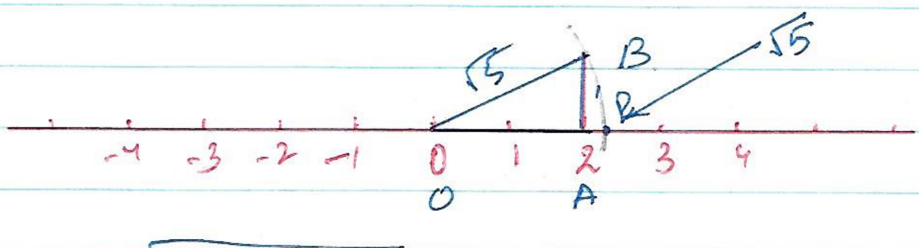
ANSWERS

SECTION - C

1) 5 can be written as $5 = 4 + 1$

$$\sqrt{5} = \sqrt{2^2 + 1}$$



$OB = \sqrt{(OA)^2 + (AB)^2}$ $\quad OA = 2$ units

$AB = 1$ unit $\quad AB \perp OA$

Using a compass with centre O and radius OB, draw an arc intersecting the number line at the point P.

2) $2x + 3y = 12 \quad xy = 6$ (Given)

We know $(a+b)^3 = a^3 + b^3 + 3ab(a+b)$

$\therefore 8x^3 + 27y^3 = (2x)^3 + (3y)^3$

$$(2x)^3 + (3y)^3 = (2x+3y)^3 - 3 \cdot 2x \cdot 3y\,(2x+3y)$$
$$= (12)^3 - 18 \times 6\,(12)$$
$$= 12\,[144 - 108]$$
$$= 12 \times 36$$
$$= 432 \text{ Ans.}$$

3) Let Gurnam has Rs. x and Akhter has Rs y

When Akhter gave Rs. 40 to Gurnam

Money left with Akhter = $y-40$

Increased money with Gurnam = $x+40$

According to given condition

$$(x+40) = 3(y-40)$$

$$x+40 = 3y - 120$$

$$x - 3y + 160 = 0$$

$x = 2$, $3(y-40) = 42$, $y-40 = 14$, $y = 54$

$x = 8$, $3(y-40) = 48$, $y-40 = 16$, $y = 56$

$x = 11$, $3(y-40) = 51$, $y-40 = 17$, $y = 57$

$x = 20$, $3(y-40) = 60$, $y-40 = 30$, $y = 70$

x	2	8	11	20
y	54	56	57	70

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4) Let length and breadth of rectangle be x & y

Perimeter = $2(x+y)$

According to given condition $\frac{1}{2} \times 2(x+y) = 36$

$\therefore$ $x+y = 36$

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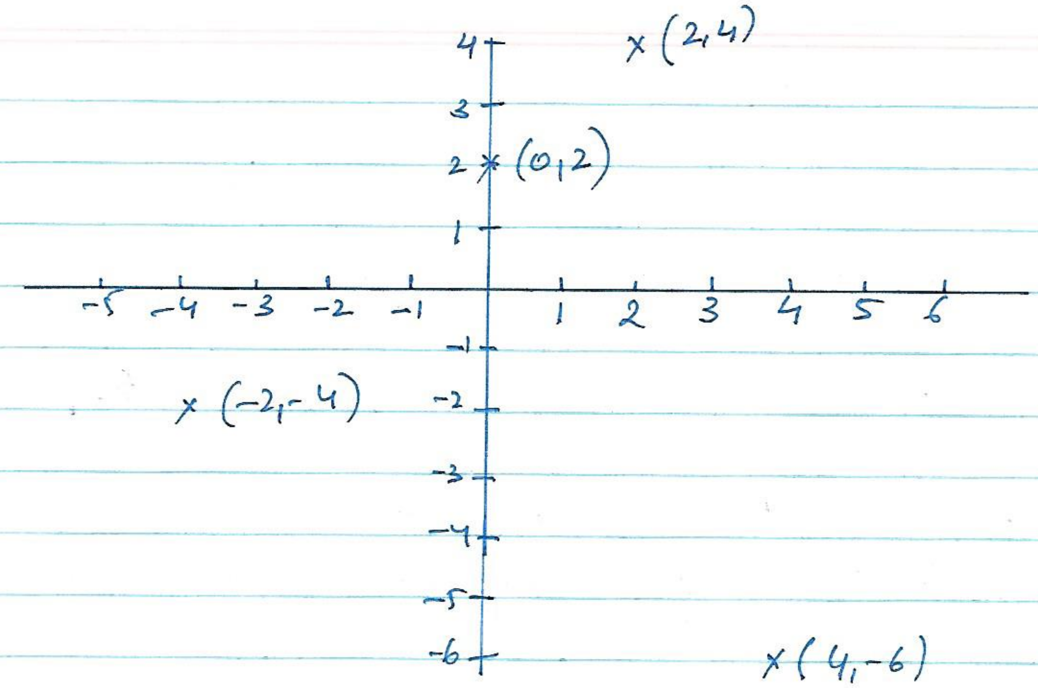
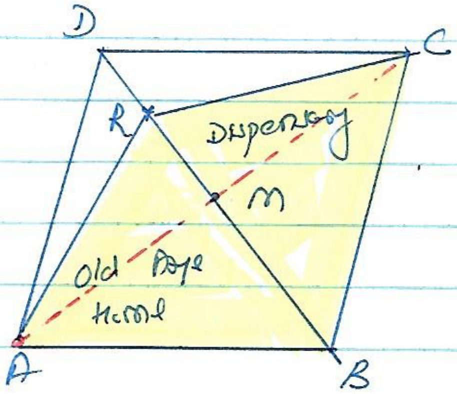
5)



(-2, -4) — III Quadrant
(2, 4) — I Quadrant
(0, 2) — on y-axis (between I & II Quadrant)
(4, -6) — IV Quadrant.

6) R is any point on BD diagonal.



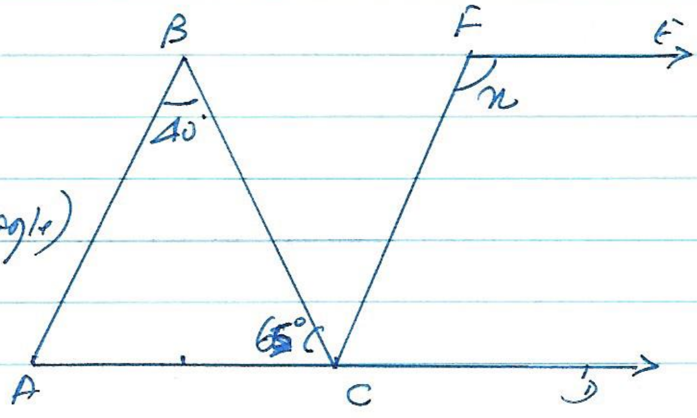
To prove: ar ΔARB = ar(ΔCRB)

Join AC.
Since diagonal of the ||gram bisect each other,
∴ M is the midpoint of AC & BD.

