Quantitative Ability

(SLOT - 2)

67. Let us consider the matrix as below:

6		2

Now, we have to try substituting values from 1 to 9 in exact middle grid.

If $x = 1$ or 3, then the value in left bottom grid will be more than 9 which is not possible.

If $x = 4$, value of left bottom grid will be 9 but then the addition of first column will be more than 15. So, it is not possible.

If $x = 5$, all conditions are satisfied and the bottom middle entry will be 3.

6	7	2
1	5	9
8	3	4

Answer : 3

68. By the time A travelled 10 km, B travelled 9 km.

Hence, speed ratio of A and B is 10 : 9.

similarly, speed ratio of B and C is 10 : 9

A : B = 10 : 9

B : C = 10 : 9

so, the ratio of speeds of A : B : C = 100 : 90 : 81

Hence, by the time A travelled 10 kms, C should have travelled 8.1 kms

So, A beat C by 1900 mts

ans: 1900 mts

69. concentration of milk in first bottle is 7/9 and that in second is 9/13. The required mixture is 3/4.

So, using Mixtures & Allegations,

7/9   9/13

3/4

$\frac{3}{52}$ 1/36

27 : 13

∴ The ratio of volumes should be 27 : 13.

Answer : 27 : 13

70. Let the distance from his home to his hostel be 'x' miles.

Time taken on his onward journey $= \frac{x}{60}$ hours

Time taken on his return journey $= \frac{\left(\frac{x}{2}\right)}{25} + \frac{\left(\frac{x}{2}+5\right)}{50}$

Given, his return journey took 0.5 hours more than his onward journey.

$$\Rightarrow \frac{x}{60} + 0.5 = \frac{x}{50} + \frac{\left(\frac{x}{2}+5\right)}{50}$$

$\therefore x = 30$

Therefore, total distance $= 30+15+20 = 65$ miles

Answer: 65

71. Let total number of shirts be x.

Hence, defective shirts $= 0.15x$

non defective shirts $= 0.85x$

Number of shirts left for export = no. of non defective shirts - no. of shirts sold in domestic market

= no. of non defective shirts − 20% of no. of non defective shirts

= 80% of Number of non defective shirts

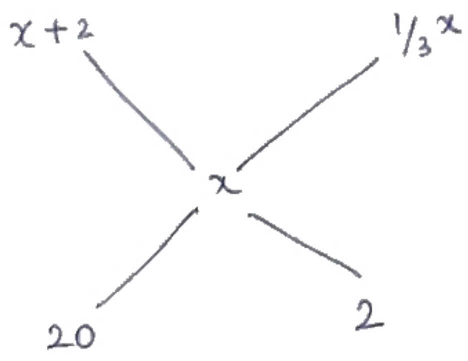
Therefore $8840 = 0.8(0.85x)$

$\therefore x = 13000$

Answer: 13000

72. Let x be the average age of 22 Toddlers.

Using allegations and given data,



$$x - 20 = \frac{1}{3} \cdot x$$

$$x = 30$$

$$\therefore x + 2 = 32$$

Answer: 32

73. Let the manufacturing price of table $= x$

Hence, price at which wholesaler buys $= 1.1x$

price at which retailer buys $= 1.1 \times 1.3 \times x$

price at which customer buys $= 1.5 \times 1.3 \times 1.1 \times x$

according to given data

$$1.5 \times 1.3 \times 1.1 \times x = 4290$$

$$x = 2000$$

Answer: 2000

74. Let the time taken by outlet pipe to empty $= x$ hours

Then, according to given data

$$\frac{1}{8} - \frac{1}{x} = \frac{1}{10}$$

$$\Rightarrow x = 40$$

Hence, time taken by outlet pipe to make the tank half full $= \frac{40}{2} = 20$ hours

Answer: 20

75. Let the number of dozens of candies he bought be x.

Hence, total cost $= 15x + 12x = 27x$

Total Selling Price $= 16.50 \times 2x = 33x$

So, profit $= 33x - 27x = 6x$

$6x = 150 \quad \Rightarrow x = 25$

Hence, he bought 50 dozens of candies in total

Answer : 50

76. Let the initial population be x, production be y and final population be z.

final production $= 1.4y$,

final percapita $= 1.27$ times initial percapita

$$\Rightarrow \frac{1.4y}{z} = 1.27 \times \frac{y}{x}$$

$$\Rightarrow \frac{z}{x} = \frac{1.4}{1.27} \approx 1.10$$

Hence, the percentage increase in population $= 10\%$.

