CAT 2017 QA Slot 1 Answer Key

QNo:- 67 ,Correct Answer:- *20*

Explanation:- *Let Barun's age be 10x. Arun's age is 4x. The difference of these ages in 6x, a constant. When Arun's age is 50% of Barun's age, this difference also would be 50% ie Barun's age, at that stage would be 12x. It would be increase by 20%.*

QNo:- 68 ,Correct Answer:- *15*

Explanation:- *Let the number of days required to complete the job be n.*
1 person works on day 1, 2 on day 2, 3 on day 3, ... n on day n.
Each person has the same efficiency.

$$\text{Work} = 1\left(\frac{1}{120}\right)+2\left(\frac{1}{120}\right)+3\left(\frac{1}{120}\right).....+n\left(\frac{1}{120}\right).$$

This is also equal to 1.

$$\frac{1}{120}+\frac{2}{120}+\frac{3}{120}+.....+\frac{n}{120}=1$$

$\Sigma n = 120$

$n = 15.$

QNo:- 69 ,Correct Answer:- *11*

Explanation:- *Number of people in the group cannot exceed* $\frac{630}{53}$ i.e., 11.8.
Maximum possible number of people in the group = 11.

QNo:- 70 ,Correct Answer:- *20*

Explanation:- *The speed in the second case is 5/4 times the speed in the first case. Therefore, the time would be 4/5 times the time, i.e., 1/5 less. This one fifth is 20 min. Therefore, the time taken in the first case is 100 min.*

$$\text{The distance} = (12)\left(\frac{5}{3}\right)\text{km} = 20\text{km}$$

QNo:- 71 ,Correct Answer:- *70000*

Explanation:- *Let the total monthly savings be S.*

Investment in FD = $\frac{50}{100}S$.

Investment in stocks = $\frac{30}{100}\left(S-\frac{50}{100}S\right)=\frac{15}{100}S$

Investment in savings bank account = $\frac{35}{100}S$

$\frac{35}{100}S+\frac{50}{100}S=59500$

S = 70000

QNo:- 72 ,Correct Answer:- *D*

Explanation:- *Let the retail price be 100.*
Discount = 15
Selling price = 85
Cost price = $\frac{85}{1.02}=\frac{500}{6}$
In order to make a profit of 20%, the selling price
$=\frac{500}{6}(1.2)=100$
The seller must sell at the retail price

QNo:- 73 ,Correct Answer:- *B*

Explanation:- *Let the speed of the boat in still water and the speed of the river be u and v respectively.*

$\frac{d}{2x+y}+\frac{d}{2x-y}=\frac{1}{4}\left(\frac{d}{x+y}+\frac{d}{x-y}\right)$

$\frac{d(4x)}{4x^2-y^2}=\frac{1}{4}\left(\frac{d(2x)}{x^2-y^2}\right)$

$8(x^2-y^2)=4x^2-y^2$

$\frac{x^2}{y^2}=\frac{7}{4}$

$\frac{x}{y}=\frac{\sqrt{7}}{2}$

QNo:- 74 ,Correct Answer:- *A*

Explanation:- *The data is given below*

C1	C2	C3	C4	C5
9	10	8		
	18		19	
81	90	72	95	100

C5 – C1 = 19. The numbers above are the actual profits (and not just the ratio). The total profit = 438 crore.

QNo:- 75 ,Correct Answer:- *D*

Explanation:- *Let the number of boys appearing for the admission test be b.*
Percentage of candidates who get admission =

$$\frac{\frac{30}{100}(2b)+\frac{45}{100}b}{2b+b}(100)\% = 35\%$$

65% of the candidates do not get admission.

