S46. Ans.(b)
Sol.
For quantity I →
First the different no. of ways to arrange 5 men or 5 women = 5!
Now,
_M_M_M_M_M_
No. of ways of arranging 5 men and 5 women such that no two women or men sit together = 2 × 5! × 5!
For quantity II →
No. of ways of arranging 5 men and 5 women such that all men sit together → 6! × 5!
\[2 \times 5! \times 5! < 6! \times 5!\]
Then Quantity I < Quantity II

S47. Ans.(b)
Sol.
Since S is an acute angle
\[a + 40 + a < 90\]
\[(2a + 40) < 90\]
\[2a < 50\]
a < 25°
\[\therefore \text{Quantity I} < \text{Quantity II}\]

S48. Ans.(a)
Sol.
For Quantity I →
Let required no = 10x + y
\[10y + x = 10x + y + 36\]
\[9y = 9x = 36\]
y - x = 4
\[\therefore \text{unit digit of the no. should be 4 more than the ten's digit of the number.}\]
\[\therefore \text{such possible numbers from 1 to 63 are}\]
\[= 04, 15, 26, 37, 48, 59\]
\[\therefore \text{Required probability} = \frac{6}{63}\]
For quantity II →
Possible numbers from 1 to 63 = 8, 24, 40, 56
Required probability = \[\frac{4}{63}\]
\[\therefore \text{Quantity I} > \text{Quantity II}\]

S49. Ans.(b)
Sol.
From A → m + n = 10 × k (Let k is an integer value)
From B → 10m + 7n = 70 × l (let l is an integer value)
From C → n > m
From A and B

\[
\begin{align*}
10m + 10n &= 100k \\
10m + 7n &= 70l \\
10n - 7n &= 100k - 70l \\
3n &= 100k - 70l
\end{align*}
\]
3n=10(10k-7l); Hence n is divisible by 10. Thus option A and B together are needed to solve the question.

S50. Ans.(b)
Sol.
Let speed of boat in still water on Thursday = x
\[
\frac{x - 1}{12 \times 18} = \frac{16 + 2}{12 \times 18 \times 18}
\]
\[x - 1 = 16.2\]
x = 17.2 kmph

S51. Ans.(c)
Sol.
Let speed of boat in still water on Monday = x
\[
\begin{align*}
15 \times 18 &= 45 \times 16 \\
\frac{x - 2}{18} &= \frac{x + 2}{16}
\end{align*}
\]
\[15 \left(\frac{x - 2}{18} = \frac{x + 2}{16}\right) = 11\]
x - 2 = x + 2
If we put x = 20
Then it satisfy the above equation
\[\therefore x = 20 \text{ kmph}\]
S52. Ans. (d)
Sol.
Speed of boat in still water on Tuesday = 15 km/hr
\[ \frac{2}{3} \% \text{ of } 6 = \frac{2}{3} \]
Speed of boat in still water on Wednesday = \[ 15 + \frac{2}{3} \times 15 \]
= 25 km/hr
\[ \frac{14 \times 18}{6} = \frac{9}{10} \times (15 + 3) \]
\[ \frac{25 - x}{6} = \frac{9}{18} \times \frac{5}{10} \]
\[ 25 - x = 24 \]
x = 1 km/hr

S53. Ans. (a)
Sol. Given
Speed of boat in still water on Saturday = 21 km/hr
\[ \frac{4}{7} \% \text{ of } 28 \]
\[ \therefore \text{ Speed of boat in still water on Sunday } = 21 - \frac{2}{7} \times 21 \]
= 21 - 6 = 15 kmph
\[ \frac{19 \times 15}{10} = \frac{15 + 4}{x} \times 1.8 \]
Required time = \[ \frac{21 - 1.8}{57.6} \times 3 \text{ hrs} \]

S54. Ans. (a)
Sol.
\[ \frac{18 \times 15}{x - 4} = 2 + \frac{12 \times 15}{17 + 1} \]
\[ 18 \times 15 = 12 (x - 4) \]
x - 4 = 27
x = 31 kmph
Required upstream speed = 31 - 4 = 27 kmph

Solutions (55-57)
For Bag A—
No. of yellow balls = 18
No. of green balls = 18 + 4 = 22
According to the question
Total no. of balls in bag A are in multiple of 13.
so by hit and trial method.
If we assume total no. of balls in bag A = 65
Then, No. of black balls = 25
It satisfies the probability statement given in the question.

