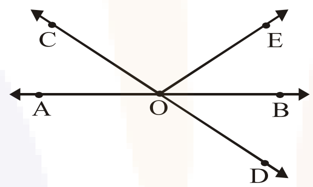
CLASS IX: MATHS
Chapter 6: Lines and Angles

Questions and Solutions | Exercise 6.1 - NCERT Books

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



Sol. $\angle AOC = \angle BOD$ [Vertically opposite angles]

$\Rightarrow \angle AOC = 40°$ [$\because \angle BOD = 40°$ is given]

Now, $\angle AOC + \angle BOE = 70°$ [Given]

$\Rightarrow 40° + \angle BOE = 70°$

$\Rightarrow \angle BOE = 30°$

$\angle AOE + \angle BOE = 180°$ [Linear pair of angles]

$\Rightarrow \angle AOE + 30° = 180°$

$\Rightarrow \angle AOE = 150°$

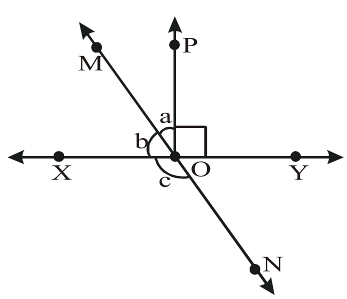
$\Rightarrow \angle AOC + \angle COE = 150°$

$\Rightarrow 40° + \angle COE = 150°$

$\Rightarrow \angle COE = 110°$

Reflex $\angle COE = 360° – 110° = 250°$

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



Sol. Ray OP stands on line XY

$\angle POX + \angle POY = 180°$

$\angle POX + 90° = 180°$

$\angle POX = 90°$

$\angle POM + \angle XOM = 90°$

$a + b = 90°$ .... (1)

$a : b = 2 : 3$

$\frac{a}{2} = \frac{b}{3} = k$ (let)

$a = 2k, b = 3k$

$3k + 2k = 90°$ from (1)

$k = 18°$

$\Rightarrow a = 36°$, $b = 54°$

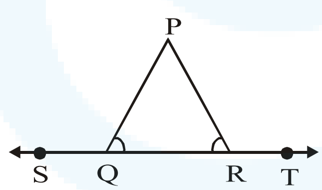
$\therefore$ Ray OX stands on line MN

$\angle XOM + \angle XON = 180°$

$b + c = 180°$

$54° + c = 180° \Rightarrow c = 126°$

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



Sol. $\angle PQR = \angle PRQ = x$ (say) ...(1)

Now, $\angle PQS + \angle PQR = 180°$ [Linear pair of angles]

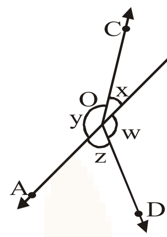
and $\angle PRT + \angle PRQ = 180°$ [Linear pair of angles]

$\Rightarrow \angle PQS + \angle PQR = \angle PRT + \angle PRQ$ [$\because$ each = 180°]

$\Rightarrow \angle PQS + x = \angle PRT + x$ [By (1)]

$\Rightarrow \angle PQS = \angle PRT$

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



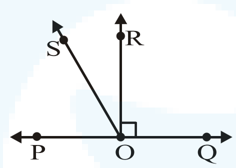
Sol. $x + y = w + z$ ...(1)

$x + y + w + z = 360°$ [Complete angle]

$\Rightarrow 2(x + y) = 360°, x + y = 180°$ [From (1)]

$\Rightarrow$ AOB is a line.

Q5. 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 $\angle ROS = \frac{1}{2}(\angle QOS - \angle POS)$.