∴ In ΔARC, RM is the median ∴ ar ΔARM = ar ΔCRM --(1)

In ΔACB, BM is the median,
∴ ar (ΔAMB) = ar(ΔCMB) ...(2)
Adding (1) & (2) ar ΔARM + ar AMB = ar Δ (CRM) + ar ΔCMB
Gives
ar (ΔARB) = ar (CRB)

7) Given $AB \parallel CF$, $CD \parallel EF$



$\angle ABC = \angle BCF$

[$\because AB \parallel CF$, Alternate interior angle]

$\therefore \angle BCF = 40°$

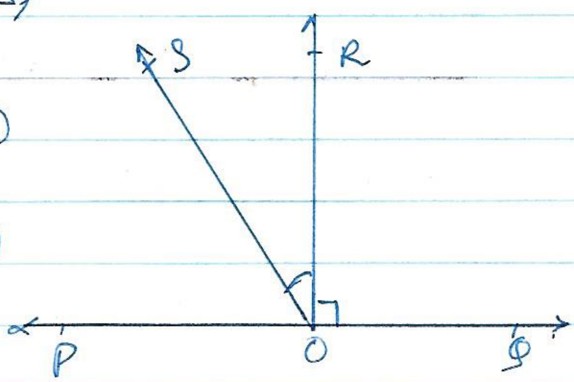
Also $\angle ACF = \angle CFE = x$

[$\because FE \parallel CD$, Alternate interior angle]

$\therefore x = 65 + 40°$

$x = 105°$ Ans

8) To prove $\angle ROS = \frac{1}{2}(\angle QOS - \angle POS)$



$\angle QOS = 90 + \angle ROS$ ...(i)

$\angle POS = 90 - \angle ROS$ ...(ii)

Subtracting (ii) from (i)

$\angle QOS - \angle POS = 90 + \angle ROS - (90 - \angle ROS)$

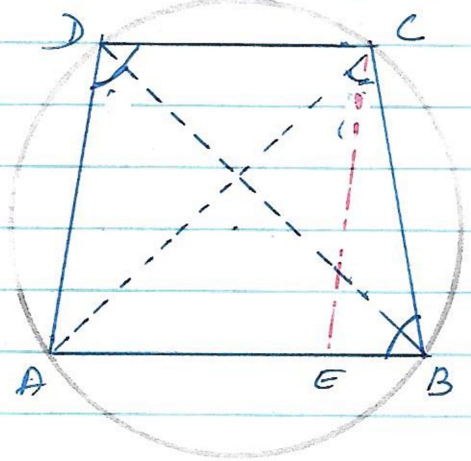
$= \cancel{90} + \angle ROS - \cancel{90} + \angle ROS$

$2\angle ROS = \angle QOS - \angle POS$

$\angle ROS = \frac{1}{2}(\angle QOS - \angle POS)$

Hence proved.

9) Given ABCD is a trapezium,
AB ∥ CD and AD = BC.
(Non-parallel sides are equal)



Draw a line CD ∥ AD

CE ∥ AD and AE ∥ CD

∴ AECD is a ∥gram.

$\angle CDA = \angle CEA$

AD = CE (Opposite sides of ∥gram

But AD = BC (given)

∴ EC = BC

$\angle CEB = \angle CBE$ (Opposite angles of equal sides)

$\angle CEB + \angle CEA = 180$ (Linear pair)

$\angle CDA + \angle CBE = 180$ [$\because \angle CAD = \angle CEA$, $\angle CEB = \angle CBE$]

Trapezium is cyclic as the sum of the pair of opposite angle is 180°

Alternative Method:

In ΔBAD & ΔABC

AB = AB (Common)

AD = BC (Given)

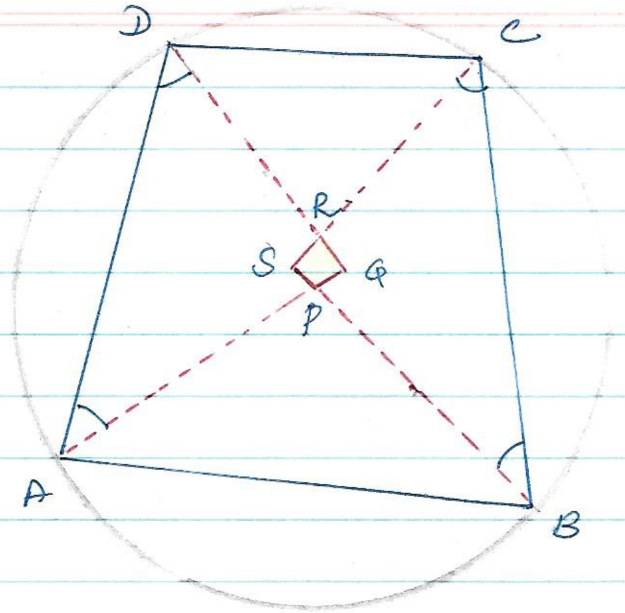
AC = BD (Isosceles trapezium)

$\therefore \Delta BAD \cong \Delta ABC$ [SSS Rule]

$\therefore \angle ADB = \angle ACB$ (by CPCT)

By theorem 10.10, if a line segment joining two points subtends equal angles at two other points lying on the same side, the four points lie on a circle (concyclic)

10) Given: ABCD is a cyclic quadrilateral in which DR, CR, AP, BP are angle bisectors.



To prove: PQRS is a quadrilateral. (cyclic)

In Δ AQD,

$\angle \frac{1}{2} D + \angle \frac{1}{2} A + \angle Q = 180$ . . . . (i)

In Δ BSC, $\frac{1}{2}\angle B + \frac{1}{2}\angle C + \angle S = 180$ . . . (ii)

Adding (i) & (ii), we get

$\frac{1}{2}\angle A + \frac{1}{2}\angle B + \frac{1}{2}\angle C + \frac{1}{2}\angle D + \angle Q + \angle S = 360^{\circ}$

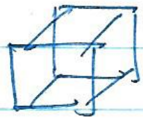
$\frac{1}{2}(\angle A + \angle B + \angle C + \angle D) + \angle Q + \angle S = 360^{\circ}$

$\frac{1}{2} \times 360 + \angle Q + \angle S = 360^{\circ}$

$\angle Q + \angle S = 360 - 180$, $\Rightarrow \angle Q + \angle S = 180^{\circ}$

As the sum of the pair of opposite angles of quadrilateral PQRS is 180°, Therefore, quadrilateral PQRS is cyclic. Hence proved.

11) Experiment :- Rolling of dice.



1 to 6

Outcome
1 − 179
2 − 150
3 − 157
4 − 149
5 − 175
6 − 190

Total no. of outcomes
= Sample size
= 1000

Probability = $\frac{\text{No. of favourable comes}}{\text{Total no. of outcomes}}$

$p(1) = \frac{179}{1000}$ $\quad p(2) = \frac{150}{1000}$ $\quad p(3) = \frac{157}{1000}$ $\quad p(4) = \frac{149}{1000}$

$p(5) = \frac{175}{1000}$ $\quad p(6) = \frac{190}{1000}$

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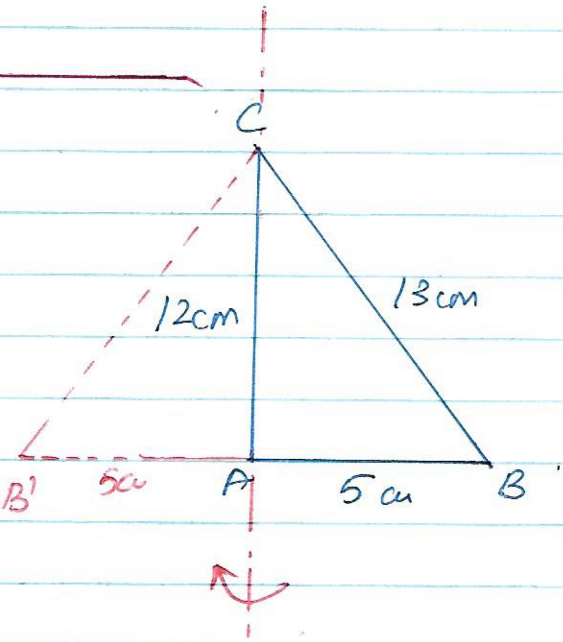
12) Volume of cone $= \frac{1}{3}\pi r^2 \times h$



