ALLEN CAREER INSTITUTE

PRELIMINARY EXAM : 2019-20

Paper Set : SET-I(HT) **SUBJECT : Mathematics**

ICSE Board - Sample Paper - 1 Solutions

SECTION - A

Q.1 (A) Let the speed of boat in still water = v

speed of stream = u

speed of boat in v/s = v – u

speed of boat in d/s = v + u

	d / s	u / s
D	30	30
s	$v+u$	$v-u$
t	$\frac{30}{v+u}$	$\frac{30}{v-u}$

D = Distance, S = Speed, t = Time.

given $\frac{30}{v+u} \quad \frac{30}{v-u} \quad 4 \quad \frac{30}{60}$

$\frac{30}{15+v} \quad \frac{30}{15-v} \quad 4 \quad \frac{1}{2}$

$30\left[\frac{1}{15+u} \quad \frac{1}{15-u}\right] \quad \frac{9}{2}$

$30\left[\frac{30}{(15)^2-v^2}\right] \quad \frac{9}{2}$

$200 = 225 - u^2.$

$u^2 = 25$

$u = 5$ km/hr

(B) $a_4 + a_8 = 24$

$(a + 3d) + (a + 7d) = 24$

$2a + 10d = 24$

$a + 5d = 12$ .... (i)

$a_6 + a_{10} = 34$

$(a + 5d) + (a + 9d) = 34$

$2a + 14d = 34$

$a + 7d = 17$ .... (ii)

From (i) and (ii)

$a = -\frac{1}{2}$

d $\frac{5}{2}$

First 3 terms, $-\frac{1}{2}, 2, \frac{9}{2}$

(C) If 6 is the mean proportion of x and y

6 $\sqrt{xy}$

$36 = xy$

$36 \times 36 = x^2y^2$ .... (i)

48 is 3rd proportion to x and y

$x : y = y : 48$

$\frac{x}{y}$ $\frac{y}{48}$

$y^2 = 48x$ .... (ii)

$36 \times 36 = x^2 (48\ x)$ [From (i)]

$\frac{36 \times 36}{48}$ x^3

$x^3 = 27$

$x = 3$ and $y = 12$

Q.2 (A) Let the G.P. is

$a, ar, ar^2, ...ar^{n-1}$.

if each term raised to power x

$a^x, (ar)^x, (ar^2)^x ..... (ar^{n-1})^x$

$a^x, a^xr^x, a^xr^{2x}..... a^xr^{(n-1)x}$

$\frac{T_2}{T_1}$ $\frac{a^xr^x}{a^x}$ r^x

$\frac{T_3}{T_2}$ $\frac{a^xr^{2x}}{a^xr^x}$ r^x

ration of terms are same so it is a G.P. with common ratio r^x.

(B) $A \begin{bmatrix} 1 & 1 \\ -2 & 0 \end{bmatrix}, B \begin{bmatrix} 2 & -1 \\ 1 & 1 \end{bmatrix}$

(i) $x + 2A = B$

$x = B - 2A$

$$= \begin{bmatrix} 2 & -1 \\ 1 & 1 \end{bmatrix} - 2\begin{bmatrix} 1 & 1 \\ -2 & 0 \end{bmatrix}$$

$$= \begin{bmatrix} 2 & -1 \\ 1 & 1 \end{bmatrix} - \begin{bmatrix} 2 & 2 \\ -4 & 0 \end{bmatrix}$$

$$\begin{bmatrix} 2-2 & -1-2 \\ 1-(-4) & 1-0 \end{bmatrix}$$

$$\begin{bmatrix} 0 & -3 \\ 5 & 1 \end{bmatrix}$$

(ii) $3X + B + 2A = 0$

$3X = -B - 2A$

$$X = \frac{1}{3} -B - 2A$$

$$X = \frac{1}{3}\left\{-\begin{bmatrix} 2 & -1 \\ 1 & 1 \end{bmatrix} - 2\begin{bmatrix} 1 & 1 \\ -2 & 0 \end{bmatrix}\right\}$$

