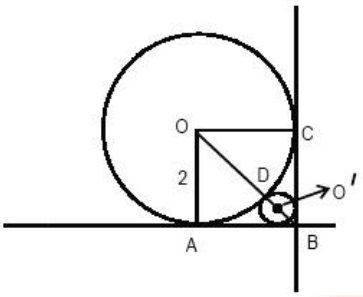
(A) $3 - 2\sqrt{2}$

(B) $4 - 2\sqrt{2}$

(C) $7 - 4\sqrt{2}$

(D) $6 - 4\sqrt{2}$

Ans. [D]



Let the radius of smaller circle = r

$\therefore$ O′B = $r\sqrt{2}$

$\therefore$ OB = O′B = O′D + OD

= $r\sqrt{2} + r + 2$

Also

OB = $2\sqrt{2}$

$\Rightarrow r\sqrt{2} + r + 2 = 2\sqrt{2}$

$\Rightarrow r = 6 - 4\sqrt{2}$

22. Of 128 boxes of oranges, each box contains at least 120 and at most 144 oranges. The number of boxes containing the same number of oranges is at least

(A) 5

(B) 103

(C) 6

(D) Cannot be determined

Ans. [C]

We can put a minimum of 120 oranges and a maximum of 144 oranges, i.e., 25 oranges need to be filled in 128 boxes.

There are 25 different possibilities if there are 26 boxes. In such a case, at least 2 boxes contain the same number of oranges. (i.e., even if each of the 25 boxes contain a different

number of oranges, the 26^{th} must contain one of these numbers).

Similarly, if there are 51 boxes, at least 3 boxes contain the same number of oranges.

Hence, at least 6 boxes have the same number of oranges in case of 128 boxes.

23. A student took five papers in an examination, where the full marks were the same for each paper. His marks in these papers were in the proportion of 6 : 7 : 8 : 9 : 10. In all papers together, the candidate obtained 60% of the total marks. Then the number of papers in which he got more than 50% marks is

(A) 2 (B) 3

(C) 4 (D) 5

Ans. [C]

Let the marks scored in five subjects be 6x, 7x, 8x, 9x and 10x (on a scale of 1).

Average score = 60%

$$\Rightarrow \frac{6x+7x+8x+9x+10x}{5} = \frac{60}{100}$$

$$\Rightarrow 8x = 0.6$$

x = 0.075

So the marks are 0.45, 0.525, 0.6, 0.675 and 0.75.

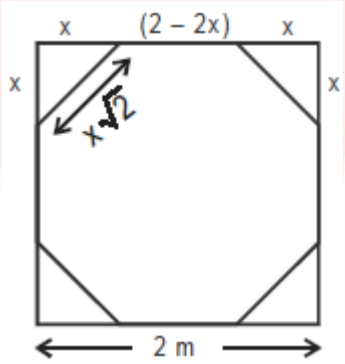
Number of times the marks exceed 50% is 4.

24. A square, whose side is 2 m, has its corners cut away so as to form an octagon with all sides equal. Then the length of each side of the octagon, in metres, is

(A) $\frac{\sqrt{2}}{\sqrt{2}+1}$ (B) $\frac{2}{\sqrt{2}+1}$

(C) $\frac{2}{\sqrt{2}-1}$ (D) $\frac{\sqrt{2}}{\sqrt{2}-1}$

Ans. [B]



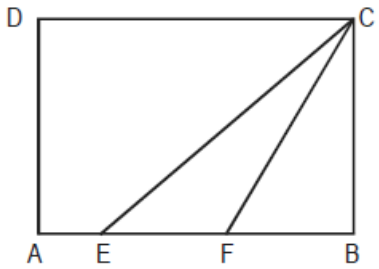
Let the length of the edge cut at each corner be x m. Since the resulting figure is a regular octagon.

$\therefore \sqrt{x^2 + x^2} = 2 - 2x \Rightarrow x\sqrt{2} = 2 - 2x$

$\Rightarrow \sqrt{2}x(1 + \sqrt{2}) = 2 \Rightarrow x = \frac{\sqrt{2}}{\sqrt{2}+1}$

$\therefore 2 - 2x = \frac{2}{\sqrt{2}+1}$

25. In the above diagram, ABCD is a rectangle with AE = EF = FB. What is the ratio of the areas of ΔCEF and that of the rectangle



(A) $\frac{1}{6}$ (B) $\frac{1}{8}$

(C) $\frac{1}{9}$ (D) None of these

Ans. [A]

Let BC = y and AB = x.

