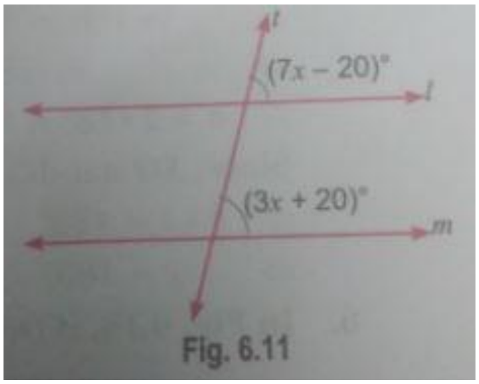
Short Answer Type Questions – II

[3 MARKS]

Que 1. For what value of x will the lines l and m be parallel to each other? [Fig. 6.11].



Sol. $l \parallel m$ only when a pair of corresponding angles is equal.

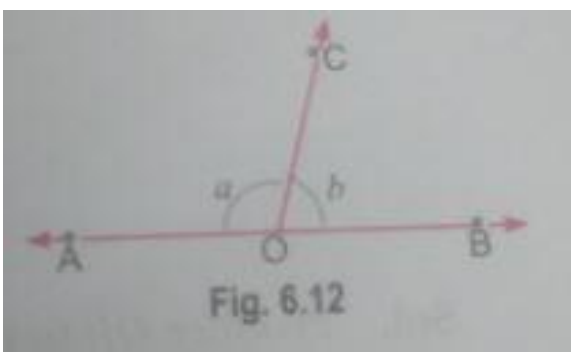
$\therefore \quad 7x - 20 = 3x + 20$

$7x - 3x = 20 + 20$

$\Rightarrow \quad 4x = 40$

$\Rightarrow \quad x = \frac{40^0}{4} = 10^0$

Que 2. In Fig. 6.12, $\angle AOC$ and $\angle BOC$ form a linear pair. If $a - b = 20^0$, find the values of a and b.



Sol. $a + b = 180^0$ (Linear pair) …(i)

$a - b = 20^0$ (Given) …(ii)

Adding (i) and (ii), we get

$$2a = 200^0 \Rightarrow a = \frac{200^0}{2}\ a = 100^0$$

Putting the value of a in equation (i), we get

$100^0 + b = 180^0 \quad \Rightarrow \quad b = 80^0$

Que 3. In Fig. 6.13, OD is the bisector of $\angle AOC$, OE is the bisector of $\angle BOC$ and $OD \perp OE$. Show that the points A, O and B are collinear.

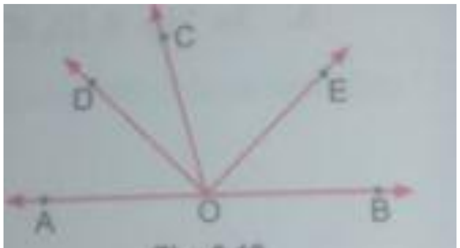


Fig. 6.13

Sol. Since OD and OE are the bisectors of angles $\angle AOC$ and $\angle BOC$ respectively

$\therefore \quad \angle AOD = \angle COD$ and $\angle BOE = \angle COE$

Also $\quad \angle DOE = 90^0$

Now, $\angle AOC + \angle BOC = \angle AOD + \angle COD + \angle BOE + \angle COE$

$= \angle COD + \angle COD + \angle COE + \angle COE$

$\Rightarrow \quad \angle AOC + \angle BOC = 2\angle COD + 2\angle COE = 2(\angle COD + \angle COE)$

$= 2\angle DOE = 2 \times 90^0 = 180^0$

Hence, points A, O and B are collinear.

Que 4. In Fig. 6.14, if $x + y = w + z$, then prove that AOB is a line.

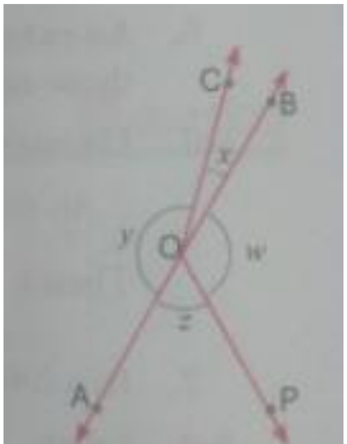


Fig. 6.14

Sol. As sum of all the angles about a point is equal to 360^0

Therefore, $x + y + z + w = 360^0$

$\Rightarrow$ $(x + y) + (z + q) = 360^0$

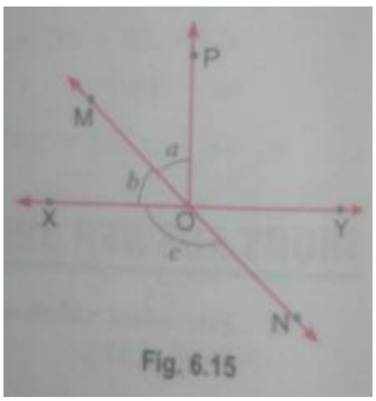
Also, $z + w = x + y$ (Given)

$\therefore$ $(x + y) + (x + y) = 360^0$ $\Rightarrow$ $2x + 2y = 360^0$

$\Rightarrow$ $2(x + y) = 360^0$ $\Rightarrow$ $(x + y) = 180^0$

$\therefore$ AOB is a straight line.