$$= \frac{1}{3}\left\{\begin{bmatrix} -2 & 1 \\ -1 & -1 \end{bmatrix} - \begin{bmatrix} 2 & 2 \\ -4 & 0 \end{bmatrix}\right\}$$

$$\frac{1}{3}\begin{bmatrix} -2-2 & 1-2 \\ -1+4 & -1-0 \end{bmatrix}$$

$$\frac{1}{3}\begin{bmatrix} -4 & -1 \\ 3 & -1 \end{bmatrix}$$

$$= \begin{bmatrix} -\frac{4}{3} & -\frac{1}{3} \\ 1 & -\frac{1}{3} \end{bmatrix}$$

(iii) $3A - 2X = X - 2B$

$3A = 3X - 2B$

$3X = 3A + 2B$

$$X \quad \frac{1}{3}[3A \quad 2B]$$

$$A \quad \frac{2}{3}B$$

$$X \quad A \quad \frac{2}{3}B$$

$$\begin{bmatrix} 1 & 1 \\ -2 & 0 \end{bmatrix} \quad \frac{2}{3}\begin{bmatrix} 2 & -1 \\ 1 & 1 \end{bmatrix}$$

$$\begin{bmatrix} 1 & 1 \\ -2 & 0 \end{bmatrix} \quad \begin{bmatrix} \frac{4}{3} & \frac{-2}{3} \\ \frac{2}{3} & \frac{2}{3} \end{bmatrix}$$

$$\begin{bmatrix} 1+\frac{4}{3} & 1-\frac{2}{3} \\ -2 \quad \frac{2}{3} & 0 \quad \frac{2}{3} \end{bmatrix}$$

$$\begin{bmatrix} \frac{7}{3} & \frac{1}{3} \\ -\frac{4}{3} & \frac{2}{3} \end{bmatrix}$$

Q.2 (C)

Output tax in Delhi (interstate) :

IGST = 9% of 50,000 = Rs. 9000

Output tax in Delhi = Rs. 9000

Output tax in Calcutta :

C.P. in Calcutta = Rs. 50,000 and Profit = Rs. 20,000

S.P. in Calcutta = 50,000 + 20,000 = Rs. 70,000

IGST = 18% of 70,000 = Rs. 12,600

Output tax in Calcutta = Rs. 12,600

Since, the dealer in Nainital does not sell the product.

Output GST (tax on sale) = Rs. 0

Q.3 (A) Dividend = Divisor × Quotient + remainder

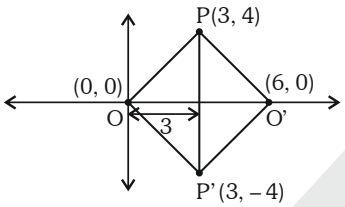
$3x^3 - 5x^2 + 6x + P = (x - 3)q(x) + 8$

$$
\begin{array}{l}
x-3\overline{)\,3x^3-5x^2+6x+P-8\,(\,3x^2+4x+18} \\
\quad -3x^3 \mp 9x^2 \\
\quad\quad\quad 4x^2+6x+P-8 \\
\quad\quad -4x^2 \mp 12x \\
\quad\quad\quad\quad\quad 18x+P-8 \\
\quad\quad\quad\quad -18x \mp 54 \\
\quad\quad\quad\quad\quad P+46
\end{array}
$$

$P + 46 = 0$

$P = -46$

(B)



(i) P' (3, – 4)

O' (6, 0)

(ii) PP' = 8

OO' = 6

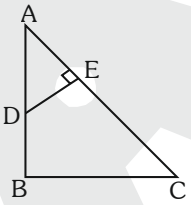
(iii) Perimeter of quadrilateral POP'O'

= PO + OP' + P'O' + PO'

