

(SLOT - 1)

67. Let Ann's current age be 'X'.
Then, Barun's present age = $\frac{X}{0.4} = 2.5X$
Now, let Ann's age be half of Barun's age after Y years.
So, $2(X+Y) = 2.5X + Y$
 $\Rightarrow Y = 0.5X$
Hence, Barun's age increased by $\frac{0.5X}{2.5X}$
So, percentage increase will be 20%.
Answer: 20
68. Let the number of days required to complete the job be N.
It is given that 1 person works on first day, 2 on second day and 3 on third day and so on.
Also, each person has same efficiency.
 $\therefore \text{Work} = 1\left(\frac{1}{120}\right) + 2\left(\frac{1}{120}\right) + 3\left(\frac{1}{120}\right) + \dots + N\left(\frac{1}{120}\right)$
The work done is equal to 1.
 $\Rightarrow \frac{1}{120} + \frac{2}{120} + \frac{3}{120} + \frac{4}{120} + \dots + \frac{N}{120} = 1$
 $\Rightarrow 1 + 2 + 3 + \dots + N = 120$
 $\Rightarrow \Sigma N = 120$
 $\therefore N = 15$

Answer: 15

69. Since the weight limit is 630kg and the weight of lightest person it carries is 53kg, so
- $$\frac{630}{53} = 11.8$$

Therefore, maximum possible number of people in the group = 11.

Answer : 11

70. Man saves 20 minutes by changing his speed from 12km/hr to 15km/hr.
The speed in second case is $\frac{5}{4}$ times the speed in first case.
So, the time would be $\frac{4}{5}$ times i.e. $\frac{1}{5}$ less.
Now, this $\frac{1}{5} = 20 \text{ min}$

\therefore The time taken in first case is 100 min.

$$\text{So, distance} = 12 \times \frac{5}{3} = 20 \text{ km}$$

Answer : 20km

71. Let the total monthly savings be X.
So, it is given that
Investment in FD = $\frac{50}{100} X$

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

$$\text{Investment in savings bank amount} = \frac{35X}{100}$$

$$\therefore \frac{35X}{100} + \frac{50X}{100} = 59500$$

$$\therefore X = 70000$$

Answer : 70,000

72.

Let the retail price be 100.

So, according to given condition,

$$\text{Discount} = 15$$

$$\text{Selling Price} = 85$$

Now, because seller makes 2% profit,

$$\text{cost price} = \frac{85}{1.02}$$

Now, to make a profit of 20%.

$$\text{Selling price} = \frac{85}{1.02} \times 1.2 = 100 \text{ i.e. the retail price}$$

Answer: Sell at retail price (D)

73.

Let the speed of boat in still water be x and speed of river be y and d be one way distance

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

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

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

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

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

\therefore ratio is $\sqrt{7} : 2$

Answer: $\sqrt{7} : 2$

74. According to given data,

$$C_1, C_2, C_3 \rightarrow 9, 10, 8$$

$$C_2, C_4, C_5 \rightarrow 18, 19, 20$$

$$\text{Also, } C_5 - C_1 = 19$$

Let profit made by C_1, C_2, C_3 be x and of C_2, C_4, C_5 be y

$$\therefore 20y - 9x = 19$$

$$20y - 19 = 9x$$

$$\therefore \text{for } y = 5, \Rightarrow 20y - 19 = 100 - 19 = 81$$

$$\therefore x = 9, y = 5$$

$$\text{So, } C_1 = 9x = 81, C_2 = 10x = 90, C_3 = 8x = 72, C_4 = 95$$

$$C_5 = 100, \therefore \text{Total} = 438$$

Answer: 438

75.

Let the number of girls be 200
and the number of boys be 100

$$\therefore \text{Girls getting admission} = 60$$

$$\text{Boys getting admission} = 45$$

$$\text{Now, Candidates who did not get admission} \\ = 300 - 60 - 45 = 195$$

$$\therefore \text{percentage of candidates who did not get admission} \\ = \frac{195}{300} \times 100 = 65\%$$

Answer: 65

76. Let the total number of popcorn packets in stock be x .

Then, according to given data

total number of chips packet in stock = x

Therefore, Required ratio = $\frac{16}{40}x : \frac{14}{35}x$

$$= 1:1$$

Answer : 1:1

77. Let the price of each ^{good} mango be 'm'.

Price of each medium quality mango = $\frac{m}{2}$

Then, total cost price = $80m + 40\left(\frac{m}{2}\right) = 100m$

Total selling price = $120(0.9m) = 108m$

Overall profit = 8%.

Answer : 8

78. Let the printed price be 'p'.

After giving 40% discount,

Selling price = $0.6 \times 60p = 36p$

Now, still she makes 20% profit

\therefore Total cost price = $\frac{36p}{1.2} = 30p$

Now, 10 toys are destroyed in fire

Profit made on remaining toys = $6p$

Total selling price ~~on~~ of remaining toys = $36p$

Discount that should be given = $50p - 36p = 14p$

Discount percentage = 28%.