QNo:- 76 ,Correct Answer:- *A*

Explanation:- *Let the total number of popcorn packets in stock be T.*
Total number of chips packets in stock = T

$$\text{Required ratio} = \frac{16}{40}T : \frac{14}{35}T = 1:1$$

QNo:- 77 ,Correct Answer:- *B*

Explanation:- *Let the price of each good mango be g.*
Price of each medium quality mango = $\frac{g}{2}$.

$$\text{Total cost price} = 80g + 40\left(\frac{g}{2}\right) = 100g$$

Total selling price = 120(0.9g) = 108g
Overall profit = 8%

QNo:- 78 ,Correct Answer:- *D*

Explanation:- *Let the printed price be p.*
If 40% discount is given, selling price = 0.6(60p) =36p

In order to make a profit of 20%, the selling price
Total cost price
=>36p/1.2 = 30p
Ten toys are destroyed in the fire.
The remaining toys are sold at a price such that the same amount of profit is made as in the conditional case.
Profit made on remaining toys = 6p
Total selling price of remaining toys = 36p
Discount that should be given = 50p – 36p = 14p
Discount% = 28%

QNo:- 79 ,Correct Answer:- *D*

Explanation:- $\left(\frac{a+3}{b}\right)^2 = 9$ and $\left(\frac{a-1}{b-1}\right)^2 = 4$.

We get 4 cases

a + 3 = 3b a – 1 = 2b – 2	a +3 = 3b a – 1 = –2b + 2
a+3 = –3b a – 1 = 2b – 2	a + 3 = –3b a – 1 = –2b + 2

Subtracting the second equation from the first we get,

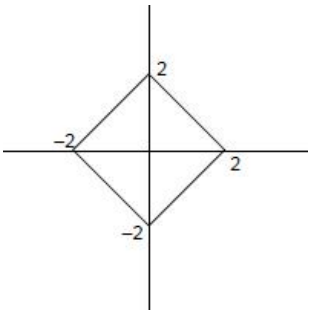
	I	II	III	IV
4	b+2	5b-2	-5b+2	-b – 2

I ⇒ b = 2, a = 3 Rejected
II, III ⇒ b is not an integer. Rejected
IV ⇒ b = –6 , a = 15
$\therefore \frac{a^2}{b^2} = \left(\frac{15}{6}\right)^2 = \frac{25}{4}$

QNo:- 80 ,Correct Answer:- *A*

Explanation:- *Let the average score of the boys in the midsemester examination be b.*
Average score of the girls = b + 5
In the final exam, average score of the girls = b + 5 – 3 = b + 2.
Average score of the entire class increased by 2
and is hence $\frac{20b+30(b+5)}{50}+2$ i.e. $b+5$
Average score of the boys
$\frac{50(b+5)-30(b+2)}{20} = b+9.5$
Increases in the average of boys is 9.5.

QNo:- 81 ,Correct Answer:- *C*



Explanation:-
The closed region bounded by |ax| + |by| = c in the two- dimensional plane has x-intercepts of $\pm\frac{c}{|a|}$ *and y- intercepts of* $\pm\frac{c}{|b|}$.
This is in general a rhombus. In the given question, we have a square which has each of its diagonals as 4.
Area = $\frac{1}{2}(4)(4)=8$

QNo:- 82 ,Correct Answer:- B

Explanation:- *The medians of a triangle divide the triangle into six parts of equal area.*

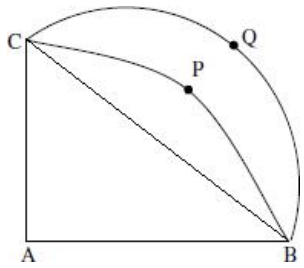
Area of GBC = $\frac{1}{3}$ (Area of the triangle)

$= \frac{1}{3}\sqrt{5(5-a)(s-b)(s-c)} = \frac{250}{\sqrt{3}}$

Area of the remaining portion = $2\left(\frac{250}{\sqrt{3}}\right) = \frac{500}{\sqrt{3}}$

QNo:- 83 ,Correct Answer:- B

Explanation:-



Let AB = a (a = 6)

CQB is a semicircle of radius $\frac{a}{\sqrt{2}}$

CPB is a quarter circle (quadrant) of radius a

∴ Area of semicircle = $\frac{\pi a^2}{4}$

Area of quadrant = $\frac{\pi a^2}{4}$

∴ Area of region enclosed by BPC, BQC = Area of ΔABC = 18.