= 5 + 5 + 5 + 5 = 20

(iv) Rhombus

(C)



For $\Delta ADE \sim \Delta ACB$

$\angle E = \angle B = 90^0$

$\angle DAE = \angle BAC$ = Common angle

So, $\Delta ADE \sim \Delta ACB$ [by AA similarity]

By CPST

$$\frac{AD}{AC} \quad \frac{DE}{CB} \quad \frac{AE}{AB}$$

$$\frac{AD}{13} \quad \frac{DE}{5} \quad \frac{4}{AB}$$

$$\frac{AD}{13} \quad \frac{DE}{5} \quad \frac{4}{12}$$

$$AD \quad \frac{13}{3}, DE \quad \frac{5}{3}$$

(iii) $\text{Ar}(\Delta ADE) = \frac{1}{2} \times AE \times DE$

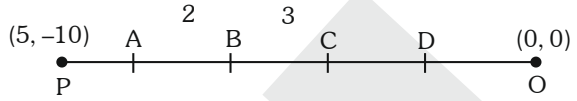
$$= \frac{1}{2} \times 4 \times \frac{20}{8} \quad 5$$

$$\text{Ar}(\Delta ABC) = \frac{1}{2} \times 5 \times 8$$

$$= 20$$

$$\text{Ar}(\square BCED) = 20 - 5 = 15$$

Q.4 (A)



B divide OP in 2 : 3 ratio

D divide OP in 4 : 1 ratio

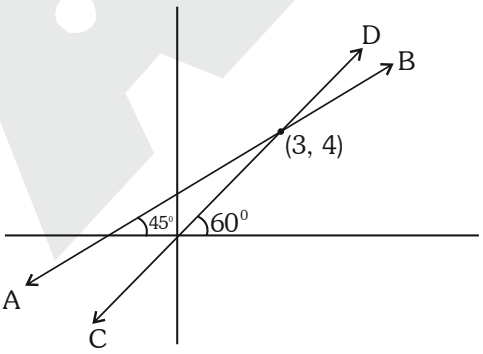
$$B \quad \left[\frac{2(0) \quad 3(5)}{2 \quad 3}, \frac{2(0) \quad 3(-10)}{2 \quad 3}\right]$$

B (3, – 6)

$$D \quad \left[\frac{4(0) \quad (1)5}{4 \quad 1}, \frac{4(0) \quad 1(-10)}{4 \quad 1}\right]$$

D [1, – 2]

(B)



Equation of line BC

$y - y_1 = m(x - x_1)$

$y - 4 = \tan 60\,(x - 3)$

$y - 4 = \sqrt{3}(x - 3)$

$y - \sqrt{3}x - 4 \quad 3\sqrt{3} \quad 0$

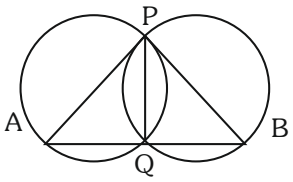
Equation of line AB

$y - 4 = \tan 45\,(x - 3)$

$y - 4 = x - 3$

$x - y + 1 = 0$

(C)



$\angle PQA = 90^0$ {Diameter subtent 90^0 on circumference}

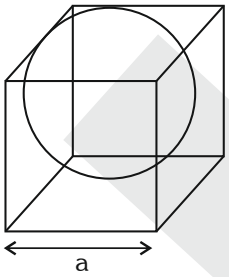
$\angle BQP = 90^0$

$\angle PQA + \angle PQB = 180^0$

So, A, Q, B are collinear.

