

Exercise: 6.1

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

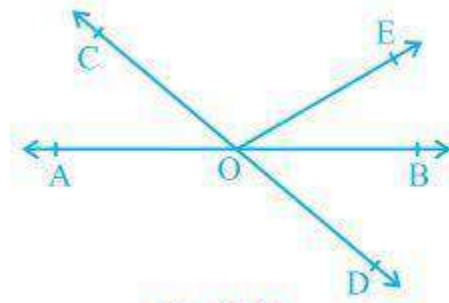


Fig. 6.13

Solution:

From the diagram, we have

$(\angle AOC + \angle BOE + \angle COE)$ and $(\angle COE + \angle BOD + \angle BOE)$ forms a straight line.

So, $\angle AOC + \angle BOE + \angle COE = \angle COE + \angle BOD + \angle BOE = 180^\circ$

Now, by putting the values of $\angle AOC + \angle BOE = 70^\circ$ and $\angle BOD = 40^\circ$ we get

$\angle COE = 110^\circ$ and

$\angle BOE = 30^\circ$

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

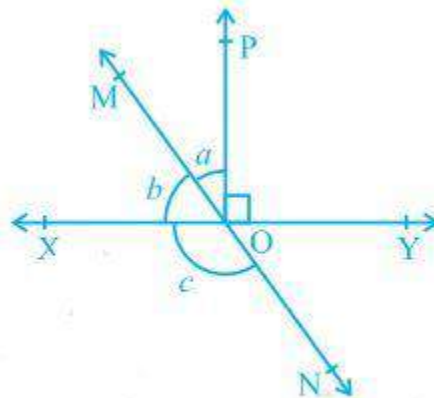


Fig. 6.14

Solution:

We know that the sum of linear pair are always equal to 180°

So,

$$\angle POY + a + b = 180^\circ$$

Putting the value of $\angle POY = 90^\circ$ (as given in the question) we get,

$$a + b = 90^\circ$$

Now, it is given that $a : b = 2 : 3$ so,

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

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

Solving this we get

$$5x = 90^\circ$$

$$\text{So, } x = 18^\circ$$

$$\therefore a = 2 \times 18^\circ = 36^\circ$$

Similarly, b can be calculated and the value will be

$$b = 3 \times 18^\circ = 54^\circ$$

From the diagram, $b + c$ also forms a straight angle so,

$$b + c = 180^\circ$$

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

$$\therefore c = 126^\circ$$

3. In Fig. 6.15, $\angle PQR = \angle PRQ$, then prove that $\angle PQS = \angle PRT$.

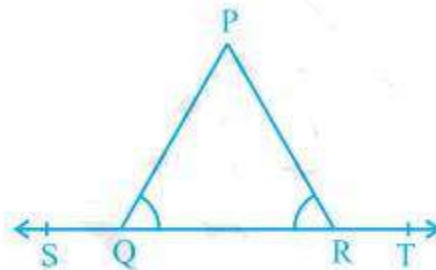


Fig. 6.15

Solution:

Since ST is a straight line so,

$$\angle PQS + \angle PQR = 180^\circ \text{ (linear pair) and}$$

$$\angle PRT + \angle PRQ = 180^\circ \text{ (linear pair)}$$

$$\text{Now, } \angle PQS + \angle PQR = \angle PRT + \angle PRQ = 180^\circ$$

Since $\angle PQR = \angle PRQ$ (as given in the question)
 $\angle PQS = \angle PRT$. (Hence proved).

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

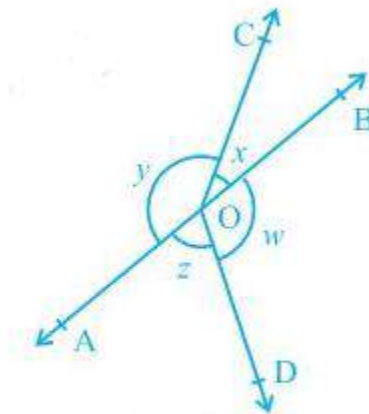


Fig. 6.16

Solution:

For proving AOB is a straight line, we will have to prove $x+y$ is a linear pair
 i.e. $x+y = 180^\circ$

We know that the angles around a point are 360° so,
 $x+y+w+z = 360^\circ$

In the question, it is given that,

$$x+y = w+z$$

$$\text{So, } (x+y) + (x+y) = 360^\circ$$

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

$$\therefore (x+y) = 180^\circ \text{ (Hence proved).}$$

5. In Fig. 6.17, POQ is a line. Ray OR is perpendicular to line PQ. OS is another ray lying between rays OP and OR. Prove that $\angle ROS = \frac{1}{2} (\angle QOS - \angle POS)$.

