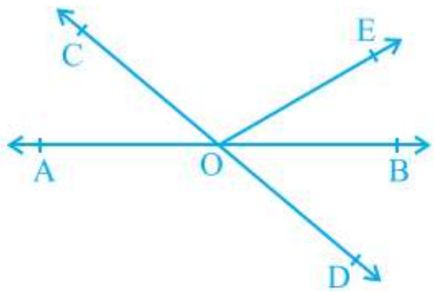
Lines and Angles: Exercise 6.1

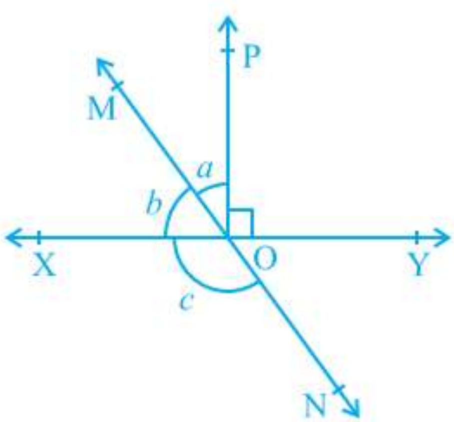
Q.1 In figure, lines AB and CD intersect at O. If ∠AOC + ∠BOE = 70° and ∠BOD = 40°, find ∠BOE and reflex ∠COE.



Sol. Since, AB is a straight line and ray OC stands on AB. So,
∠AOC + ∠COB = 180° (Sum of linear pairs angles is 180°)
⇒ ∠AOC + ∠COE + ∠BOE = 180° (Since ∠COB = ∠COE + ∠BOE)
⇒ (∠AOC + ∠BOE) + ∠COE = 180°
⇒ 70° + ∠COE = 180° (Since, given: ∠AOC + ∠BOE = 70°)
⇒ ∠COE = 180° – 70° = 110°
So, reflex ∠COE = 360°–110° = 250°

Since, CD is a straight line and ray OE stands on CD. So,
∠COE + ∠EOD = 180° (Sum of linear pairs angles is 180°)
⇒ ∠COE + ∠BOE + ∠BOD = 180° (Since, ∠EOD = ∠BOE + ∠BOD)
⇒ 110° + ∠BOE + 40° = 180°
(Since, ∠COE = 110° (Already proved), given: ∠BOD = 40°)
⇒ ∠BOE = 180° – 110° – 40° = 30°
Thus, ∠BOE = 30°
and reflex ∠COE = 250°

Q.2 In figure, lines XY and MN intersect at O. If ∠POY = 90° and a : b = 2 : 3, find c.



Sol. Given: a : b = 2 : 3 and a + b = ∠POX = ∠POY = 90°
And sum of ratios = 2 + 3 = 5

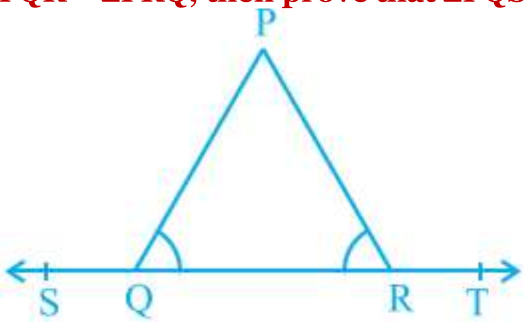
So, a = $\frac{2}{5} \times 90° = 2 \times 18° = 36°$

and b = $\frac{3}{5} \times 90° = 3 \times 18° = 54°$

Since MN is a straight line and ray OX stands on MN. So,

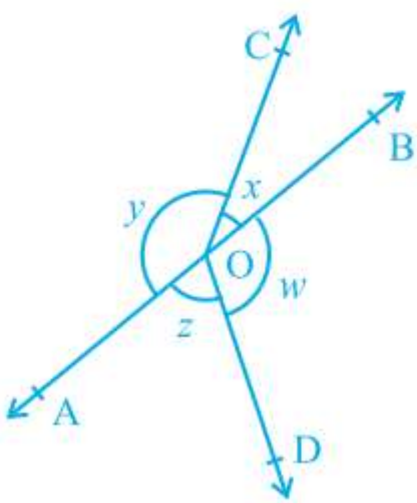
$\angle MOX + \angle XON = 180^o$ (Sum of linear pairs angles is 180^o)
$\Rightarrow b + c = 180^o$
$\Rightarrow 54^o + c = 180^o$
$\Rightarrow c = 180^o - 54^o = 126^o$
Thus, $c = 126^o$

Q.3 In figure ∠PQR = ∠PRQ, then prove that ∠PQS = ∠PRT.