$r = 5cm \quad h = 12cm$

$V = \frac{1}{\cancel{3}} \times \frac{22}{7} \times 5 \times 5 \times \cancel{12}^{4}$

$= \frac{22 \times 25 \times 4}{7}$

$= \frac{2200}{7}$

$V = 314.285 \ cm^2$

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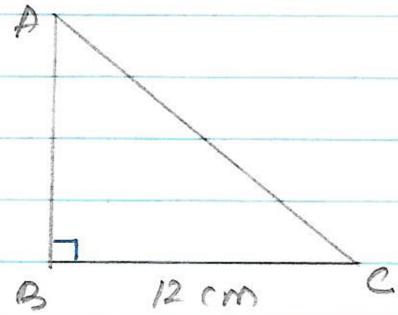
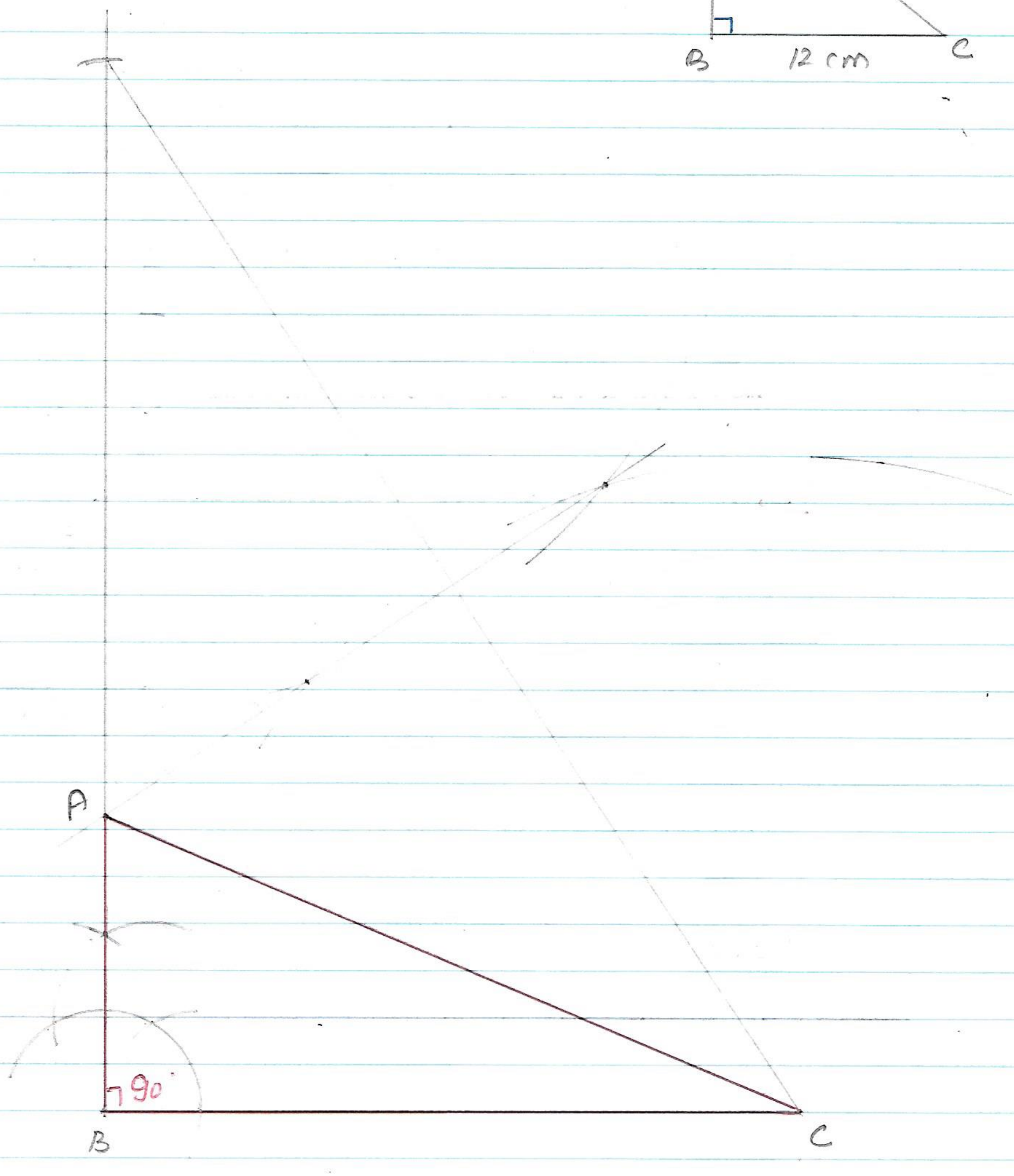
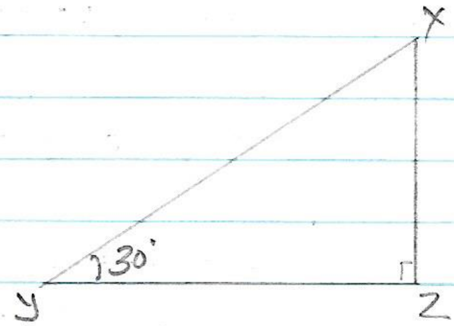
13) Given: $\angle B = 90^\circ$

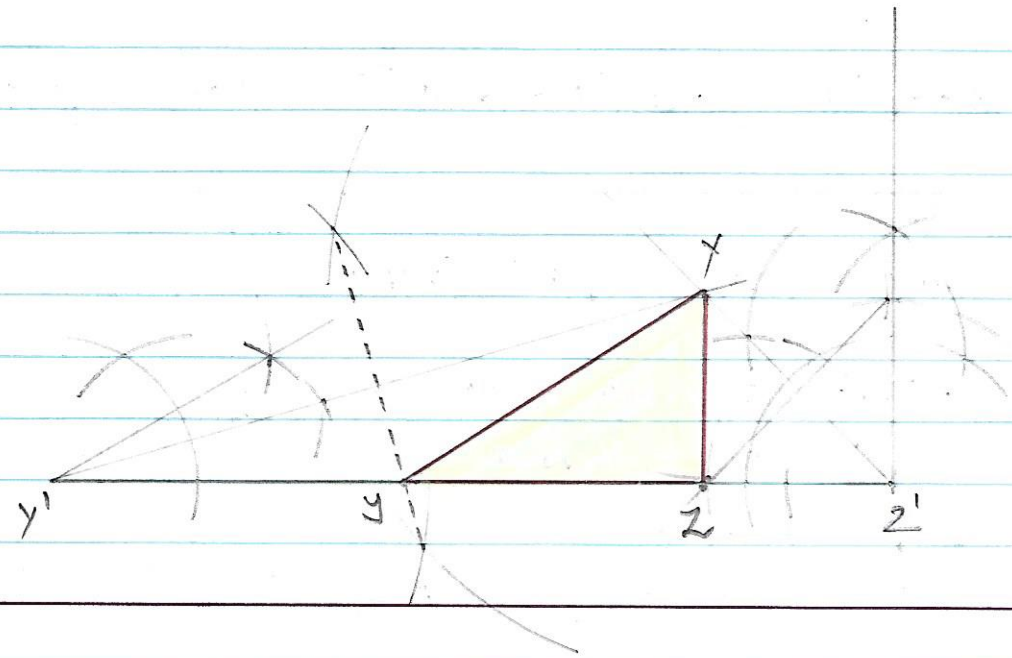
$BC = 12cm$ $AC + AB = 18 cm$





14)