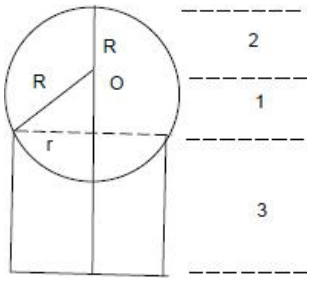
QNo:- 84 ,Correct Answer:- B

Explanation:-

The volumes of the 5 smaller cubes and the original big one are in the ratio 1 : 1 : 8 : 27 : 27 : 64. Therefore, the sides are in the ratio 1 : 1 : 2 : 3 : 3 : 4 while the areas are in the ratio 1 : 1 : 4 : 9 : 9 : 16. The sum of the areas of the 5 smaller cubes is 24 parts while that of the big cube is 16 parts. The sum is 50% greater.

QNo:- 85 ,Correct Answer:- 6

Explanation:-



The height of the cylinder (h) = 3

The volume = 9π

$\pi r^2 h = 9\pi \Rightarrow r = \sqrt{3}$

The radius of the ball (R) = 2

The height of O, the centre of the ball, above the line representing the top of the cylinder is say a.

(a = 1)

∴ The height of the topmost point of the ball from the base of the cylinder is h + a +R = 3 + 1 + 2 = 6

QNo:- 86 ,Correct Answer:- 24

Explanation:- In a 3, 4, 5 triangle, the length of the altitude to the hypotenuse = 3(4)/5 = 2.4. Therefore, in a 15, 20, 25 triangle, it is 12. This is the shortest distance from A to BC. At 60 km/hr, i.e., 1 km/min, it would take 24 min to cover 24 km.

QNo:- 87 ,Correct Answer:- D

Explanation:- $\log_3 x = a \Rightarrow x = 3^a$

$\log_{12} y = a \Rightarrow y = 12^a$

$\therefore xy = 36^a$ and $xy = G = 6^a$

$\therefore \log_6 G = a$

QNo:- 88 ,Correct Answer:- D

Explanation:- $x + 1 = x^2 \Rightarrow x^2 - x - 1 = 0 \Rightarrow x = \frac{1+\sqrt{5}}{2} (\because x > 0)$

Also, $x^2 = x + 1 \Rightarrow x^4 = x^2 + 2x + 1 = 3x + 2$

$\Rightarrow 2x^4 = 6x + 4 = 3 + 3\sqrt{5} + 4 = 7 + 3\sqrt{5}$

QNo:- 89 ,Correct Answer:- C

Explanation:- $0.008 = \frac{8}{1000} = 5^{-3}$

$\therefore \log_{0.008}\sqrt{5} = \frac{1/2}{-3} = \frac{-1}{6}$ and $\log_{\sqrt{3}} 81 = \frac{4}{1/2} = 8$

$\therefore$ The given expression is $\frac{5}{6}$

QNo:- 90 ,Correct Answer:- B

Explanation:- $9^{2x-1} - 9^{2x-2} = 9^{2x-2}(9 - 1) = 1944 = 8(243) = 8(9^{2.5})$

$\therefore 2x - 2 = 2.5 \Rightarrow x = \frac{4.5}{2} = \frac{9}{4}$

QNo:- 91 ,Correct Answer:- B

Explanation:- $x = 25 + y + z$. The possible values of x, y, z and the corresponding number of values of y, z are tabulated below(x, y, z are positive integers). We see that $27 \le x \le 40$

x	y	z	No of values of (x, y)
27	1	1	1
28	1,2	2,1	2
-	-	-	-
38	1, ... 2	12, ... 1	12
39	2, ... 12,	12, ... 2	11
40	3, ... 12	12, ... 3	10

The number of solutions is 1 + 2 + ... + 12 + 11 + 10 = 78 + 21 = 99

QNo:- 92 ,Correct Answer:- 11

Explanation:- $(n - 5)(n - 10) - 3(n - 2) \leq 0$
$\Rightarrow n^2 - 18n + 56 \leq 0$
$\Rightarrow (n - 4)(n - 14) \leq 0$
As n is an integer, n can be 4, 5, 6 .....14, i.e. it can have 11 values.

