Q1. In Fig. 6.13, lines AB and CD intersect at O. If $\angle AOC + \angle BOE = 70°$ and $\angle BOD = 40°$, find $\angle BOE$ and reflex $\angle COE$.

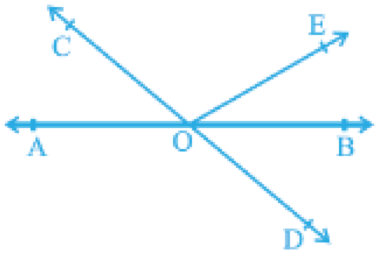


Fig. 6.13

Ans. We are given that $\angle AOC + \angle BOE = 70^{\circ}$ and $\angle BOD = 40^{\circ}$.

We need to find $\angle BOE$ and reflex $\angle COE$.

From the given figure, we can conclude that $\angle COB$ and $\angle COE$ form a linear pair.

We know that sum of the angles of a linear pair is 180°.

$\therefore \angle COB + \angle COE = 180^{\circ}$

$\because \angle COB = \angle AOC + \angle BOE$, or

$\therefore \angle AOC + \angle BOE + \angle COE = 180^{\circ}$

$\Rightarrow 70^{\circ} + \angle COE = 180^{\circ}$

$\Rightarrow \angle COE = 180^{\circ} - 70^{\circ}$

$= 110^{\circ}$.

Reflex $\angle COE = 360^{\circ} - \angle COE$

$= 360^{\circ} - 110^{\circ}$

$= 250^{\circ}$.

$\angle AOC = \angle BOD$ (Vertically opposite angles), or

$\angle BOD + \angle BOE = 70^{\circ}$.

But, we are given that $\angle BOD = 40^{\circ}$.

$40^{\circ} + \angle BOE = 70^{\circ}$

$\angle BOE = 70^{\circ} - 40^{\circ}$

$= 30^{\circ}$.

Therefore, we can conclude that

Reflex $\angle COE = 250^{\circ}$ and $\angle BOE = 30^{\circ}$.

Q2. In Fig. 6.14, lines XY and MN intersect at O. If $\angle$**POY** $=$ **90°** and a:b = 2 : 3, find c.

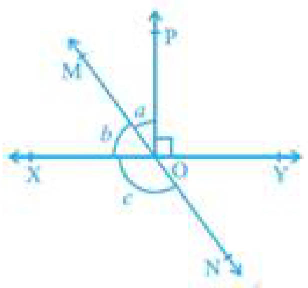


Fig. 6.14

Ans. We are given that $\angle POY = 90^{\circ}$ and $a : b = 2 : 3$.

We need find the value of c in the given figure.

Let a be equal to $2x$ and b be equal to $3x$.

$\because\ a + b = 90^{\circ} \Rightarrow 2x + 3x = 90^{\circ} \Rightarrow 5x = 90^{\circ}$

$\Rightarrow x = 18^{\circ}$

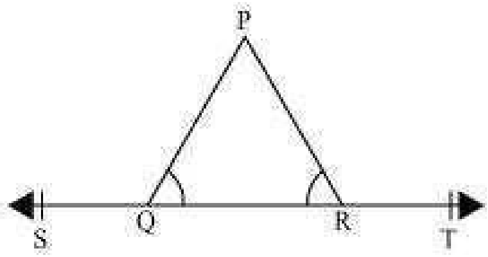
Therefore $b = 3 \times 18^{\circ} = 54^{\circ}$

Now $b + c = 180^{\circ}$ [Linear pair]

$\Rightarrow 54^{\circ} + c = 180^{\circ}$

$\Rightarrow c = 180^{\circ} - 54^{\circ} = 126^{\circ}$

Q3. In the given figure, $\angle PQR = \angle PRQ$, then prove that $\angle PQS = \angle PRT$.



Ans. We need to prove that $\angle PQS = \angle PRT$.

We are given that $\angle PQR = \angle PRQ$.

From the given figure, we can conclude that $\angle PQS$ and $\angle PQR$, and $\angle PRS$ and $\angle PRT$ form a linear pair.

We know that sum of the angles of a linear pair is 180°.

$\therefore \angle PQS + \angle PQR = 180^\circ$, and (i)

$\angle PRQ + \angle PRT = 180^\circ$. (ii)

From equations (i) and (ii), we can conclude that

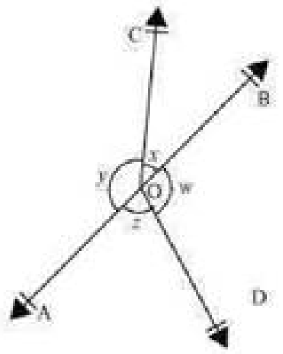
$\angle PQS + \angle PQR = \angle PRQ + \angle PRT$.