Sol. Since SR is a straight line and QP stands on the line SR.
So, $\angle PQS + \angle PQR = 180^o$ (Sum of linear pairs angles is 180^o)......... (i)
Again QT is a straight line and PR stands on the line QT.
So, $\angle PRQ + \angle PRT = 180^o$ (Sum of linear pairs angles is 180^o).......... (ii)
From (i) and (ii),
$\angle PQS + \angle PQR = \angle PRQ + \angle PRT$ (From eq. (i) & (ii)) .... (iii)
Also given $\angle PQR = \angle PRQ$ ....(iv)
Subtracting (iv) from (iii), we get
$\angle PQS = \angle PRT$.......... Hence Proved

Q.4 In figure, if x + y = w + z, then prove that AOB is a line.

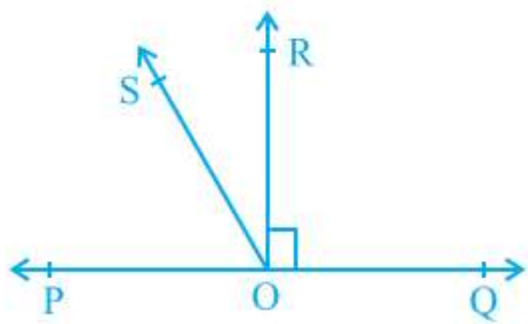


Sol. Since, the sum of all angles around a point = 360^o
So, $(\angle BOC + \angle COA) + (\angle BOD + \angle AOD) = 360^o$
$\Rightarrow (x + y) + (w + z) = 360^o$
Given, $x + y = w + z$

So, $x + y = w + z = \dfrac{360^o}{2} = 180^o$

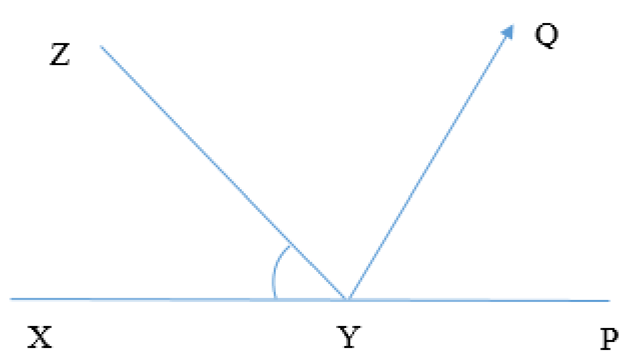
Therefore, ∠BOC and ∠COA, ∠BOD and ∠AOD form linear pairs. So, OA and OB are two opposite rays. Thus, AOB is a straight line.

Q.5 In figure POQ is a line. Ray OR is perpendicular to line PQ. OS is another ray lying between rays OP and OR. Prove that ∠ROS = $\frac{1}{2}$ (∠QOS – ∠POS)



Sol. Given: OR is perpendicular to the line PQ.
So, ∠POR = ∠ROQ [Since, OR ⊥ PQ]
⇒ ∠POS + ∠ROS = ∠QOS – ∠ROS
⇒ 2∠ROS = ∠QOS – ∠POS
⇒ ∠ROS = $\frac{1}{2}$ (∠QOS – ∠POS)............Hence Proved.

Q.6 It is given that ∠XYZ = 64° and XY is produced to point P. Draw a figure from the given information. If ray YQ bisects ∠ZYP, find ∠XYQ and reflex ∠QYP.
Sol. Given: XY is produced to point P. So, XP is a straight line and YZ stands on XP.
So, ∠XYZ + ∠ZYP = 180° (Sum of linear pairs angles is 180°)
⇒ 64° + ∠ZYP = 180° [Given: ∠XYZ = 64°]
⇒ ∠ZYP = 180° – 64° = 116°
Since, ray YQ bisects ∠ZYP



So, ∠QYP = ∠ZYQ = $\frac{116^o}{2}$ = 58°
Now, ∠XYQ = ∠XYZ + ∠ZYQ
⇒ ∠XYQ = 64° + 58° = 122°
and reflex ∠QYP = 360° – ∠QYP (Since, ∠QYP = 58°)
= 360° – 58°
= 302°