15) $a = 1+\sqrt{7}$ $\qquad \dfrac{1}{a} = \dfrac{1}{1+\sqrt{7}}$ $\qquad \dfrac{1}{a} = \dfrac{1}{(1+\sqrt{7})} \times \dfrac{1-\sqrt{7}}{(1-\sqrt{7})}$

$$\frac{1}{a} = \frac{1-\sqrt{7}}{1-(\sqrt{7})^2} = \frac{1-\sqrt{7}}{1-7} = \frac{1-\sqrt{7}}{-6}$$

$$\frac{-6}{a} = \frac{1-\sqrt{7}}{\cancel{-6}} \times (\cancel{-6}) = 1-\sqrt{7}$$

$$\therefore \frac{-6}{a} = \underline{\underline{1-\sqrt{7}}} \text{ Ans}$$

16) Given: $(x-2y)^3 + (2y-3z)^3 + (3z-x)^3$

$x - 2y + 2y - 3z + 3z - x = 0$

Using identity when $a+b+c=0$
then $a^3+b^3+c^3 = 3abc$

$\therefore (x-2y)^3 + (2y-3z)^3 + (3z-x)^3 = (x-2y)(2y-3z)(3z-x)$ Ans.

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17) Given $p(x) = px^2+5x+r$

Since $x-2$ is factor of $p(x)$
Using factor theorem
$p(2) = 0$
$\therefore p(2) = p(2)^2 + 5(2) + r = 0$

$4p + 10 + r = 0$
$4p + r = -10 \quad \ldots (i)$

$x - \frac{1}{2}$ is factor of $p(x)$ $\therefore p(\frac{1}{2}) = p(\frac{1}{2})^2 + 5(\frac{1}{2}) + r = 0$

$\therefore \frac{p}{4} + \frac{5}{2} + r = 0 \Rightarrow p + 10 + 4r = 0$
$p + 4r = -10 \quad \ldots (ii)$

From (i) & (2) $4p + r = p + 4r$
$3p = 3r$
$p = r$ Hence proved.

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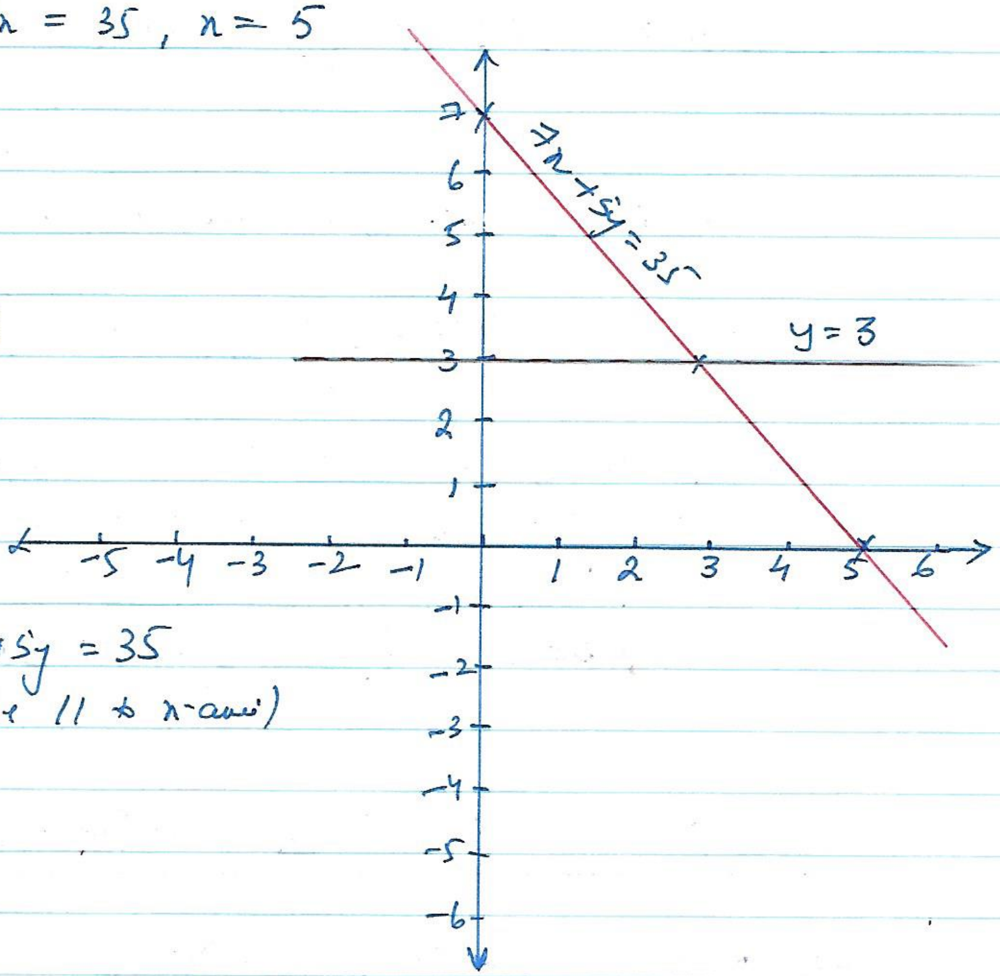
18) Given linear eq. $7x + 5y = 35$

$x = 0$, $5y = 35$, $y = 7$

$y = 0$, $7x = 35$, $x = 5$

x -	0	5
y -	7	0

$(0,7)$ $(5,0)$



Linear equation $7x+5y = 35$ meets $y = 3$ (line ∥ to x-axis)

at $(3,3)$

19) Coordinates of point A $(0,-3)$, B $(4,-5)$, C $(6,3)$ D $(4,5)$, E $(-6,3)$

Point B & D have same abscissa

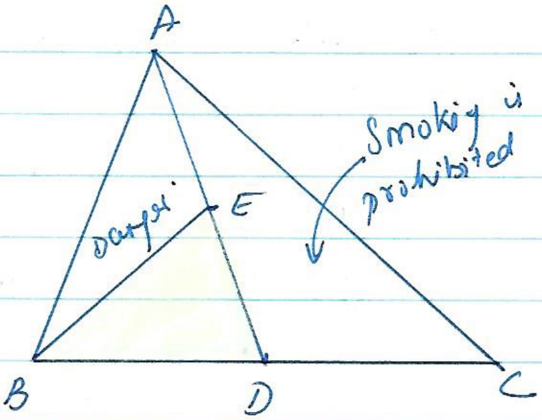
Point C & E have same ordinate.

20) Given AD is median,

$BD = DC$

E is mid point of AD, $AE = ED$

To prove : $ar(\Delta BED) = \frac{1}{4} ar(\Delta ABC)$



In ΔABC, since AD is a median,

$\therefore \; ar(\Delta ABD) = \frac{1}{2} ar(\Delta ABC) \quad \ldots\ldots (i)$

In ΔABD, since E is the median,

$ar(\Delta BED) = \frac{1}{2} ar(\Delta ABD)$

$ar(\Delta BED) = \frac{1}{2} ar\left(\frac{1}{2} ar(\Delta AB\right) \quad$ [from (i)]

$\therefore \; ar(\Delta BED) = \frac{1}{4} ar(\Delta ABC)$, Hence proved.