Then area of ΔCEF = Area(ΔCEB) – Area(ΔCFB)

$$\frac{1}{2}\cdot\frac{2x}{3}.y-\frac{1}{2}\cdot\frac{x}{3}.y=\frac{xy}{6}$$

$$\frac{xy}{6}.xy=\frac{1}{6}$$

26. A college has raised 75% of the amount it needs for a new building by receiving an average donation of Rs. 600 from the people already solicited. The people already solicited represent 60% of the people the college will ask for donations. If the college is to raise exactly the amount needed for the new building, what should be the average donation from the remaining people to be solicited?

(A) Rs.300 (B) Rs.250

(C) Rs.400 (D) Rs.500

Ans. [A] Let x be the total number of people the college will ask for donations.

$\therefore$ People already solicited = 0.6x

Amount raised from the people solicited
$= 600 \times 0.6x = 360x$
Now 360x constitutes 75% of the amount.
Hence, remaining 25% = 120x
$\therefore$ Average donation from remaining people $= \frac{120x}{0.4x} = 300$

27. If $x = (16^3 + 17^3 + 18^3 + 19^3)$ then x divided by 70 leaves a remainder of

(A) 0 (B) 1

(C) 69 (D)35

Ans. [B]

$x = 16^3 + 17^3 + 18^3 + 19^3$ is even number
Therefore, 2 divides x.
$a^3 + b^3 = (a + b)(a^2 - ab + b^2)$
$\Rightarrow$ a + b always divides $a^3 + b^3$.
Therefore, $16^3 + 19^3$ is divisible by 35.
$18^3 + 17^3$ is divisible by 35.

Thus, x is divisible by 70

28. If $R = \frac{30^{65} - 29^{65}}{30^{64} + 29^{64}}$, then

(A) $0 < R \leq 0.1$ (B) $0.1 < R \leq 0.5$

(C) $0.5 < R \leq 1.0$ (D) $R > 1.0$

Ans. [B]

It is clear from the diagram that at 10:30; Shyam overtakes Ram.

Alternate: At 10:15 the situation is as show:

Time taken for Shyam to overtake Ram

$= \frac{1.25}{(10-5)} \times 60 = 15\,\text{min}$

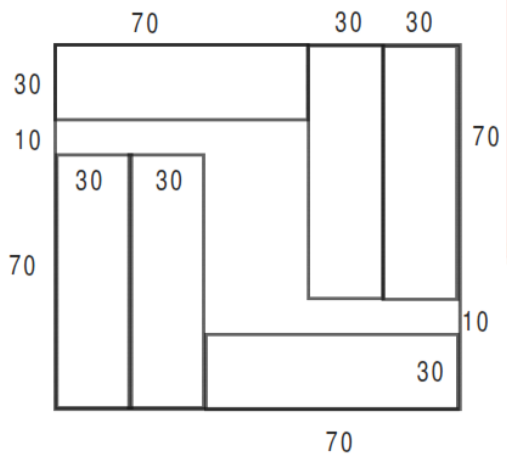
$\Rightarrow$ Shyam overtakes Ram at 10:30 AM

29. Rectangular tiles each of size 70 cm by 30 cm must be laid horizontally on a rectangular floor of size 110 cm by 130 cm, such that the tiles do not overlap. A tile can be placed in any orientation so long as its edges are parallel to the edges of the floor. No tile should overshoot any edge of the floor. The maximum number of tiles that can be accommodated on the floor is

(A) 4 (B) 5

(C) 6 (D) 7

Ans. [C]



30. A telecom service provider engages male and female operators for answering 1000 calls per day. A male operator can handle 40 calls per day whereas a female operator can handle 50 calls per day. The male and the female operators get a fixed wage of Rs. 250 and Rs. 300 per day respectively. In addition, a male operator gets Rs. 15 per call he answers and female operator gets Rs. 10 per call she answers. To minimize the total cost, how many male operators should the service provider employ assuming he has to employ more than 7 of the 12 female operators available for the job?

(A) 15 (B) 14

(C) 12 (D) 10

Ans. [D]

There are two equations to be formed 40 m + 50 f = 1000

250 m+300 f+40×15m +50×10×f = A

850 m+8000 f=Am and f are the number of males and females A is amount paid by the employer.

Then, the possible values of f=8,9,10,11,12

If f=8, m=15.

If f = 9, 10, 11 then m will not be an integer while if = 12, then m will be 10.

By putting f = 8 and m = 15, A = 18800. When f = 12 and m = 10, then A = 18100

Therefore, the number of males will be 10.