Answer : 28%

79.

80. Let the average score of the boys in mid semester exams be B .

Then, Average score of girls = $B+5$

Average score of girls in the final exam = $B+5-3 = B+2$

Average score of entire class = $\frac{20B + 30(B+5)}{50} + 2$

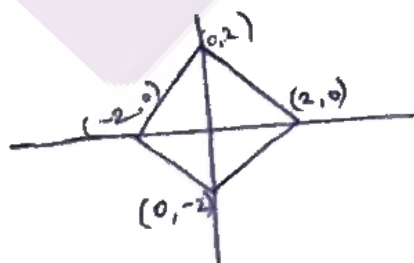
$$= B+5$$

Average score of boys = $\frac{50(B+5) - 30(B+2)}{20}$

Hence, increase in average = 9.5

Answer: 9.5

81.

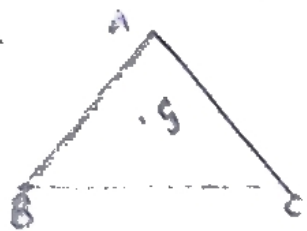


It is a square of side $2\sqrt{2}$

\therefore Area of square = $(2\sqrt{2})^2 = 8$ units

Answer: 8

82.

Area of $\triangle ABC = \frac{1}{3}$ (Area of Triangle)

Using Heron's formula,

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

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

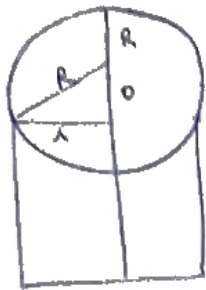
$$\text{Answer: } \frac{500}{\sqrt{3}}$$

83

- 84 The volume of 5 smaller cubes and the original big one are in the ratio $1:1:8:27:27:64$.
 So, the sides will be in ratio $1:1:2:2:3:4$.
 Now, the areas are in ratio $1:1:4:4:9:16$.
 Sum of areas of 5 smaller cubes is 24 parts
 while that of big cube is 16 parts. The
 sum is 50% greater.

$$\text{Answer: } 50\%$$

85.



$$\text{Volume of cylinder} = 9\pi = \pi r^2 \cdot 3$$

$$r = \sqrt{3}$$

Radius of ball is 2 cm. Hence, ball will lie on the top of cylinder.

The dist of O, centre of ball, above the line representing the top of cylinder is x.

$$(x=1)$$

Then, vertical distance = $h + x + R = 3 + 1 + 2 = 6$
 Answer: 6

86. The length of altitude from A to hypotenuse will be the shortest distance.

This is right angled triangle with sides 3:4:5.

$$\therefore \text{Hypotenuse} = 25 \text{ km.}$$

$$\therefore \text{Length of altitude} = \frac{15 \times 20}{25} = 12 \text{ km}$$

$$\text{Time taken} = \frac{12}{30} \times 60 = 24 \text{ minutes}$$

Answer: 24

87. we know $\log_3 x = a \Rightarrow x = 3^a$

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

Therefore, geometric mean of x & y equals $\sqrt{x \times y}$

$$\Rightarrow \sqrt{xy} = \sqrt{3^a \times 12^a} = 6^a$$

$$\therefore 6 = 6^a \text{ or } \log_6 6 = a$$

Answer: a

88. $x+1 = x^2$
 $\Rightarrow x^2 - x - 1 = 0 \quad \Rightarrow x = \frac{1 \pm \sqrt{5}}{2} \approx 1.62$

Also, $x^2 = x+1 \Rightarrow x^4 = x^2 + 2x + 1 = 3x + 2$
 $\Rightarrow 2x^4 = 6x + 4 = 2 + 3\sqrt{5} + 4 + 3\sqrt{5}$
 $\therefore 2x^4 = 13.7$

Using options, option 4 matches

\therefore Answer: $7 + 3\sqrt{5}$

89. $0.008 = 5^{-3}$, $3^4 = 81$
 $\therefore \log_{0.008} \sqrt{5} + \log_{\sqrt{3}} 81 - 7 = ?$

Now, $\log_{0.008} \sqrt{5} = \frac{1/2}{-3} = -\frac{1}{6}$

and $\log_{\sqrt{3}} 3^4 = \frac{4}{1/2} = 8$

$\therefore -\frac{1}{6} + 8 - 7 = 5/6$

Answer: $5/6$

90. $9^{2x-1} - 81^{x-1} = 1944$
 $\Rightarrow 9^{2x-1} - 9^{2x-2} = 9^{2x-2}(9-1) = 1944 = 8(243) = 8(9^{2.5})$
 $\therefore 2x-2 = 2.5 \Rightarrow x = 9/4$