Que 5. In Fig. 6.15, lines XY and MN intersect at O. If $\angle POY = 90^0$ and $a : b = 2 : 3$, find c.



Sol. $\angle POX + \angle POY = 180^0$

$\Rightarrow$ $\angle POX + 90^0 = 180^0$

$\therefore$ $\angle POX = 90^0$

Let $a = 2x$ and $b = 3x$

$\therefore$ $2x + 3x = 90^0$

$\Rightarrow$ $5x = 90^0$

$\therefore$ $a = 2 \times 18^0 = 36^0$ and $b = 3 \times 18^0 = 54^0$

Since, XO stands on MN

$\therefore$ $b + c = 180^0$ $\Rightarrow$ $54^0 + c = 180^0$

$\Rightarrow$ $c = 180^0 - 54^0 = 126^0$

Que 6. In Fig. 6.16, if $OP \parallel RS, \angle OPQ = 110^0$ and $\angle QRS = 130^0$, then determine $\angle PQR$.

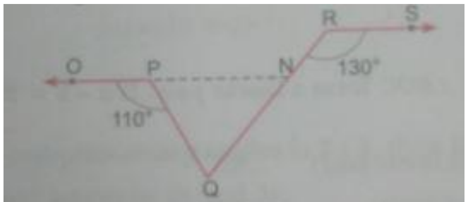


Fig. 6.16

Sol. Produce OP TO intersect RQ at point N.

Now, $OP \parallel RS$ and transversal RN intersects them at N and R respectively

∴ $\angle RNP = \angle SRN$ (Alternate interior angles)

⇒ $\angle RNP = 130^0$

∴ $\angle PNQ = 180^0 - 130^0 = 50^0$ (Linear pair)

$\angle OPQ = \angle PNQ + \angle PQN$ (Exterior angle property)

⇒ $110^0 = 50^0 + \angle PQN$

⇒ $\angle PQN = 110^0 - 50^0 = 60^0 = \angle PQR$

Que 7. In Fig. 6.17, $AB \parallel CD$. Find the value of x.

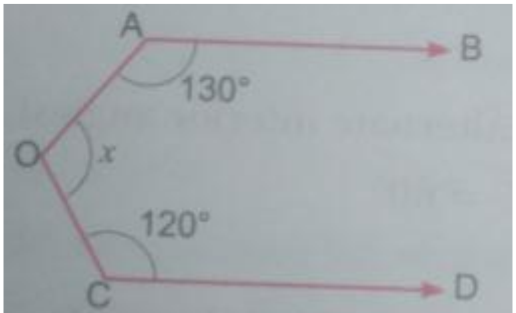


Fig. 6.17

Sol. Through O, draw a line POQ parallel to AB, [Fig. 6.18]

Now $PQ \parallel AB$ and $CD \parallel AB$

So, $CD \parallel PQ$

∵ $AB \parallel PQ$ and AO is a transversal

We have,

$\angle AOQ + \angle OAB = 180^0$ (Cointerior angles are supplementary)

$\Rightarrow \quad \angle AOQ + 130^0 = 180^0$

$\Rightarrow \quad \angle AOQ = 180^0 - 120^0 = 60^0$

$\therefore \quad \angle AOC = \angle AOQ + \angle QOC = 50^0 + 60^0 = 110^0$

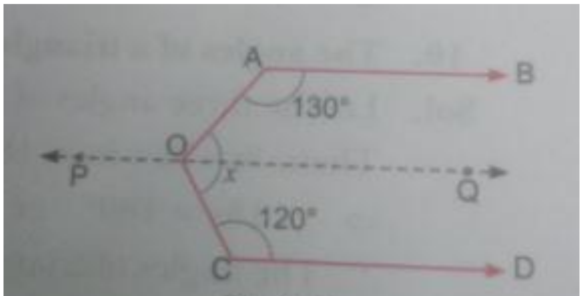


Fig. 6.18

Que 8. In Fig. 6.19, $AB \parallel CD$. Determine x.