Answer : 10

77. $a:b = 3:4$ and $b:c = 2:1$

$\Rightarrow a:b:c = 3:4:2$

$\Rightarrow a = 3x, \quad b = 4x, \quad c = 2x$

$\Rightarrow a + b + c = 9x$

So, $a+b+c$ is a multiple of 9

So, from options only 207 is multiple of 9.

Answer : 207

78. The motorbike that left A travelled 168 kms from 1 pm to 3:40 pm i.e. $\frac{8}{3}$ hours. The car that left B, started at 2 pm and travelled till 3:40 pm i.e. $\frac{5}{3}$ hours.

Car would have travelled $\frac{5}{8}$ th of the distance as the bike, but since car travelled at twice the speed, car would have travelled $\frac{10}{8}$ th of distance

i.e. $\left(\frac{10}{8}\right) \times 168 = 210$ kms

$\therefore$ Total distance b/w A and B $= 168 + 210$
$= 378$ kms

Answer: 378 kms

79. Let the time taken by Kamal to complete the work be x days.

Hence, we have $\frac{1}{10} + \frac{1}{8} + \frac{1}{x} = \frac{1}{4}$

$\Rightarrow x = 40$ days

Ratio of work done by them $= \frac{1}{10} : \frac{1}{8} : \frac{1}{40}$
$= 4 : 5 : 1$

So, wage earned by Kamal $= \frac{1}{10} \times 1000 = 100$

Answer: 100

80. The proportion of water in 1^{st} mixture is $1/3$.

" " " liquid A " " " is $2/3$.

" " " water " 2^{nd} " " $1/4$.

" " " liquid B " 2^{nd} " " $3/4$.

" " " water " 3^{rd} " " $1/5$.

" " " liquid C " 3^{rd} " " $4/5$.

As they are mixed in ratio 4:3:2,
final amount of water is

$$4\times\frac{1}{3}+3\times\frac{1}{4}+2\times\frac{1}{5}=\frac{149}{160}$$

The final amount of liquid A in mixture is

$$4\times\frac{2}{3}=\frac{8}{3}$$

" " " " liquid B " . . . . $= 3\times\frac{3}{4}=\frac{9}{4}$

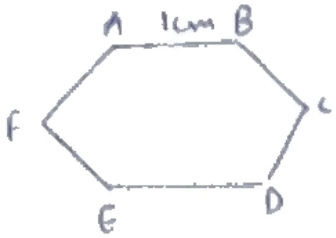
" " " " liquid C " " " $= 2\times\frac{4}{5}=\frac{8}{5}$

Hence, ratio of water : A : B : C in final mixture is

$$\frac{149}{160}:\frac{8}{3}:\frac{9}{4}:\frac{8}{5}=149:160:135:96$$

So, from given options, option c is correct

81.



In $\triangle ABC$, $AB = 1$ cm, $BC = 1$ cm

$\angle B = 120°$

$AC^2 = 1^2 + 1^2 - 2(1)(1)\cos(120°)$

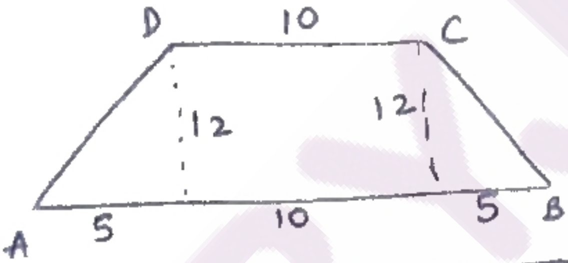
$= 3$

$\therefore AC = \sqrt{3}$ cm

The square of side $\sqrt{3}$ cm will have area $= 3\ cm^2$

Answer: 3

82.



Length of side $AD = \sqrt{12^2 + 5^2} = 13$

Area of Trapezium $= 12\left(\frac{10+20}{2}\right) = 180$

Perimeter of Trapezium $= 10 + 20 + 13 + 13 = 56$

Area of sides of pillar $= 56 \times 20 = 1120$

Total area of pillar $= 1120 + 180 + 180$

$= 1480$

Answer: 1480

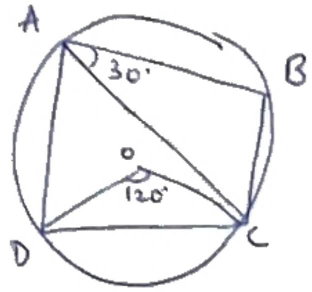
83. In rectangle, mid point of the diagonal connecting (2, 5) and (6, 3) = $\left(\frac{2+6}{2}, \frac{5+3}{2}\right) = (4,4)$

The other diagonal, $y = 3x + c$ should also pass through (4, 4).