But, $\angle PQR = \angle PRQ$.

$\therefore \angle PQS = \angle PRT$.

Therefore, the desired result is proved.

Q4. In Fig. 6.16, if $x + y = w + z$, then prove that AOB is a line.



Ans. We need to prove that AOB is a line.

We are given that $x+y=w+z$.

We know that the sum of all the angles around a fixed point is 360°.

Thus, we can conclude that
$\angle AOC+\angle BOC+\angle AOD+\angle BOD=360^\circ$, or

$y+x+z+w=360^\circ$.

But, $x+y=w+z$ (Given).

$2(y+x)=360^\circ$.

$y+x=180^\circ$.

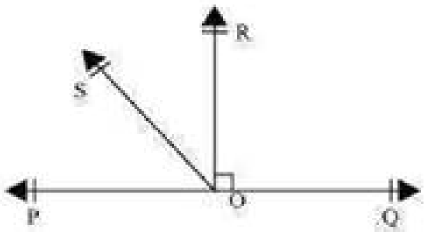
From the given figure, we can conclude that y and x form a linear pair.

We know that if a ray stands on a straight line, then the sum of the angles of linear pair formed by the ray with respect to the line is 180°.

$y+x=180^\circ$.

Therefore, we can conclude that AOB is a line.

Q5. In the given figure, POQ is a line. Ray OR is perpendicular to line PQ. OS is another ray lying between rays OP and OR. Prove that $\angle ROS = \frac{1}{2}(\angle QOS - \angle POS)$.



Ans. We need to prove that

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

We are given that OR is perpendicular to PQ, or

$\angle QOR = 90^\circ$.

From the given figure, we can conclude that $\angle POR$ and $\angle QOR$ form a linear pair.

We know that sum of the angles of a linear pair is 180°.

$\therefore \angle POR + \angle QOR = 180^\circ$, or

$\angle POR = 90^\circ$.

From the figure, we can conclude that $\angle POR = \angle POS + \angle ROS$.

$\Rightarrow \angle POS + \angle ROS = 90^\circ$, or

$\angle ROS = 90^\circ - \angle POS$.(i)

From the given figure, we can conclude that $\angle QOS$ and $\angle POS$ form a linear pair.

We know that sum of the angles of a linear pair is 180°.

$\angle QOS + \angle POS = 180^\circ$, or

$\frac{1}{2}(\angle QOS + \angle POS) = 90^\circ$.(ii)

Substitute (ii) in (i), to get

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

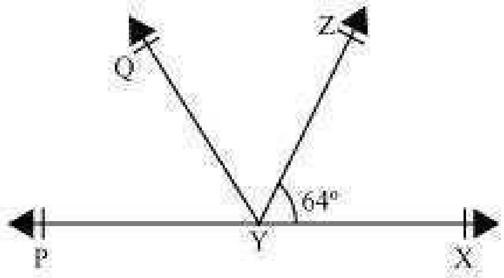
$= \frac{1}{2}(\angle QOS - \angle POS)$.

Therefore, the desired result is proved.

Q6. It is given that $\angle XYZ = 64^{\circ}$ and XY is produced to point P. Draw a figure from the given information. If ray YQ bisects $\angle ZYP$, find $\angle XYQ$ and reflex $\angle QYP$

Ans. We are given that $\angle XYZ = 64^{\circ}$, XY is produced to P and YQ bisects $\angle ZYP$.

We can conclude the given below figure for the given situation:



We need to find $\angle XYQ$ and reflex $\angle QYP$.

From the given figure, we can conclude that $\angle XYZ$ and $\angle ZYP$ form a linear pair.

We know that sum of the angles of a linear pair is 180°.

$\angle XYZ + \angle ZYP = 180^{\circ}$.

But $\angle XYZ = 64^{\circ}$.

$\Rightarrow 64^{\circ} + \angle ZYP = 180^{\circ}$

$\Rightarrow \angle ZYP = 116^{\circ}$.

Ray YQ bisects $\angle ZYP$, or

$\angle QYZ = \angle QYP = \frac{116^{\circ}}{2} = 58^{\circ}$.

$\angle XYQ = \angle QYZ + \angle XYZ$

$= 58^{\circ} + 64^{\circ} = 122^{\circ}$.

Reflex $\angle QYP = 360^{\circ} - \angle QYP$

$= 360^{\circ} - 58^{\circ}$

$= 302^{\circ}$.

Therefore, we can conclude that $\angle XYQ = 122^{\circ}$ **and Reflex** $\angle QYP = 302^{\circ}$

*********** END **********