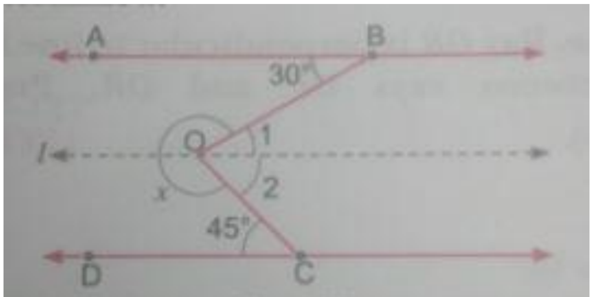


Fig. 6.19

Sol. Through O,draw a line l parallel to both AB and CD.

Then, $\angle 1 = \angle ABO = 30^0$ (Alternate interior angles)

And $\angle 2 = \angle DCO = 45^0$ (Alternate interior angles)

Now, $\angle BOC = \angle 1 + \angle 2 \quad \Rightarrow \quad \angle BOC = 30^0 + 45^0 = 75^0$

So, $x = 360^0 - \angle BOC = 360^0 - 75^0 = 285^0$

Hence, $x = 285^0$

Que 9. In Fig. 6.20, find x if $AB \parallel CD \parallel EF$.

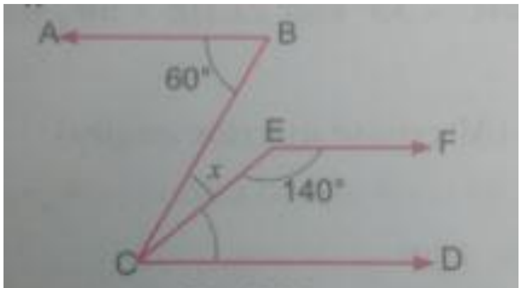


Fig. 6.20

Sol. As $EF \parallel CD$ and EC is the transversal

$\therefore$ $\angle DCE + \angle FEC = 180^0$ (Cointerior angles are supplementary)

$\angle DCE + 140^0 = 180^0$

$\Rightarrow$ $\angle DCE = 180^0 - 140^0 = 40^0$

Also, $\angle BCD = \angle ABC$ (Alternate interior angles)

$\therefore$ $\angle BCD = 60^0 \Rightarrow X + \angle DCE = 60^0$

$\Rightarrow$ $x = 60^0 - 40^0 = 20^0$

Que 10. The angles of a triangle are in the ratio 3: 7: 8. Find the angles of the triangle.

Sol. Let the three angles of the triangle be $3x, 7x$ and $8x$.

Then, $3x + 7x + 8x = 180^0$ (By angle sum property of Δ)

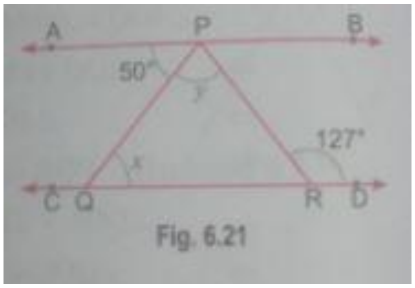
$\Rightarrow$ $18x = 180^0$ or $x = 10^0$

$\therefore$ The angles of triangle are

$3 \times 10^0 = 30^0, 7 \times 10^0 = 70^0, 8 \times 10^0 = 80^0$

Hence, the angles of triangle are $30^0, 70^0$ and 80^0

Que 11. In Fig. 6.21, if $AB \parallel CD, \angle APQ = 50^0$ and $\angle PRD = 127^0$, find x and y.



Sol. As $AB \parallel CD$ and PQ is a transversal.

$\therefore$ $\angle APQ = \angle PQR$ (Alternate interior angles)

$\Rightarrow$ $50^0 = x$

Also $\angle APR = \angle PRD$ (Alternate interior angles)

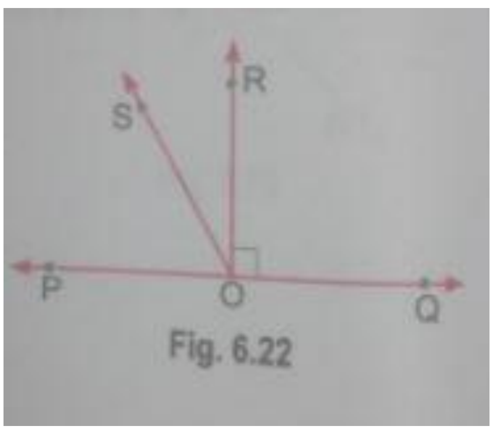
$\Rightarrow$ $50^0 + \angle QPR = 127^0$

$\Rightarrow$ $50^0 + y = 127^0$

Or $y = 127^0 - 50^0 = 77^0$

Hence, $x = 50^0, y = 77^0$

Que 12. In Fig. 6.22, POQ is a line. Ray OR is perpendicular to line $PQ. OS$ is another ray lying between rays OP and OR. Prove that $\angle ROS = \frac{1}{2}(\angle QOS - \angle POS)$.