By similar method for Bag B—
No. of Yellow balls = 22
No. of Green balls = 25
No. of Black balls = 28

For Bag C—
No. of Yellow balls = 42
No. of Green balls = 21
No. of Black balls = 15

S55. Ans. (d)
Sol.
After replacement →
Yellow no. of balls in bag B = 22 - x
Black no. of balls in bag B = 28 + 5 = 33
Green no. of balls in bag B = 25
Then, \[ \frac{22 - x + 33 + 25}{33} = \frac{1}{11} \]
\[ 80 - x = \frac{26}{78} \]
x = 2

S56. Ans. (e)
Sol.
Required probability = \[ \frac{18 \times 22 + 22 \times 25 + 25 \times 28}{65 \times 75} \]
= \[ \frac{1646}{65 \times 75} \]

S57. Ans. (c)
Sol.
Required % = \[ \frac{40 - 1}{40} \times 100 \]
= \[ \frac{39}{40} \times 100 \]
= 97.5%

S58. Ans. (c)
Sol.
Let MP of item II by seller A = 100x
\[ \therefore \text{ MP of item II by seller C } = 100x \]
\[ \frac{100}{100 + s} \times 68x = \frac{17}{21} \]
\[ \frac{100}{100 + s} \times 84x = \frac{17}{21} \]
\[ \frac{84}{96 + 2s} = \frac{17}{21} \]
\[ \frac{100}{100 + s} = \frac{1}{1} \]
\[ 96 + 2s = 100 + s \]
s = 4

S59. Ans. (b)
Sol.
Let mark price of item II = 100x
Let mark price of item III = 100y
\[ \therefore 100x + 100y = 6000 \]
x + y = 60 ....(i)
And, 72x - 84y = 420
6x - 7y = 35 ......(ii)
From (i) and (ii)
y = 25
x = 35
∴ M.P of item II = 3500
M.P. of item III = 2500
Required % = \frac{3500 - 2500}{2500} \times 100
= \frac{1000}{25}
= 40%

S60. Ans.(a)
Sol.
Let M.P. of item II = 100a
∴ S.P. of item II by seller A = 68a
S.P. of item II by seller B = (100 - x)a

Then (168 - x)a = (3888) \times 2
(184 - x)a = 4320 \times 2
∴ \frac{184 - x}{9} = \frac{10}{10}
(10 \times 168) - 10x = 9 \times 184 - 9x
x = 24
a = 54
Now S.P. of item II by seller C = 4536 Rs.

S61. Ans.(e)
Sol.
Let S.P. of item I = 500
∴ S.P. of item III = 600
C.P. of item I = \frac{100 \times 500}{125} = 400
C.P. of item II = \frac{120 \times 600}{100} = 720
Profit on item I = 500 - 400 = 100

∴ 100 \rightarrow 750
1 \rightarrow 7.5
(200) \rightarrow (200 \times 7.5) = 1500 Rs.

S62. Ans.(a)
Sol.
C.P. = 60 Rs.
M.P. = \frac{200 \times 60 + 60}{300}
= 40 + 60
= 100
Total C.P. = 60 \times 5 = 300 Rs.
Total selling price should be = 380 Rs.
S.P. of item III by seller E = (380 - 64 - 67 - 86 - 84) = 79
∴ Minimum required discount = (100 - 79) = 21%

S63. Ans.(b)
Sol.
From question we observe that sum of investment of A and C is equal to B for first quarter.

So, if ratio of investment of B is equal to (A + C) for all quarters of year then B’s profit is 50% of total profit.
So profit of B = \frac{125000}{2} = 62500

S64. Ans.(b)
Sol.
Total amount invested by A + B in a year
⇒ 2500 + 7x + 7y + 13z = 9000 ...........(i)
Total amount invested by B and C in a year
⇒ 2300 + 8x + 7y + 13z = 10500 .........(ii)
From (i) and (ii)
200 - x = -1500
x = 1700
Total amount for second quarter = 17000

S65. Ans.(d)
Sol.
\begin{align*}
P & \quad \text{Q} \\
A & \quad \rightarrow \quad \text{B}
\end{align*}

Distance between P and Q (x) = 27 + \frac{13}{3} \times 120
= 27 + 520
= 547 km

Total time taken in given condition = \frac{1}{2} + \frac{13}{3} \times h = \frac{29}{6} h
New time taken according to condition = \frac{547 + 2 \times 54}{(66 - 54)} = \frac{655}{12} h

Required difference in time = \frac{655}{12} - \frac{29}{6} = \frac{597}{12} = 49 hour 45 min.

S66. Ans.(c)
Sol.
Required ratio = \(\frac{66 - 54}{66 + 54} = \frac{1}{10}\)

S67. Ans.(a)
Sol.
Area of quadrilateral BFDE = Area of rectangle ABCD – Area of ∆ABE – Area of ∆DCF
\[\frac{120 - 30 - 25}{65}\]

S68. Ans.(a)
Sol.
Ratio of Investment of A, B and C
\[
\frac{(3000 \times 4 + 1800 \times 5 + 3600 \times 3)}{(4000 \times 4 + 8000 \times 5)} : \frac{(4000 \times 4 + 33600)}{31800 : 56000 : 47600}
\]
159 : 280 : 238
Profit of C = \(\frac{238}{677}\) × 677000
= 238000
Average of profit earned by (A + B + C) \(\approx 225666\)

S69. Ans.(b)
Sol.
Let the C do in one day = 4y work
Let the D do in one day = 5y work
2 day work of C + D = 9y
In 44 day they will complete 9y × 22 = 198y
In another \(\frac{1}{2}\) days 2y work will be done
C will take = \(\frac{200y}{4y}\) days = 50 day
D will take = 40 days.
C and D will complete work together in = \(\frac{50 \times 40}{90} = \frac{200}{9}\)
According to condition
\[
\frac{9x}{18x} = \frac{9 \times 2x}{400 + 200} = \frac{1}{1}
\]
\[\Rightarrow x = \frac{33}{3}\]