Section B :

Q.5 (A)



$a = 2r$

$V_C = a^3$

$V_S = \frac{4}{3}\pi r^3$

$= \frac{4}{3}\pi\left(\frac{a}{2}\right)^3$

$V_S = \frac{4}{3}\pi\left(\frac{a^3}{8}\right)$

$$\frac{V_C}{V_S} \quad \frac{a^3}{\frac{4}{3}\pi\frac{a^3}{8}} \quad \frac{6}{\pi}$$

(B) $\dfrac{\sin A - \cos A \quad 1}{\sin A + \cos A - 1} \quad \dfrac{\cos A}{1 - \sin A}$ $\{1 - \cos^2 A = \sin^2 A\}$

$$\text{L.H.S.} = \frac{\sin A - \cos A \quad 1}{\sin A + \cos A - 1} \times \frac{\sin A \quad \cos A \quad 1}{\sin A \quad \cos A \quad 1}$$

$$\frac{(\sin A + 1)^2 - \cos^2 A}{(\sin A + \cos A)^2 - 1^2}$$

$$\Rightarrow \frac{\sin^2 A \quad 1 \quad 2\sin A - \cos^2 A}{\sin^2 A \quad \cos^2 A \quad 2\sin A \cos A - 1}$$

$$\frac{2\sin^2 A \quad 2\sin A}{2\sin A \cos A}$$

$$\frac{2\sin A[1 \quad \sin A]}{2\sin A \cos A}$$

$$= \frac{1 + \sin A}{\cos A} \times \frac{1 - \sin A}{1 - \sin A}$$

$$\frac{1 - \sin^2 A}{\cos A(1 - \sin A)} \quad \frac{\cos^2 A}{\cos A(1 - \sin A)}$$

$$\frac{\cos A}{1 - \sin A}$$

(C) 366 Days = 52 weeks + 2 Days.

2 days can be :

MON	TUE
TUE	WED
WED	TH
THE	FRI
FRI	SAT
SAT	SUN
SUN	MON

Favorable case = 2

Total case = 7

$$P = \frac{2}{7}$$

Q.6 (A)

Let Rs. X be invested in 9% Rs. 50 share at 8% premium and Rs.(20304 – X) be invested in 8% Rs.25 share at 8% discount.

When Rs X is invested in 9% Rs. 50 share at 8% premium, we have Nominal value of share = Rs. 50

Market value of share = Rs. 50 + 8% of Rs50 = Rs 50 $\times \frac{108}{100}$ = Rs, 54

Number of shares bought = $\frac{\text{Rs.X}}{\text{Rs.54}}$ $\frac{\text{X}}{54}$

Dividend on each share = 9% of Rs 50 = $\frac{9}{100}\times 50$ Rs.$\frac{9}{2}$

Total dividend = Rs.$\frac{9}{2}\times\frac{\text{X}}{54}$ Rs.$\frac{\text{X}}{12}$

When Rs. (20304 – X) is invested in 8% Rs. 25 Share at 8% discount, we have

Nominal value of share = Rs. 25

Market value of share = Rs 25 – 8% of Rs. 25 = Rs. 25 $\times \frac{92}{100}$ = Rs. 23

Number of shares bought = $\frac{\text{Rs.}(20304-\text{x})}{\text{Rs.23}}$ $\frac{20304-\text{x}}{23}$

Dividend on each share = 8% of Rs. 25 = Rs.$\frac{8}{100}\times 25$ Rs.2

Total dividend = Rs. 2 $\times\frac{(20304-\text{x})}{23}$

Given, dividends (or incomes) from both the investments are equal.

$\therefore \frac{\text{x}}{12}$ $\frac{2(20304-\text{x})}{23}$

$\Rightarrow 23\text{x}$ 24x 24×20304

$\Rightarrow \text{x}$ $\frac{24\times 20304}{47}$ Rs.10368

$\therefore$ 20304 – x = 20304 – 10368 = 9936

Thus, Rs. 10368 is invested in 9% rS. 50 share at 8% premium and Rs. 9936 is invested in 8% Rs. 25 share at 8% discount.