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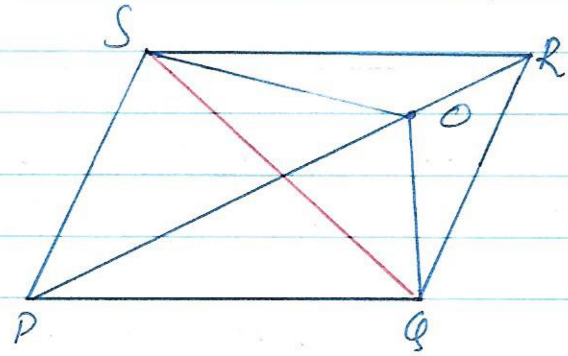
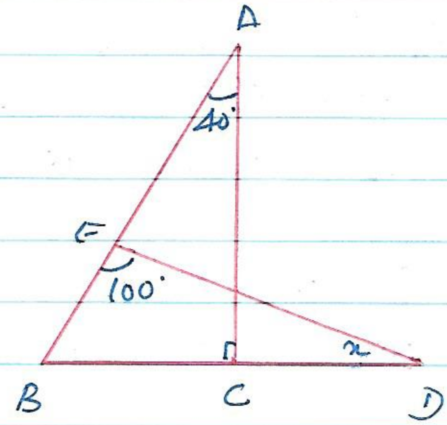
21) Refer to question (6) Section. C



22) In ΔABC,

Using angle sum property of triangle



$40 + 90 + \angle B = 180°$

$\angle B = 180 - 90 - 40$

$= 50°$

In ΔBED,

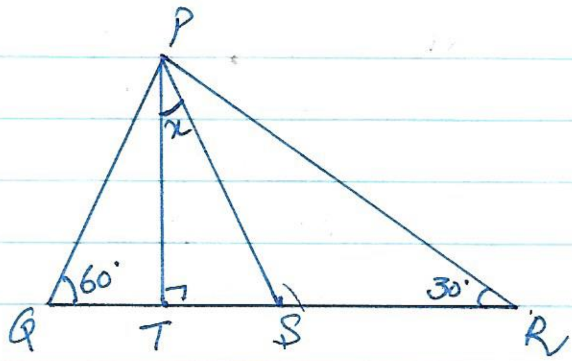
$100 + 50 + x = 180°$

$x = 180 - 100 - 50$

$= 80 - 50$

$\underline{x = 30°}$ Ans

23) Given $PT \perp QR$ & PS PS is bisector of $\angle P$



In ΔQPR,

$\angle Q + \angle P + \angle R = 180°$

$60 + 30 + \angle P = 180°$

$\angle P = 180 - 90$

$\angle P = 90°$

In ΔQPT $60 + \angle QPT + 90 = 180$

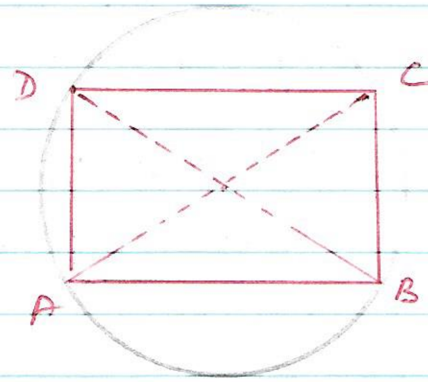
$\therefore \angle QPT = 30°$

$\angle QPS = \frac{1}{2} \times 90 = 45°$ (Since PS is bisector of $\angle P$.)

$\therefore \angle QPT + x = 45 \Rightarrow 30 + x = 45$

$\underline{x = 15°}$ Ans. $\angle TPS = 15$

24) Let ABCD be a cyclic quadrilateral such that its diagonals AC and BD are the diameter of the circle.



As, AC is a diameter and angle in a semi circle is a right angle.

$\therefore \angle D = 90^\circ \quad \angle B = 90^\circ$

Similarly, BD is a diameter,

$\therefore \angle A = 90^\circ \quad \& \quad \angle C = 90^\circ$.

Thus, ABCD is a rectangle.

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25)

Distance (km)	Frequency
Less than 4000	20
4000 - 9000	210
9000 - 14,000	325
More than 14,000	445

Total favourable outcome = 1000

(i) $P(E) = \frac{2\cancel{0}}{100\cancel{0}} = \frac{2}{100} = \frac{1}{50}$

(ii) $P(E) = \frac{325+445}{1000} = \frac{77\cancel{0}}{100\cancel{0}} = \frac{77}{100}$

(iii) $P(E) = \frac{210+325}{1000} = \frac{535}{1000} = \frac{107}{200}$

26) Test (% marks)

I	52
II	60
III	65
IV	75
V	80
VI	72

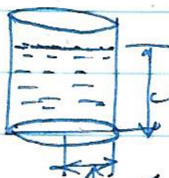
Total number of tests = 6

(i) $P(E) = \frac{3}{6} = \frac{1}{2}$

(ii) $P(E) = \frac{3}{6} = \frac{1}{2}$

(iii) $P(F) = \frac{5}{6}$

27) Given



Height $h = 32$ cm

radius $(r) = 15$ cm

Small cylindrical glass $r = 3$cm $h = 8$ cm Sold for Rs. 3.

Volume of big/large jar/vessel $= \pi r^2 h$

$= \pi \times 15 \times 15 \times 32$ ... (i)

Volume of small glass $= \pi \times 3 \times 3 \times 8$ -- (ii)

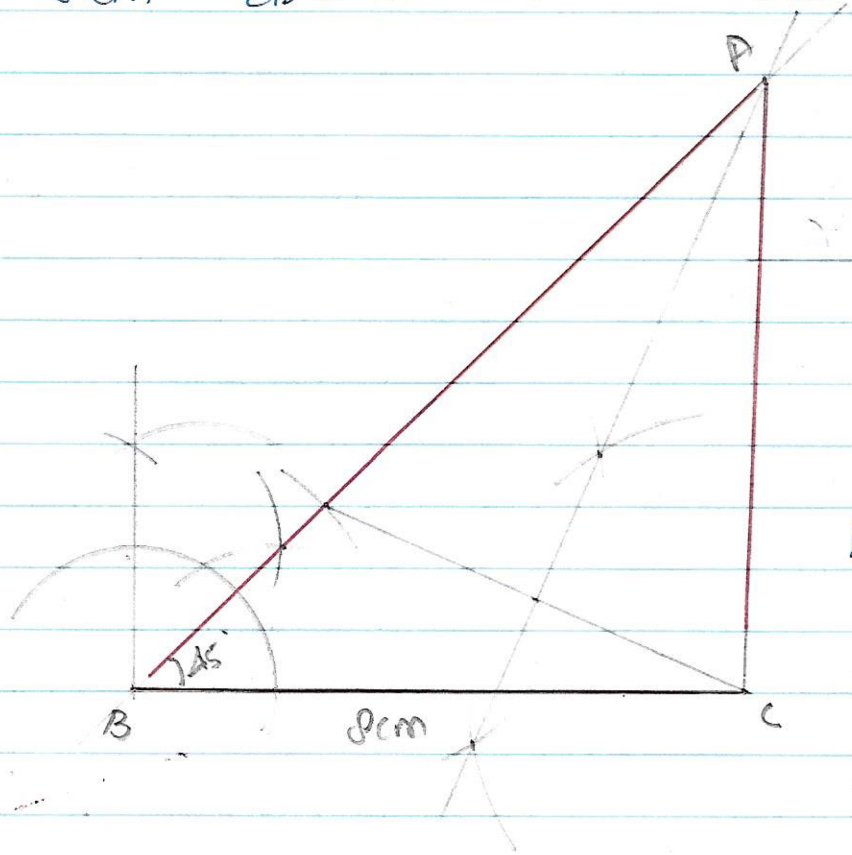
Dividing (i) by (ii) No. of glass $= \dfrac{\cancel{\pi} \times \cancel{15}^{5} \times \cancel{15}^{5} \times \cancel{32}^{4}}{\cancel{\pi} \times \cancel{3} \times \cancel{3} \times \cancel{8}_{1}} = 5 \times 5 \times 4$