On substitution, $4 = 3(4) + c \Rightarrow c = -8$

Answer: −8

84.



Given,

$\angle COD = 120$ and $\angle BAC = 30°$

As, $\angle COD = 120°$, $\angle DAC = 60°$

$\angle DAC + \angle BAC = 60° + 30° = 90°$

$\angle A = 90° \Rightarrow \angle BCD = 90°$ (opposite angles)

Answer: 90°

85. Let one side be L and other be B.

Given, $2L + B = 400$

for area to be maximum, LB should be maximum.

$\therefore L(400 - 2L)$ should be maximum.

$\cancel{L(400-2L) = L(2)(200-L) = 2(L)(200-L)}$

$\Rightarrow L(200-L)$ will be maximum when $L = 200 - L$ or

$2L = 200 \Rightarrow L = 100$

If $L = 100$, $B = 200$

$\therefore$ The longer side is 200 feet long.

Answer: 200

86. Let sides of triangle be a, a and hypotenuse $\sqrt{2}a$.

As, P is equidistant from the sides, P is the incentre of the triangle.

In a right angled triangle,

inradius $= \frac{a+b-h}{2} = \frac{a+a-\sqrt{2}a}{2} = 4(\sqrt{2}-1)$

As triangle $= \frac{1}{2}(a)(a) = r(s)$,

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

$\Rightarrow a = 4\sqrt{2}$

Area $= \frac{1}{2}a^2 = 16$ sq units

87. Let three positive consecutive integers be $(x-1), x, (x+1)$.

Given, $(x-1)(x)(x+1) = 15600$

As 15600 has 2 zeroes in it, one of the three integers should be multiple of 25.

Dividing 15600 by 25, we get 624

and $624 = 24 \times 26$, so numbers are 24, 25, 26.

Now, $24^2 + 25^2 + 26^2 = 1877$

Answer: 1877

88. $\log_3 5 = \log_5(x+2)$

$\Rightarrow \log_3 3 < \log_3 5 < \log_3 9$

$\Rightarrow 1 < \log_3 5 < 2$

So, $1 < \log_5(x+2) < 2$

$\Rightarrow 5^1 < x+2 < 5^2$

$\Rightarrow 3 < x < 23$

Answer: $3 < x < 23$

89 $f(x) = x^2,\ g(x) = 2^x$

$f(f(2^x) + g(x^2))$

$\Rightarrow f(f(2) + g(1))$

$\Rightarrow f(2^2 + 2^1)$

$\Rightarrow f(6) = 6^2 = 36$

Answer : 36

90. Let the roots of equation $x^2 + (a+3)x - (a+5) = 0$ be p and q.

So, $p + q = -(a+3)$

$pq = -(a+5)$

$\therefore,\ p^2 + q^2 = a^2 + 6a + 9 + 2a + 10$

$= a^2 + 8a + 19$

$= (a+4)^2 + 3$

As, $(a+4)^2$ is always +ve, the least value of sum is 3.

Answer : 3

91. We will substitute the values of x from the options and by doing that we get

$x = \frac{3}{2}$

Answer : $\frac{3}{2}$

92. It is given that,

$$\log(2^a \times 3^b \times 5^c) = \frac{\log(2^2 \times 3^3 \times 5) + \log(2^6 \times 3 \times 5^7) + \log(2 \times 3^2 \times 5^4)}{3}$$

$$= \frac{\log(2^{2+6+1} \times 3^{3+1+2} \times 5^{1+7+4})}{3}$$

$$= \frac{\log(2^9 \times 3^6 \times 5^{12})}{3} = \log(2^3 \times 3^2 \times 5^4)$$

$\therefore\ a = 4$

Answer : 4

93. 5 consecutive odd numbers are a_1, a_2, a_3, a_4, a_5

5 ,, even ,, ,, $2a_3-8,\ 2a_3-6,\ 2a_3-4,$

$2a_3-2,\ 2a_3$

It is given that sum of these 5 numbers

$= 10a_3 - 20 = 450$

$\therefore a_3 = 47$ and $a_5 = 51$

Answer : 51

94. $\frac{1}{a} + \frac{1}{b} = \frac{1}{9}$

$\Rightarrow 9(a+b) = ab$

$\Rightarrow ab - 9a - 9b + 81 = 81$

$\Rightarrow (a-9)(b-9) = 81 = 3^4$

As $a, b > 0$ and $a \le b$, there are only 3 ordered pairs, given by $a-9 = 1, 3$ or 9

and $b-9 = 81, 27, 9$

Answer : 3

95. Let Amal be A, Bimal be B and kamal be K.

$A + B + K = 8$

After, Amal, Bimal and kamal are given their minimum required pens, pens left are

$= 8 - (1 + 2 + 3) = 2$ pens

So, the possible ways $= {}^{2+3-1}C_{3-1} = {}^4C_2 = 6$

Answer : 6

96. for the no. to be divisible by 6, sum of the digits should be divisible by 3 and 2.