(B)

Weekely wages (Rs)	No. of Workers (f_i)	x_i	f_ix_i
50 – 55	5	52.5	262.5
55 - 60	**20**	**57.5**	**1150**
60 – 65	10	62.5	625
65 – 70	10	67.5	675
70 – 75	9	72.5	652.5
75 – 80	6	77.5	465
80 – 85	12	82.5	990
85 – 90	8	87.5	700
	$\Sigma f_i = 80$	Σf_ix_i	5520

(i) the mean $\overline{x}$ $\frac{\Sigma f_i x_i}{\Sigma f_i}$

$$\frac{5520}{80}$$

$= 69$

(ii) 55–60 is having maximum frequency so 55–60 is modal class.

(iii) No. of workers weekely wages < 80 is $\boxed{60}$

No. of workers weekely wages greater than 65 and less than 80 are $\boxed{25}$

(C) $\frac{Ar(\Delta_1)}{Ar(\Delta_2)} \left(\frac{P_1}{P_2}\right)^2 \left(\frac{A_1}{A_2}\right)^2 \left(\frac{M_1}{M_2}\right)^2$ $\{\Delta_1 \sim \Delta_2\}$

$P \rightarrow$ Perimeter

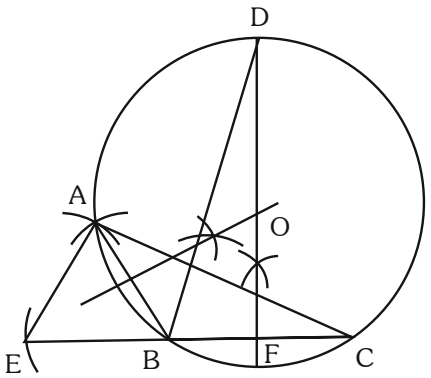
$A \rightarrow$ Length of latitude

$M \rightarrow$ Length of median

$\frac{P_1}{P_2}$ $\frac{A_1}{A_2}$ $\frac{M_1}{M_2}$ $\sqrt{\frac{Ar(\Delta_1)}{Ar(\Delta_2)}}$

$\frac{16}{25}$ $\frac{4}{5}$

Q.7 (A)



(a) Draw a line BC = 5.4 Cm.

(b) Draw AB = 6 cm, such that $m\angle ABC \quad 120^0$.

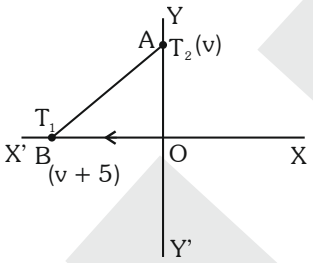
(c) Construct the perpendicular bisectors of AB and BC, such that they intersect at O.

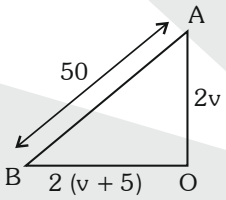
(d) Draw a circle with center O and OA as the radius

(e) Extend the perpendicular bisector of BC, such that it intersects the circle at D.

(f) Here BD = DC.

(B)





$AB^2 = OB^2 + OA^2$

$(50)^2 = [2(v + 5)]^2 + [2v]^2$

$2500 = 4[v^2 + 25 + 10v] + 4v^2$

$8v^2 + 40v - 2400 = 0$

$v^2 + 5v - 300 = 0$

$v^2 + 20v - 15v - 300 = 0$

$v(v + 20) - 15 (v + 20) = 0$

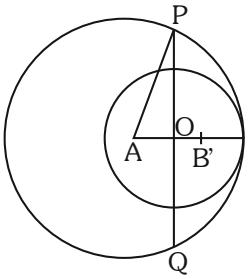
$(v + 20)(v - 15) = 0$

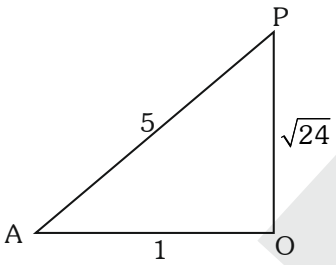
$v = 15$

Speed of train first = 15 km/hr

Speed of second train = 20 km/hr

Q.7 (C)