Answer: $9/4$

91. It is given that
 $x + y + z = 25$ and $x \leq 40, y \leq 12, z \leq 12$
 If $x = 40$ then $y + z = 15$. Now, since $y \leq 12, z \leq 12$,
 y can range from 3 to 12 giving us 10 solutions.
 Similarly, if $x = 39$, then $y + z = 14$. Now, y can range
 from 2 to 12 giving us total of 11 solutions.
 If $x = 38$ solutions, ^{then} $y + z = 13$. Now, y can range from 1 to 12
 giving us 12 solutions.
 If $x = 37$, then $y + z = 12$ which gives 11 solutions.
 Similarly on proceeding in the same manner the
 no. of solutions will be 10, 9, 8, 7, 6, ..., 1.
 \therefore Required solⁿ = $1 + 2 + 3 + \dots + 11$
 $= 99$
 Answer: 99

92. $(n-5)(n-10) - 3(n-2) \leq 0$
 $\Rightarrow n^2 - 18n + 56 \leq 0$
 $\Rightarrow (n-4)(n-14) \leq 0$
 \Rightarrow as n is an integer, n can be 4 to 14
 Hence, required no. of values = $14 - 4 + 1 = 11$
 Answer: 11

93. $x^2 + 11x + n = f_1(x)$
 $x = f_2(x)$
 $\Rightarrow x^2 + 11x + n = x \Rightarrow x^2 + 10x + n = 0$
 $\Rightarrow x^2 + 10x + 25 = 0$ has real and equal roots
 $\Rightarrow x^2 + 10x + n = 0$ where $x \geq 25$
 for this equation to have distinct real roots,
 $10^2 > 4n$
 $\Rightarrow n < 100/4 \Rightarrow n < 25$
 Thus, largest integral value that n can take
 is 24.
 Answer: 24

94. $a + b + c + d = 30$; a, b, c, d are integers.

for given expression to be minimum, the values of a, b, c and d should be as close as possible.

$$30/4 = 7.5$$

Putting values,

$$(8-8)^2 + (8-7)^2 + (8-7)^2 \\ \Rightarrow 1 + 1 = 2$$

\therefore The minimum value of $(a-b)^2 + (a-c)^2 + (a-d)^2 = 2$

Answer: 2

95. There are 5 ~~passes~~ diameters of a circle with centre O i.e. AB, CD, EF, GH & JK .

Total no. of given points = 11

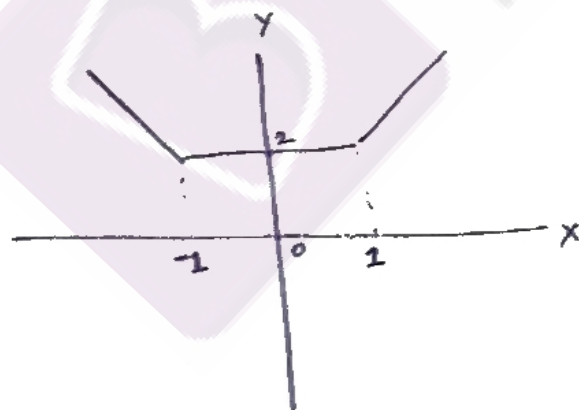
$$\text{So, total possible triangles} = {}^{11}C_3 = 165$$

and because AOB, COD, EOF, GOH, JOK lie on straight line, these 5 are not possible.

$$\therefore \text{required no. of triangles} = 165 - 5 = 160$$

Answer: 160

96.



The graph of $y = |x-1| + |x+1|$ is shown above

The shortest distance of point $(\frac{1}{2}, 1)$ from graph is 1.

Answer: 1

97 let first term be a and common difference be d .

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

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

$$\Rightarrow 4d^2 = 6ad$$

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

Answer: 2:3

98 let a, b, c, d be 4 kids.

$$\text{So, } a+b+c+d=7$$

Total ways of distributing 7 things among 4 people so that each one gets atleast one = ${}^6C_3 = 20$
 $= {}^{n-1}C_{r-1}$

Now, we need to subtract the cases where one may get more than 3 erasers.

Any person cannot get more than 4 erasers

since each child has to get atleast 1.

Any of the 4 can get 4 erasers. so, 4 cases are there.

$$\text{Required ways} = 20 - 4 = 16$$

Answer: 16

99. $f(x) = \frac{5x+2}{3x-5}$

$$f(3) = \frac{15+2}{9-5} = \frac{17}{4}$$

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

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

100. $a_1 = 3, a_2 = 7, \dots$

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

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

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

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

$$\Rightarrow n = 10 \quad (\because n \text{ is integer})$$

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

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

$$210^m > 1830 \Rightarrow m > \frac{1830}{210} = 8.7$$

The minimum positive integral value is 9

Answer: 9