S70. Ans.(a)
Sol.
Let E do work in 4x days
Let F do work in 5x days
\[
\frac{24}{5} + \frac{24}{4} + \frac{20}{3} + \frac{20}{3} = 1
\]
\[
\frac{24}{5} \left(\frac{9}{20}\right) + \frac{24}{4} \left(\frac{100}{180}\right) = 1
\]
\[
x = \frac{108}{200}
\]
\[\Rightarrow x = \frac{108}{200} = \frac{1}{10}\]
Together E and F can do work in = \(\frac{4 \times 108 \times 5 \times 108}{9 \times 108}\)
= 240 days
Required difference = \(\frac{240}{4 \times 108} - \frac{240}{5 \times 108}\)
= \(\frac{1}{9}\)

S71. Ans.(e)
Sol.
As per given condition
\[
\frac{5}{5} + \frac{5}{x} + \frac{x}{10} + \frac{x}{5x} = 1
\]
\[\Rightarrow \frac{36}{35 - 30} = \frac{1}{x}
\]
\[\Rightarrow x = \frac{36}{35 - 30}\]
= 1 days.

S72. Ans.(d)
Sol.
Part of work completed by E = \(\frac{5}{20} + \frac{3}{4}\)
3 day work by (A + B + D) = \(\frac{1}{10} + \frac{1}{12} + \frac{1}{18}\)
\[\Rightarrow \frac{18 + 15 + 10}{180} = \frac{43}{180}\]
9 day work = \(3A + 3B + 3D\) = \(\frac{129}{180}\)
Remaining work = \(\frac{3}{4}\)
\[\Rightarrow \frac{3}{180} = \frac{6}{180} = \frac{1}{30}\]
this will be done by A in = \(\frac{1}{30} \times 10 = \frac{1}{3}\) days
so B worked for 3 days.

S73. Ans.(d)
Sol.
Work done by A, C and E on job Z = \(\frac{2}{10} + \frac{2}{15} + \frac{2}{20}\)
= \frac{12+8+6}{30} = \frac{26}{30} = \frac{13}{15}

Remaining work done by B and D in 20x and 21x

\begin{align*}
20x + 21x &= 17 \\
\frac{12}{30} + \frac{18}{30} &= \frac{30}{30} = \frac{17}{30} \\
x &= \frac{1}{5}
\end{align*}

Required days = 20 \times \frac{1}{5} = 4 days

S74. Ans.(c)

Sol.

According to question

\begin{align*}
\frac{2x}{10} + \frac{4x}{15} + \frac{3x}{18} + \frac{2}{20} &= 1 \\
\frac{x}{5} + \frac{x}{3} + \frac{x}{5} + \frac{x}{5} &= 1 \\
6 + 10x + 6 + 5x + 3 &= 30 \\
x &= 1
\end{align*}

Required difference = 4x - 3x

= 4 - 3 = 1

S75. Ans.(d)

Sol.

With new efficiency C will complete job in = 12 days

3 days work of C and 1 day work of B = 1/3

Days required = 9 days

S76. Ans.(b)

Sol.

Rhombus PQRS:

\begin{align*}
\text{Side of PQRS} &= \frac{\sqrt{6^2 + 8^2}}{2} \\
&= \frac{10}{2} = 5 \text{ cm}
\end{align*}

Rhombus MLKJ

\begin{align*}
\sin 30 &= \frac{\text{perpendicular}}{\text{Hypotenuse}} \\
\frac{1}{2} &= \frac{\text{side of MLJK}}{75} \\
\text{Side of MLJK} &= 15 \text{ cm}
\end{align*}

Now, AB = 5 cm

CD = 15 cm

So median XY = \frac{5 + 15}{2} = 10 cm

S77. Ans.(c)

Sol.

After 20% of the contents of the vessel are removed,

Remaining contents = \frac{80}{100} (12.5) = 10 litres.

Ratio of water and milk in it = 1 : 4.

∴ It contains \frac{1}{5} (10) = 8 litres of milk and 2 litres of water.

To reverse the ratio, 2 litres of water must be made 32.

∴ x = 30 litres of water must be added.

To reverse this ratio again 8 litres of milk must be made

4(32) = 128 litres.

∴ y = 128 - 8 = 120 litres of milk must be added.

S78. Ans.(b)

Sol.

We can get ratio of investment from either statement B alone or C alone so profit of B can be determined from option b

S79. Ans.(d)

Sol.

From A and C we can determine the value of efficiency between men, women and children from A & B we can also determine the value of ratio of men, women and children. We can calculate the answer from B and C.

S80. Ans.(c)

Sol.

From A

Total price = \frac{3828 \times 100}{120} = \frac{319}{1}

From C

(x + y) - (x - y) = 28

y = 14

And x+y = 90 (From B)

x = 76

So total value can be determined