PQ = 2OP

$2\sqrt{24}$

$4\sqrt{6}$

Q.8 (A) $x = \dfrac{\sqrt{3a \quad 2b} \quad \sqrt{3a-2b}}{\sqrt{3a+2} - \sqrt{3a-2b}} \times \dfrac{\sqrt{3a \quad 2b} \quad \sqrt{3a-2b}}{\sqrt{3a \quad 2b} \quad \sqrt{3a-2b}}$

$x \quad \dfrac{\sqrt{3a \quad 2b} \quad \sqrt{3a-2b}^{\,2}}{3a+2b \;-\; 3a-2b}$

$x \quad \dfrac{6a \quad 2\sqrt{\;3a \quad 2b \quad 3a-2b}}{4b}$

$x \quad \dfrac{3a+\sqrt{9a^2-4b^2}}{2b}$

$2bx - 3a = \sqrt{9a^2 - 4b^2}$

$(2bx - 3a)^2 = (9a^2 - 4b^2)$

$4b^2x^2 + 9a^2 - 12abx = 9a^2 - 4b^2$

$4b^2x^2 - 12abx + 4b^2 = 0$

$4b\,[bx^2 - 3ax + b] = 0$

$bx^2 - 3ax + b = 0$

(B) Initial marked price by manufacturer A is Rs. 6000,

B bought the T.V. at discount of 20%.

Cost price of B = 80% of 6000 = Rs. 4800 ..... (i)

GST paid by B for purchase = 18% of 4800 = Rs. 864 ... (ii)

B sells T.V. at discount of 10% of market Price.

Selling price for B = 6000 – 10% of 600 = Rs. 5400 .....(iii)

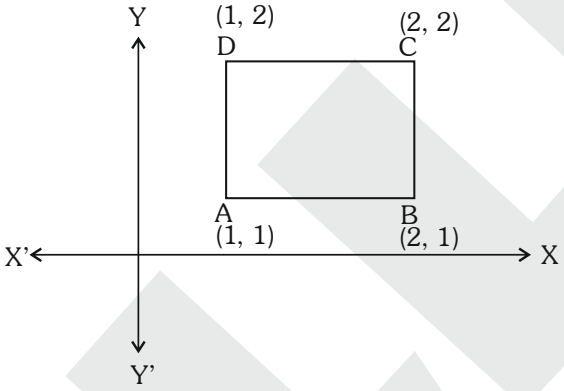
GST charged by B on selling of T.V. = 18% of 5400 = Rs. 972 ..... (iv)

GST paid by B to the government = GST charged on selling price – GST paid against purchase price

= 972 – 864

= Rs. 108

(C)



Equation of line AB, $y = 1$

Equation of line BC, $x = 2$

Equation of line DC, $y = 2$

Equation of line AD, $x = 1$

Slope of diagonal AC

A(1, 1), C(2, 2)

$\frac{1}{1}$ 1

Slope of diagonal BD

B(2, 1), D(1, 2)

$\frac{1}{-1}$ –1

Q.9 (A)

Height(cm) (x_i)	No. of plants (f_i)	$f_i x_i$
50	2	100
55	4	220
58	10	580
60	f	60f
65	5	325
70	4	280
71	3	213
	Σf_i 28 f	$\Sigma f_i x_i$ 1718 60f