Sol. As $RO \perp PQ$

$\therefore$ $\angle POR = \angle QOR = 90^0$

Now, $\angle QOS = \angle QOR + \angle ROS$

$\Rightarrow$ $\angle QOS = 90^0 + \angle ROS$ $\ldots(i)$

Since $\angle POR = 90^0 \Rightarrow \angle POS + \angle ROS = 90^0$

$\angle POS = 90^0 - \angle ROS$

Subtracting (ii) from (i), we get

$$\angle QOS - \angle POS = 90^0 + \angle ROS - (90^0 - \angle ROS)$$

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

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

Que 13. In Fig. 6.23, if $AB \parallel DE, \angle BAC = 35^0$ and $\angle CDE = 50^0$, find $\angle DCE$.

Sol. Since $AB \parallel DE$

$\therefore \quad \angle AED = \angle BAE = 35^0 \quad$ (Alternate interior angles)

In $\Delta\, CDE$

$$\angle CED + \angle EDC + \angle DCE = 180^0$$

$$35^0 + 50^0 + \angle DCE = 180^0$$

$$85^0 + \angle DCE = 180^0$$

$\angle DCE = 180^0 - 85^0 \qquad \therefore\ \angle DCE = 95^0$

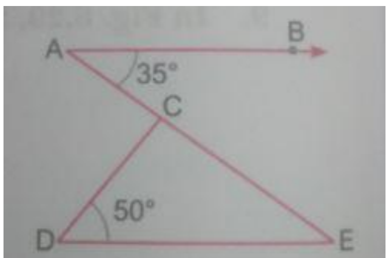


Fig. 6.23

Que 14. In Fig. 6.24, $AB \parallel DC$ AND $AD \parallel BC$. Prove that $\angle DAB = \angle DCB$.

Sol. As $AB \parallel DC$ and BC is a transversal intersecting them at B and C respectively.

$\therefore \quad \angle ABC + \angle DCB = 180^0 \qquad \ldots(i)$

Also $AD \parallel BC$ and AB is a transversal intersecting them at A and B respectively.

$\therefore \quad \angle DAB + \angle ABC = 180^0 \qquad \ldots(ii)$

From (i) and (ii), we get

$$\angle ABC + \angle DCB = \angle DAB + \angle ABC$$

$\Rightarrow \qquad \angle DCB = \angle DAB$

Hence, $\qquad \angle DAB = \angle DCB$

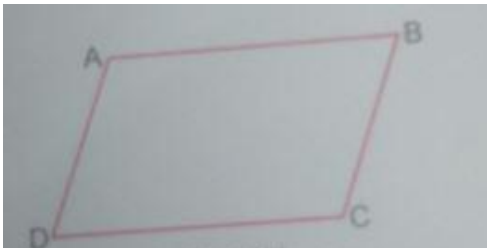


Fig. 6.24

Que 15. In Fig. 6.25, if $PQ \perp PS, PQ \parallel SR$, $\angle SQR = 28^0$ and $\angle QRT = 65^0$, then find the values of x and y.

Sol. As $PQ \parallel SR$ AND QR IS A TRANSVERSAL

$\therefore$ $\angle PQR = \angle QRT$ (Alternate interior angles)

$\Rightarrow$ $x + 28^0 = 65^0$

$\Rightarrow$ $x = 65^0 - 28^0$

$\therefore$ $x = 37^0$

Now, in ΔPQS, we have

$\angle QPS + \angle PQS + \angle PSQ = 180^0$

$\Rightarrow$ $90^0 + 37^0 + y = 180^0$

$\Rightarrow$ $127^0 + y = 180^0$

$\Rightarrow$ $y = 180^0 - 127^0$

$\therefore$ $y = 53^0$

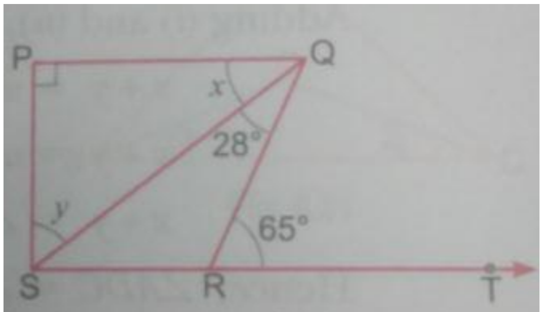


Fig. 6.25