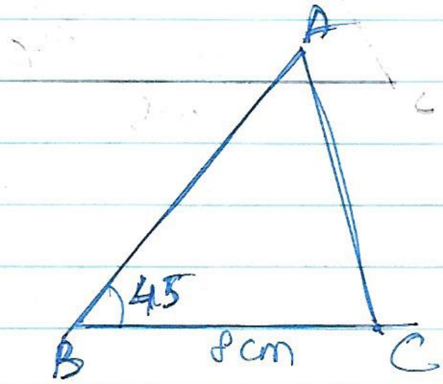
$= 100$ No.

SP of one glass = Rs. 3

SP of 100 Glasses = Rs 3×100 = Rs. 300 Ans.

28) $BC = 8\text{ cm}$ $\angle B = 45^\circ$ $AB - AC = 3.5\text{ cm}$





29) $3\sqrt{48} - \frac{5}{2}\sqrt{\frac{1}{3}} + 4\sqrt{3} = 3\sqrt{4\times4\times3} - \frac{5}{2\sqrt{3}} + 4\sqrt{3}$

$$\begin{array}{r|l} 2 & 48 \\ 2 & 24 \\ 2 & 12 \\ 2 & 6 \\ & 3 \end{array}$$

$= 3\times4\times\sqrt{3} - \frac{5\sqrt{3}}{2\times\sqrt{3}\times\sqrt{3}} + 4\sqrt{3}$

$= 12\sqrt{3} - \frac{5\sqrt{3}}{6} + 4\sqrt{3}$

$= \sqrt{3}\left(12 + 4 - \frac{5}{6}\right)$

$= \sqrt{3}\left(16 - \frac{5}{6}\right)$

$\frac{96-5}{6}$

$= \sqrt{3}\times\frac{91}{6}$

$= \frac{91}{6}\sqrt{3}$ Ans.

30) $x+y+z=12$ $\quad x^2+y^2+z^2=64$

Using the identities, $(x+y+z)^2 = x^2+y^2+z^2+2(xy+yz+zx)$

$$2(xy+yz+zx) = (x+y+z)^2-(x^2+y^2+z^2)$$
$$= (12)^2 - 64$$
$$= 144-64$$
$$= 80$$

$\therefore$ $xy+yz+zx = \frac{80}{2} = \underline{\underline{40}}$. Ans.

31) $3x+4y=12$

$x=0$ $\quad y = \frac{12}{4} = 3$

$y=0$ $\quad x = \frac{12}{3} = 4$

$x=-4$ $\quad 4y = 12+12$, $y = 6$

x -	0	4	-4
y -	3	0	6

32) Given linear equation $4x-5y=7$

(i) $x=3y$ $\quad 4\times3y-5y=7$, $12y-5y=7$

$y=1$

Abscissa $= 3\times1 = 3$ $\quad$ ordinate $=1$

$\therefore$ Point is $(3,1)$

(ii) $y=\frac{2}{5}x$ $\quad 4x-\cancel{5}\times\frac{2}{\cancel{5}}x=7$, $4x-2x=7$

$2x=7$ $\quad x=\frac{7}{2}$

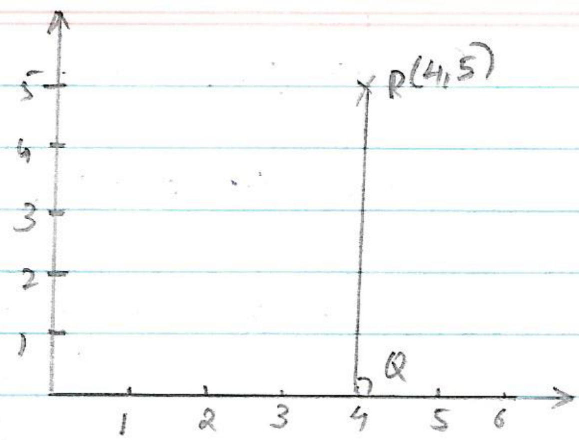
$y = \frac{\cancel{2}}{5}\times\frac{7}{\cancel{2}} = \frac{7}{5}$ $\quad$ Abscissa $=\frac{7}{2}$ $\quad$ ordinate $=\frac{7}{5}$

Point is $\left(\frac{7}{2},\frac{7}{5}\right)$

33) i) Coordinate of Q(4, 0)

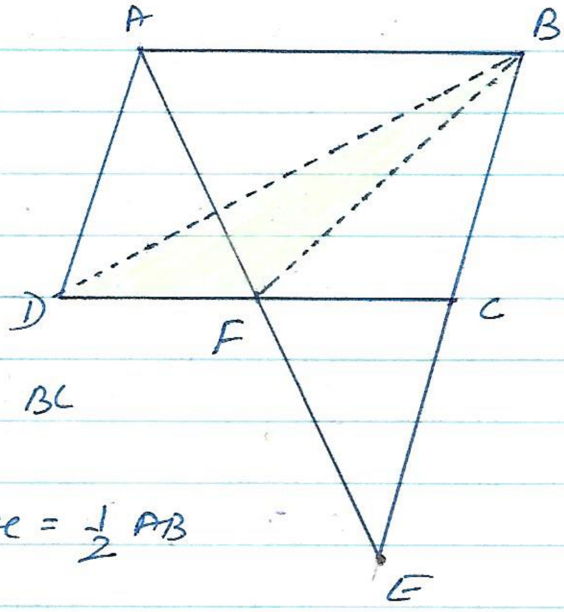
ii) length of PQ = 5 units

(iii) Distance from origin = 4 unit.



34) Given ABCD is a ||gram
CE = BC
ar (△BDF) = 3 cm^2

ar (||gram ABCD) = ?



AB || FC and C is mid point of BE

∴ In △ABE FC || AB and FC = $\frac{1}{2}$ AB

FC = $\frac{1}{2}$ DC So, F is mid-point of DC.

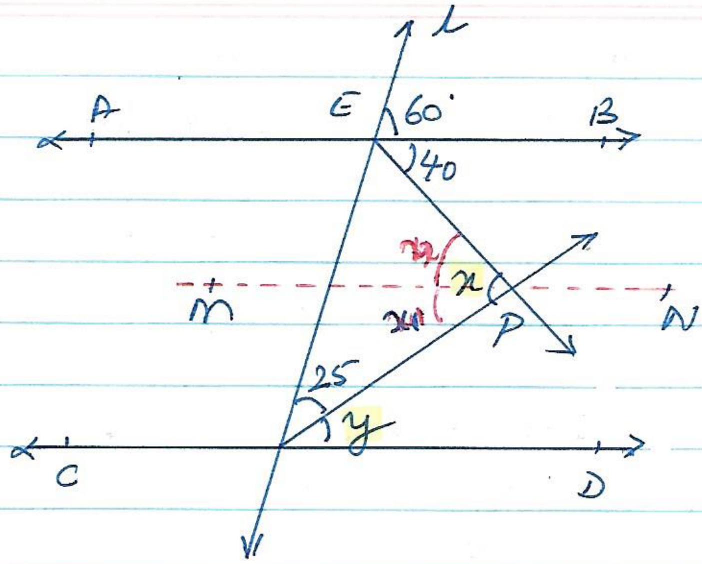
ar(△BDF) = 3cm^2
ar(△BDF) = ar(△FCB)

[∵ FC = DF, Triangle between same base and parallel'.