$\bar{x} \quad \frac{\Sigma f_i x_i}{\Sigma f_i}$

$\frac{1718 \quad 60f}{28 \quad f} \quad 60.95$

$1718 + 60f = 1706.60 + 60.95f$

$11.4 = 0.95f$

$f \quad \frac{11.4}{0.95}$

$f = 12$

(B) $3x + 5$ is a factor of polynomial

$(a - 1)x^3 + (a + 1)x^2 - (2a + 1)\,x - 15 = 0$

$3x + 5 = 0$

$x \quad \frac{-5}{3}$ is zeroes of polynomial

$f(x) \; = (a - 1)x^3 + (a + 1)x^2 - (2a + 1)x - 15$

$= (a-1)\left(\frac{-5}{3}\right)^3 \quad (a \quad 1)\left(\frac{-5}{3}\right)^2 - (2a+1)\left(\frac{-5}{3}\right) - 15$

$f(x) \; = (a-1)\left(\frac{-125}{27}\right) \quad (a \quad 1)\left(\frac{25}{9}\right) \quad (2a \quad 1)\left(\frac{5}{3}\right) - 15$

$0 \quad \frac{-125}{27}a \quad \frac{125}{27} \quad \frac{25a}{9} \quad \frac{25}{9} \quad \frac{10a}{3} \quad \frac{5}{3} - 15$

$\frac{125}{27}a - \frac{25a}{9} - \frac{10a}{3} \quad \frac{125}{27} \quad \frac{25}{9} \quad \frac{5}{3} - 15$

$$= \frac{125a}{27} - \frac{25a}{9} - \frac{10a}{3} \quad \frac{125}{27} \quad \frac{25}{9} \quad \frac{5}{3} - \frac{15}{1}$$

$$\frac{125a - 75a - 90a}{27} \quad \frac{125 \quad 75 \quad 45 - 405}{27}$$

$$\frac{125a - 165a}{27} \quad \frac{245 - 405}{27}$$

$-40a = -160$

a 4

The given polynomial is

$3x^3 + 5x^2 - 9x - 15$

(C),

1st Case

16% Rs. 100 shares at 80 means;

Market value of 1 share = Rs. 80

Norminal value of 1 share = Rs. 100

Dividend = 16%

Income on Rs. 80 = 16% of Rs. 100 = Rs. 16

Income on Rs. 1 = 16/80 of Rs. 0.20

2nd Case

20% Rs. 100 shares at 120 means;

Market value of 1 share = Rs. 120

Nominal value of 1 share = Rs. 100

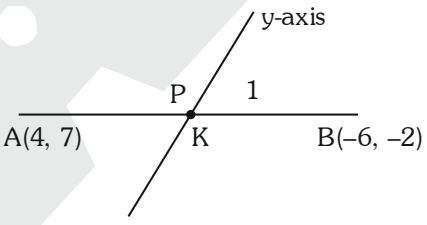
Dividend = 20%

Income on Rs. 120 = 20% of Rs. 100 = Rs, 20

Income on Rs. 1 = 20/120 = Rs. 0.17

Then 16% Rs. 100 shares at 80 is better investment.

Q.10 (A)



Let point K divide AB in P : 1 ratio

$$K \left[\frac{-6P + 4}{P \quad 1}, \frac{-2P \quad 7}{P \quad 1} \right]$$

Point K lies on y-axis, so x co-ordinate will be 0

$$\frac{-6P \quad 4}{P \quad 1} \quad 0$$

$$P \quad \frac{4}{6} \quad \frac{2}{3}$$

$$K\left[\frac{-6\left(\frac{2}{3}\right)+4}{\frac{2}{3} \quad 1}, \frac{-2\left(\frac{2}{3}\right) \quad 7}{\frac{2}{3} \quad 1}\right]$$

$$K\left[0, \frac{17}{5}\right]$$

(B) (i) A perfect square number

1, 4, 9, 16, 25, 36, 49, 64, 81, 100

$$\text{Probability} = \frac{10}{100} \quad \frac{1}{10}$$

(ii) A number divisible by 4

4, 8, 12, 16, 20, 24, 28, 32, 36, 40, 44, 48, 52, 56, 60, 64, 68, 72, 76, 80, 84, 88, 92, 96, 100

$$\text{Probability} = \frac{25}{100} \quad \frac{1}{4}$$

(iii) A number divisible by 5

$$\text{Probability} = \frac{20}{100} \quad \frac{1}{5}$$

(iv) A number divisible by 4 or 5 number

$$\text{Probability} = \frac{25}{100} + \frac{20}{100} - \frac{5}{100} \quad \frac{40}{100}$$

