CBSE Class 9 Mathematics

NCERT Solutions

CHAPTER 6

Lines and Angles(Ex. 6.1)

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 $\angle COE$.

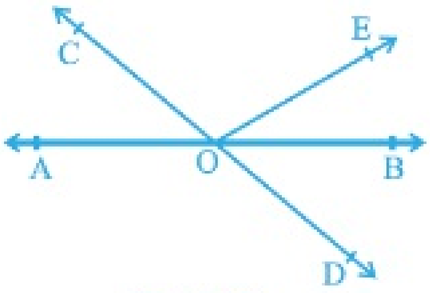


Fig. 6.13

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 $\angle AOC, \angle COE$ *and* $\angle BOE$ form a linear pair.

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

$\angle AOC + \angle COE + \angle BOE = 180^\circ$

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

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

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

$= 110^\circ.$

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 $\text{Reflex } \angle COE = 250^\circ$ 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*.

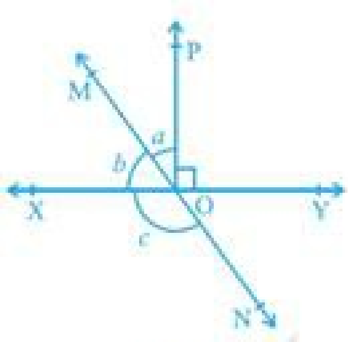


Fig. 6.14

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 2*x* and *b* be equal to *3x*.

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

$\Rightarrow x = 18^\circ$

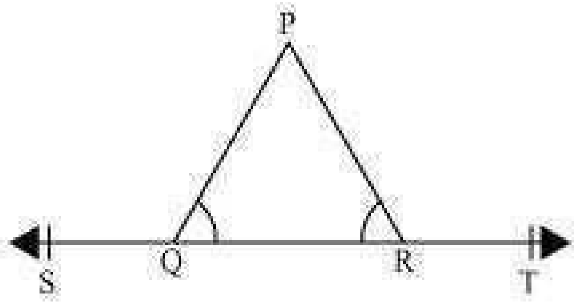
Therefore $b = 3 \times 18^\circ = 54^\circ$

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

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

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

3. 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.

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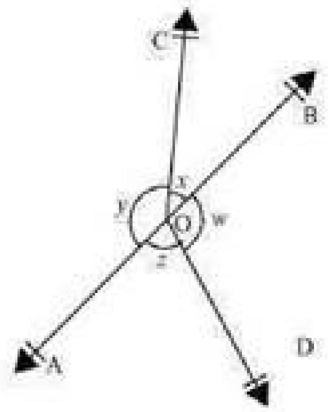
4. In Fig. 6.16, if *x* + *y* = *w* + *z*, then prove that AOB is a line.



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).

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

$y + x = 180^\circ$.

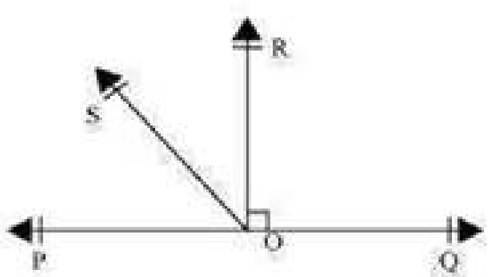
From the given figure, we can conclude that *y* and *x* form a linear pair.

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.

5. 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

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

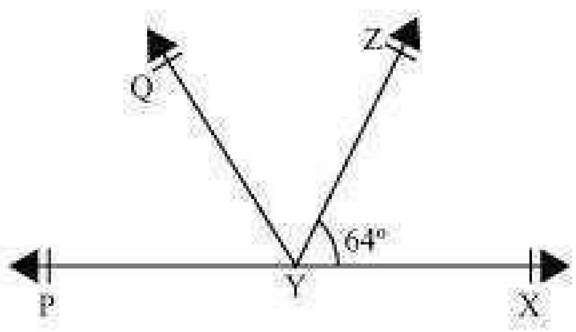
$= \frac{1}{2}(\angle QOS - \angle POS)$.

Therefore, the desired result is proved.

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 $\angle QYP$

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 $\angle QYP = 302^\circ$