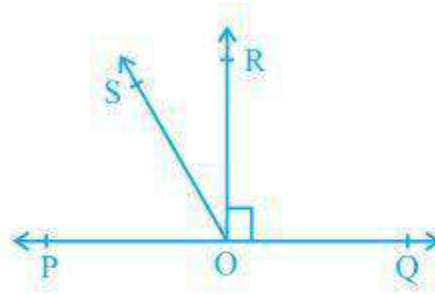


Fig. 6.17

Solution:

In the question, it is given that $(OR \perp PQ)$ and $\angle POQ = 180^\circ$

So, $\angle POS + \angle ROS + \angle ROQ = 180^\circ$

Now, $\angle POS + \angle ROS = 180^\circ - 90^\circ$ (Since $\angle POR = \angle ROQ = 90^\circ$)

$\therefore \angle POS + \angle ROS = 90^\circ$

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

It is given that $\angle ROQ = 90^\circ$,

$\therefore \angle QOS = 90^\circ + \angle ROS$

Or, $\angle QOS + \angle ROS = 90^\circ$

As $\angle POS + \angle ROS = 90^\circ$ and $\angle QOS + \angle ROS = 90^\circ$, we get

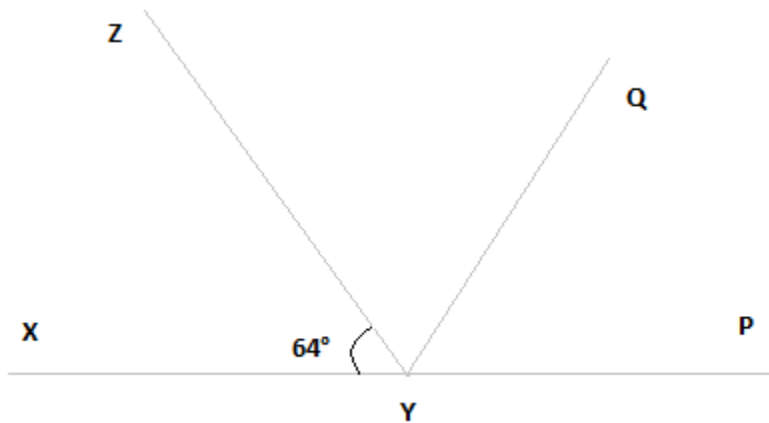
$\angle POS + \angle ROS = \angle QOS + \angle ROS$

$\Rightarrow 2 \angle ROS + \angle POS = \angle QOS$

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

6. 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 $\angle QYP$.

Solution:



Here, XP is a straight line

So, $\angle XYZ + \angle ZYP = 180^\circ$

Putting the value of $\angle XYZ = 64^\circ$ we get,

$$64^\circ + \angle ZYP = 180^\circ$$

$$\therefore \angle ZYP = 116^\circ$$

From the diagram, we also know that $\angle ZYP = \angle ZYQ + \angle QYP$

Now, as YQ bisects $\angle ZYP$,

$$\angle ZYQ = \angle QYP$$

$$\text{Or, } \angle ZYP = 2\angle ZYQ$$

$$\therefore \angle ZYQ = \angle QYP = 58^\circ$$

Again, $\angle XYQ = \angle XYZ + \angle ZYQ$

By putting the value of $\angle XYZ = 64^\circ$ and $\angle ZYQ = 58^\circ$ we get.

$$\angle XYQ = 64^\circ + 58^\circ$$

$$\text{Or, } \angle XYQ = 122^\circ$$

Now, reflex $\angle QYP = 180^\circ + \angle XYQ$

We computed that the value of $\angle XYQ = 122^\circ$.

So,

$$\angle QYP = 180^\circ + 122^\circ$$

$$\therefore \angle QYP = 302^\circ$$