∴ ar (△BDF) = ar(△FCB) = 3cm^2
∴ ar (△DBC) = 3+3 = 6 cm^2

Since diagonal BD divides ||gram into equal area.
∴ ar (△ADB) = ar (△BDC) = 6cm^2
∴ ar ||gram ABCD = 6+6 = 12 cm^2 Ans.

35) $AB \parallel CD$



$\therefore y + 25 = 60$

$y = 60 - 25$

$y = 35°$

Construct $MN \parallel CD$ & AB.

$x_1 = y$ [$\because MN \parallel CD$]

$\therefore x_1 = 35°$ . . . . (i)

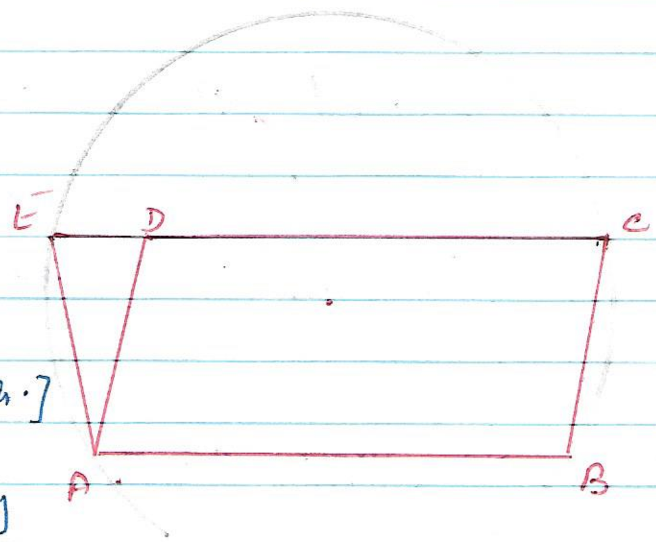
$x_2 = 40$ [$MN \parallel AB$] . . (ii)

Adding (i) & (ii) $\quad x = x_1 + x_2$

$= 40 + 35$

$x = 75°$ Ans.

36) To prove $AE = AD$



$\angle ABC + \angle AEC = 180°$ . . . . (i)

[$\because$ Opposite angles of cyclic quadrilateral.]

$\angle ADE + \angle ADC = 180°$ [linear pair]

But $\angle ADC = \angle ABC$ [opposite angle of $\parallel$gram]

$\therefore \angle ADE + \angle ABC = 180°$ . . (ii)

from (i) & (ii) $\quad \angle ABC + \angle AEC = \angle ADE + \angle ABC$

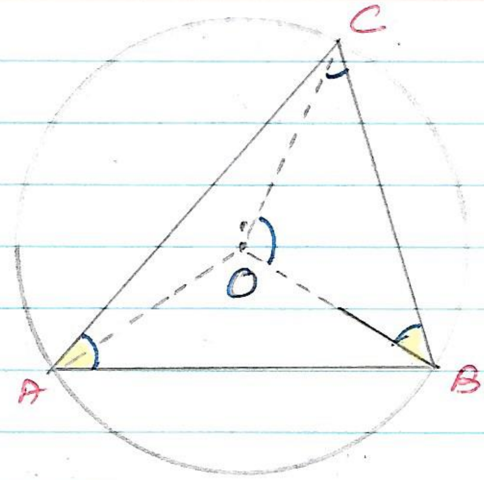
$\therefore \angle AEC = \angle ADE$

$\therefore AD = AE$

(Side opposite to equal angles).

37) O is circumcenter.

To prove $\angle OBC + \angle BAC = 90^\circ$



$\angle OBC = \angle OCB$ (opposite angle of equal sides in ΔBOC)

$\angle BOC + \angle OBC + \angle OCB = 180^\circ$

$\angle BOC + 2\,OBC = 180$ . . . (i)

$2\,BAC = \angle BOC$ . . . (ii)

from (i) & (ii) $\quad 2\angle BAC + 2\angle OBC = 180^\circ$

$\angle OBC + \angle BAC = 90^\circ$; Hence proved.

38) Total number of days for which record is available $= 250$

(i) $P(\text{forcast was correct}) = \dfrac{175}{250} = 0.7$

(ii) $P(\text{forcast was not correct}) = \dfrac{250-175}{250} = \dfrac{75}{250} = 0.3$

39) Total events $= 700$

(i) $P(\text{No defective bulb}) = \dfrac{400}{700} = \dfrac{4}{7}$

(ii) $P(\text{Defective bulb from 2 to 6}) = \dfrac{48+41+18+8+3}{700} = \dfrac{118}{700} = \dfrac{59}{350}$

(iii) $P(\text{Defective bulb less than 4}) = \dfrac{400+180+48+41}{700} = \dfrac{669}{700}$

40) Radius of the cylindrical base $r = 20$ cm
Height $h = 10$ m $= 1000$ cm

Volume of each cylinder $V = \pi r^2 h$

$= \frac{22}{7} \times 20 \times 20 \times 1000$

$= \frac{88 \times 10^5}{7}$ cm^2

$= \frac{8.8}{7} m^2$ $[1 m^3 = 10^{-6} cm^3]$

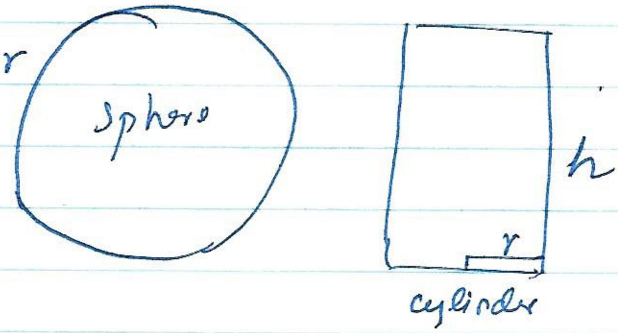
Volume of 14 pillars $= \frac{\overset{2}{\cancel{14}} \times 8.8}{\cancel{7}} m^3$

$= 17.6 \ m^3$

So, 14 pillars would need $17.6 \ m^3$ of concrete mixture.