(v) A number divisible by 4 and 5 both [20, 40, 60, 80, 100]

$$\frac{5}{100} \quad \frac{1}{20}$$

(C) Mean proportional of x and y

$$\sqrt{xy} \quad 14$$

$xy = 196$

$x^2y^2 = 196 \times 196$ ....(i)

For third proportion

x : y : : y : P

P is third proportion to x and y

$\frac{x}{y} \quad \frac{y}{P}$

$y^2 = Px$

$y^2 = 112\,x$ ... (ii)

from (i) and (ii)

$x^2\,(112x) = 196 \times 196$

$x^3 \quad \frac{196\times196}{112}$

$x^3 = 49 \times 7$

$x = 7$

$y \quad \frac{196}{7} \quad 28$

Q.11 (A) $-2\frac{5}{6} < \frac{1}{2} - \frac{2x}{3} \le 2, x \in w$

$-\frac{17}{6} < \frac{1}{2} - \frac{2x}{3} \le 2, x \in w$

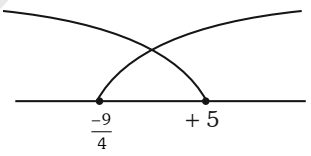
$-\frac{17}{6} - \frac{1}{2} < \frac{-2x}{3} \le 2 - \frac{1}{2}$

$\frac{-17-3}{6} < \frac{-2x}{3} \le \frac{3}{2}$

$\frac{-20}{6} < \frac{-2x}{3} \le \frac{3}{2}$

$\frac{20}{6} > \frac{2x}{3} \ge \frac{-3}{2}$

$5 > x \ge \frac{-9}{4}$



(B) 120, 125, 130, 135, ...

Sum of all angles of polygon = $(n-2)180$ .... (i)

120, 125, 130, 135, ...

120 + 125 + 130 + 135 .....

$\frac{n}{2}[2(120) \quad (n-1)d]$ .... (ii)

From (i) and (ii)

$$\frac{n}{2}[240+(n-1)5]=(n-2)\times 180$$

$$120n+\frac{n}{2}(n-1)5=180n-360$$

$$120n+\frac{5}{2}n(n-1)=180n-360$$

$$\frac{5}{2}(n^2-n)=60n-360$$

$5n^2 - 5n = 120n - 720$

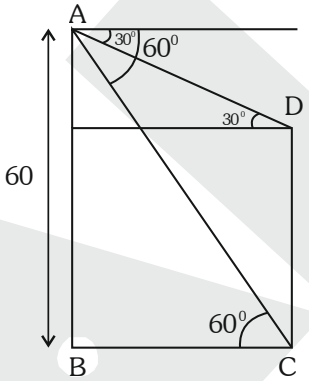
$5n^2 - 125n + 720 = 0$

$n^2 - 25n + 144 = 0$

$(n - 16)(n - 9) = 0$, $n = 16$, $n = 9$

Ans. $n = 9$

(C)



(i) In ΔABC

$\tan 60^0 \quad \frac{AB}{BC}$

$\sqrt{3} \quad \frac{60}{BC}$

$$BC=\frac{60}{\sqrt{3}}\times\frac{\sqrt{3}}{\sqrt{3}}$$

BC $20\sqrt{3}$

(ii) Height of lamp post

$$\tan 30 = \frac{AE}{ED}$$

$$\frac{1}{\sqrt{3}} \quad \frac{AE}{20\sqrt{3}}$$

$AE = 20$

$CD = AB - AE$

$= 60 - 20 = 40$ m