Case 1: 2, 3, 4, 6

Now, the units place can be filled in three ways (2, 4, 6) and remaining 3 places in $3! = 6$ ways

Hence, total number of ways $= 3 \times 6 = 18$

Case 2: 0, 2, 3, 4

0 in units place $\Rightarrow 3! = 6$ ways

0 not in units place $\Rightarrow$ 2 ways (2, 4)

thousands place can be filled in 2 ways

and remaining can be filled in 2 ways.

$\therefore$ Total number of ways $= 2 \times 2 \times 2 = 8$ ways

Total no. of ways in this case $= 6 + 8 = 14$

Case 3: 0, 2, 4, 6

0 in units place $\Rightarrow 3! = 6$ ways

0 not in units place $\Rightarrow$ 3 ways

thousands place can be filled in 2 ways

and remaining can be done in 2 ways.

So, total no. of ways $= 3 \times 2 \times 2 = 12$

Total no. of ways in this case $= 6 + 12 = 18$

Hence, total no. of ways $= 18 + 14 + 18 = 50$

Answer: 50

97. $f(1 \times 1) = f(1) f(1)$

$\Rightarrow f(1) = f(1) f(1)$

$\Rightarrow f(1) = 0$ or $f(1) = 1$

Hence, max^m value of $f(1)$ is 1.

Answer: 1

98. $|f(x)+g(x)| = |f(x)|+|g(x)|$

if and only if

Case 1: $f(x) \le 0$ and $g(x) \le 0$

$\Rightarrow 2x-5 \le 0$ and $\cancel{x}\ 7-2x \le 0$

$\Rightarrow x \le \frac{5}{2}$ and $\frac{7}{2} \le x$

$\Rightarrow \frac{5}{2} \le x \le \frac{7}{2}$

Case 2: $f(x) \ge 0$ and $g(x) \ge 0$

$\Rightarrow 2x-5 \ge 0$ and $7-2x \ge 0$

$\Rightarrow x \ge \frac{5}{2}$ and $\frac{7}{2} \ge x$

which is not possible

Answer: $\frac{5}{2} \le x \le \frac{7}{2}$

99. Let the common ratio of GP be r.

Hence,

$a_n = 3(a_{n+1} + a_{n+2} + \cdots)$

$\Rightarrow a_n = 3\left(\frac{a_{n+1}}{1-r}\right)$

$\Rightarrow a_n = 3\left(\frac{a_n \cdot r}{1-r}\right) \quad \Rightarrow r = \frac{1}{4}$

Now,

$a_1 + a_2 + a_2 + \cdots + = 32$

$\Rightarrow \frac{a_1}{1-r} = 32 \quad \Rightarrow \frac{a_1}{3/4} = 32$

$\Rightarrow a_1 = 24 \quad \Rightarrow a_5 = a_1 \times r^4$

$\Rightarrow a_5 = 24\left(\frac{1}{4}\right)^4 = \frac{3}{32}$

Answer: $\frac{3}{32}$

10 a

$$a_{100} = \frac{1}{(3\times100-1)\times(3\times100+2)} = \frac{1}{299\times302}$$

$$\frac{1}{2\times5} = \frac{1}{3}\times\left(\frac{1}{2}-\frac{1}{5}\right)$$

$$\frac{1}{5\times8} = \frac{1}{3}\left(\frac{1}{5}-\frac{1}{8}\right)$$

$$\frac{1}{8\times11} = \frac{1}{3}\left(\frac{1}{8}-\frac{1}{11}\right)$$

$\vdots$

$$\frac{1}{299\times302} = \frac{1}{3}\left(\frac{1}{299}-\frac{1}{302}\right)$$

Hence,

$a_1+a_2+a_3+\dots\dots+a_{100}$

$$= \frac{1}{3}\times\left(\frac{1}{2}-\frac{1}{5}\right)+\frac{1}{3}\left(\frac{1}{5}-\frac{1}{8}\right)+\dots\dots$$

$$\frac{1}{3}\left(\frac{1}{299}-\frac{1}{302}\right)$$

$$= \frac{1}{3}\times\left(\frac{1}{2}-\frac{1}{302}\right)$$

$$= \frac{25}{151}$$

Answer: $\frac{25}{151}$