QNo:- 93 ,Correct Answer:- 24

Explanation:- $x^2 + 11x + n = x \Rightarrow x^2 + 10x + n = 0$
$x^2 + 10x + 25 = 0$ has real and equal roots
$x^2 + 10x + n = 0$ where $n > 25$ has complex roots.
The maximum value of n for which the equation has two distinct real roots in 24.

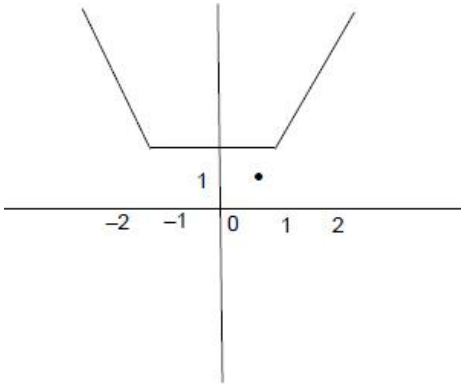
QNo:- 94 ,Correct Answer:- 2

Explanation:- $a + b + c + d = 30$, a, b, c, d are integers.
$(a - b)^2 + (a - c)^2 + (a - d)^2$ would have its maximum value when each bracket has the least possible value.
Let (a, b, c, d) = (8, 8, 7, 7)
The given expression would be 2. It cannot have a smaller value.

QNo:- 95 ,Correct Answer:- 160

Explanation:- There are 5 pairs of diametrically opposite points and the centre O.
If O is not selected, the number of triangles = ${}^{10}C_3 = 120$.
If O is selected, the other two points can be selected in 10(8)/2, i.e., 40 ways. The number of triangles is 160.

QNo:- 96 ,Correct Answer:- A



Explanation:-
The graph of $y = |x - 1| + |x + 1|$ is shown above.
The shortest distance of $\left(\frac{1}{2}, 1\right)$ from the graph is 1.

QNo:- 97 ,Correct Answer:- A

Explanation:- Let the first term be a and the common difference be d.

$(a + 6d)^2 = (a + 2d)(a + 16d)$

$\Rightarrow a^2 + 12ad + 36d^2 = a^2 + 18ad + 32d^2$

$\Rightarrow 4d^2 = 6ad$

$\Rightarrow \frac{a}{d} = \frac{2}{3}$

QNo:- 98 ,Correct Answer:- A

Explanation:- After giving one eraser to each of the 4 kids, there are 3 left. They can split 2, 1 or 1, 1, 1. (No kid can get 4)

There are ${}^4P_2 + {}^4C_3$, i.e., 16 ways of distributing the erasers.

QNo:- 99 ,Correct Answer:- A

Explanation:- $f(x) = \frac{5x + 2}{3x - 5}, g(x) = x^2 - 2x - 1$

$f(3) = \frac{5(3) + 2}{3(3) - 5} = \frac{17}{4}$

$f(17) = \frac{5\left(\frac{17}{4}\right) + 2}{3\left(\frac{17}{4}\right) - 5} = \frac{85 + 8}{51 - 20} = \frac{93}{31} = 3$

$g(3) = 3^2 - 2(3) - 1 = 2.$

QNo:- 100 ,Correct Answer:- B

Explanation:- $a_1 = 3, a_2 = 7, \ldots\ldots a_n = 4n - 1, \ldots. a_{3n} = 4(3n) - 1$

$a_1 + a_2 + \ldots.+a_{3n} = \frac{3n(12n + 2)}{2} = 1830$

$\Rightarrow n(6n + 1) = 610$

$\Rightarrow 6n^2 + n - 610 = 0$

$\Rightarrow (6n + 61)(n - 10) = 0$

$\Rightarrow n = 10$ ($\because$ n is an integer)

$\therefore a_1, a_2 + \ldots\ldots + a_n = 3 + 7 + \ldots+[4(10) - 1]$

$= \frac{4(10)(11)}{2} - 10 = 210$

$210\ m > 1830 = n > \frac{1830}{210} = 8.7$

The minimum integral value of m is 9