41)

Radius of sphere = Radius of cylinder = r



Volume of sphere $= \frac{4}{3} \pi r^3$

Volume of cylinder $= \pi r^2 h$

$\cancel{\pi} r^2 h = \frac{4}{3} \cancel{\pi} r^3$ [Since volume are equal]

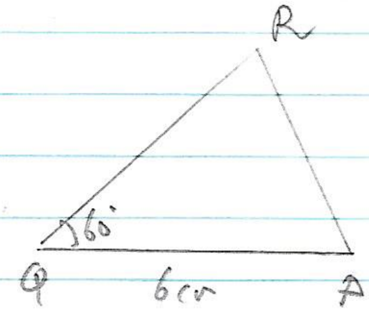
$h = \frac{4}{3} r \Rightarrow r = \frac{3}{4} h$ $d = 2r = \cancel{2} \times \frac{3}{\cancel{4}_2} h$

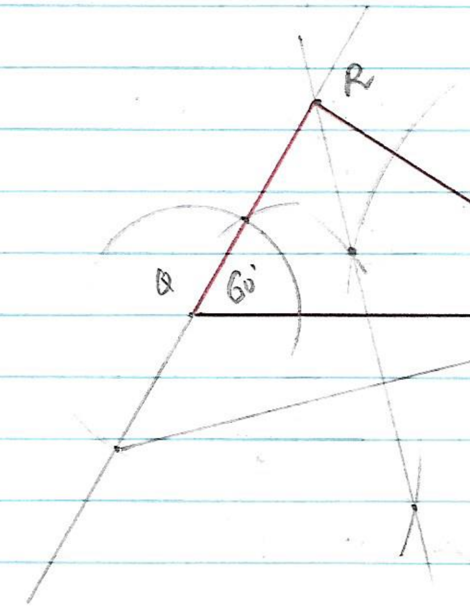
$d = \frac{3}{2} h$ $d\% = \frac{3}{\cancel{2}} \times \cancel{100}^{50} h = 150\%$ of h

So, difference $= 150\% - 100\% = 50\%$

Hence, diameter of the cylinder exceeds its height by 50%

42) $QR = 6cm \quad \angle Q = 60^\circ \quad PR - PQ = 2\ cm$





43) Let $x = 0.2\overline{35}$

$10x = 2.3535$

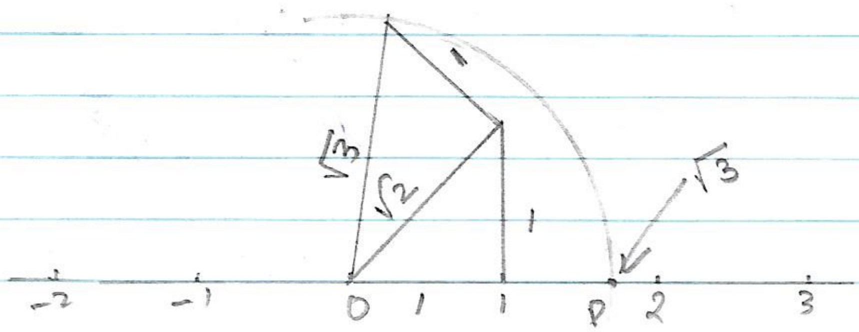
$1000x = 235.35$

$1000x - 10x = 235.35$
$\quad - 2.35$
$\quad \overline{233.00}$

$990x = 233$

$x = \frac{233}{990}$

44)



45) (i) $2x^2+3\sqrt{5}x+5 = 2x^2+2\sqrt{5}x+\sqrt{5}x+5$

$$= 2x(x+\sqrt{5})+\sqrt{5}(x+\sqrt{5})$$

$$= (2x+\sqrt{5})(x+\sqrt{5})$$

(ii) $x^3-2x^2-x+2 = p(x)$

$$p(1) = (1)-2(1)^2-1+2$$

$$= \cancel{1}-\cancel{2}-\cancel{1}+\cancel{2}$$

$$p(1)=0$$

$\therefore$ $(x-1)$ is factor of x^3-2x^2-x+2

$$
\begin{array}{r|l}
 & x^2-x-2 \\
x-1 & x^3-2x^2-x+2 \\
 & \underline{\cancel{x^3}-x^2} \\
 & \underset{(-)\quad(+)}{} \\
 & -\cancel{x^2}-x+2 \\
 & \underline{-x^2+x} \\
 & \underset{(+)\quad(-)}{} \\
 & -2x+2 \\
 & \underline{-2\cancel{x}+2} \\
 & 0
\end{array}
$$

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

$x^2(x-1)=x^3-x^2$

$\frac{-x^2}{x}=-x$

$-x(x-1)=-x^2+x$

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

$-2(x-1)=-2x+2$

$\therefore p(x) = (x-1)(x^2-x-2)$

$$x^2-x-2 = x^2-2x+x-2 = x(x-2)+1(x-2)$$

$$= (x+1)(x-2)$$

$\therefore$ $x^3-2x^2-x+2=(x-1)(x+1)(x-2)$

Alternative method: $x^3-2x^2-x+2 = \underline{x^3-x^2}\,\underline{-x^2+x}\,\underline{-2x+2}$

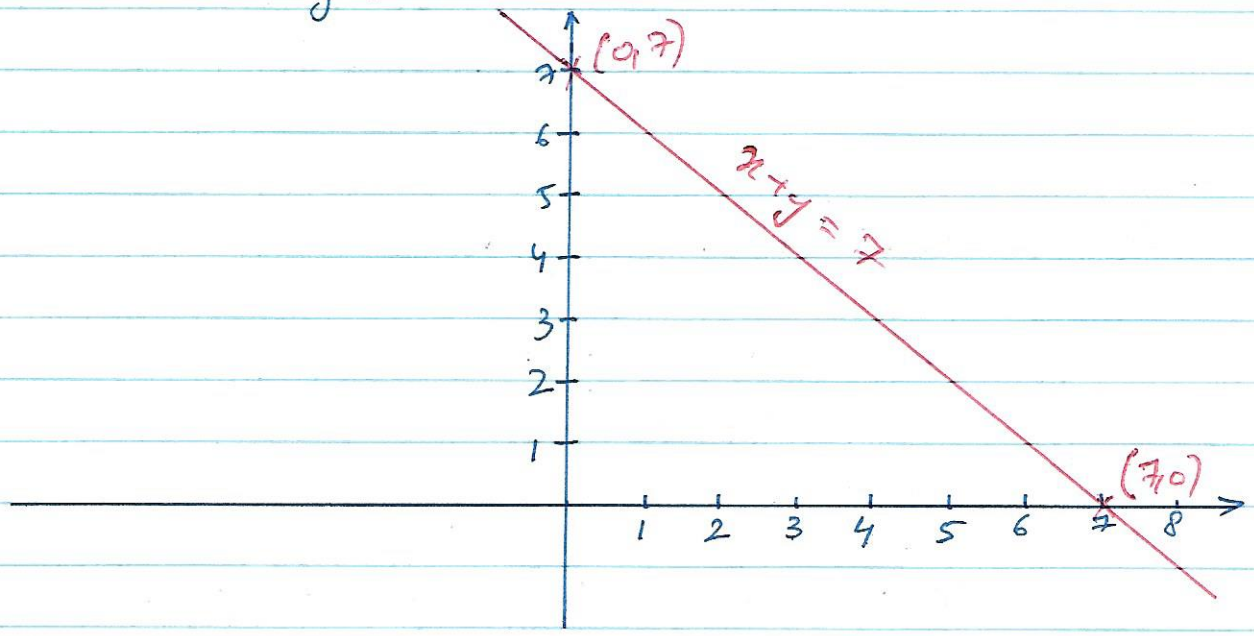
$$= x^2(x-1)-x(x-1)-2(x-1) = (x-1)(x^2-x-2)$$

$$= (x-1)(x^2-2x+x-2) = (x-1)[x(x-2)+1(x-2)]$$

$$= (x-1)(x+1)(x+2)$$

46) $x+y=7$ $\quad x=0 \quad y=7 \quad (7,0) \quad (0,7)$

$y=0 \quad x=7$



47) $x:y=3:2 \quad \frac{x}{y}=\frac{3}{2} \quad x=\frac{3}{2}y$

$x+y=180$ [Alternate interior angle, AB ∥ EF]

$\frac{3}{2}y+y=180 \Rightarrow 3y+2y=360^\circ \Rightarrow 5y=360^\circ$

$y=72^\circ$

$\therefore x=108^\circ$

$x=z=\underline{\underline{108^\circ}}$