Sol. $\angle POR = \angle QOR = 90°$ ...(1)

[$\because$ OR $\perp$ PQ at O]

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

$\Rightarrow \angle QOS = 90° + \angle ROS$ ...(2) {by (1)}

$\angle POS + \angle ROS = \angle POR$

$\Rightarrow \angle POS = \angle POR - \angle ROS$

$\Rightarrow \angle POS = 90° - \angle ROS$ ...(3) {by (1)}

Subtracting (3) from (2),

$\angle QOS - \angle POS = \{90° + \angle ROS\} - \{90° - \angle ROS\}$

$= 2 \times \angle ROS$

$\Rightarrow 2 \times \angle ROS = \{\angle QOS - \angle POS\}$

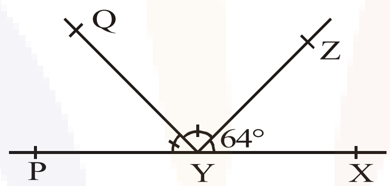
i.e., $\angle ROS = \frac{1}{2}\{\angle QOS - \angle POS\}$

Q6. It is given that $\angle XYZ = 64°$ 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 $\angle QYP$.

Sol. $\angle XYZ + \angle ZYP = 180°$ [Linear pair]

$\Rightarrow 64 + \angle ZYP = 180°$

$\Rightarrow \angle ZYP = 116°$



Ray YQ bisects angle $\angle ZYP$

$\Rightarrow \angle PYQ = \angle ZYP = \frac{116}{2} = 58°$

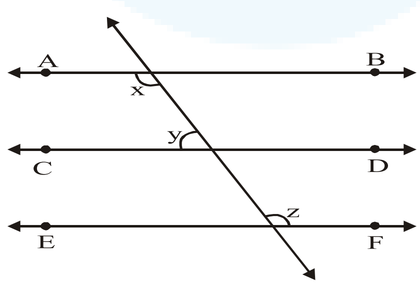
Reflex $\angle QYP = 360° - 58° = 302°$

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

$= 64° + 58° = 122°$

Questions and Solutions | Exercise 6.2 - NCERT Books

Q1. In figure, if AB || CD, CD || EF and y : z = 3 : 7, find x.



Sol. AB$\parallel$CD and CD$\parallel$EF

$\Rightarrow$ AB$\parallel$EF

$\Rightarrow x = z$ (Alternate angles)

Now, $x + y = 180°$

(Pair of interior angles on the same side of the transversal)

$\Rightarrow z + y = 180°$ i.e, $y + z = 180°$

Also, we are given that, $y : z = 3 : 7$

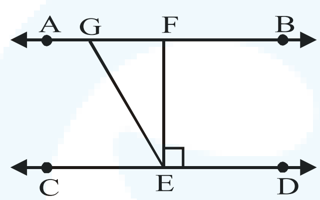
Then, $y = \frac{3}{10} \times 180° = 54°$

and $z = \frac{7}{10} \times 180° = 126°$

We have $x = z = 126°$

Therefore, $x = 126°$

Q2. In figure, if AB || CD, FE $\perp$ CD and $\angle$GED = 126°, find $\angle$AGE, $\angle$GEF and $\angle$FGE.



Sol. AB||CD [given]

$\angle AGE = \angle GED = 126°$ [Alternate angles]

$\Rightarrow \angle GEF + 90° = 126°$

$\angle GEF = 36°$

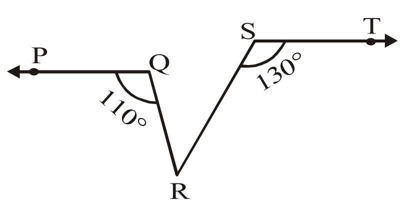
$\angle GEC + \angle GEF + \angle FED = 180°$ [Straight line]

$\angle GEC + 126° = 180°$

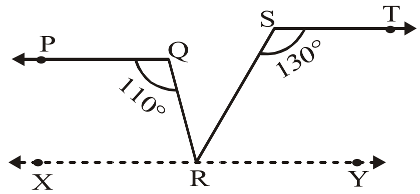
$\angle GEC = 180° - 126° = 54°$

$\angle FGE = \angle GEC = 54°$ [Alternate angles]

Q3. In figure, if PQ || ST, $\angle$PQR = 110° and $\angle$RST = 130°, find $\angle$QRS.



Sol. Through R, we draw XRY || PQ.



$\Rightarrow$ XRY || ST (∵ PR || ST)

$\angle QRX + 110° = 180°$

and $\angle YRS + 130° = 180°$

$\Rightarrow \angle QRX = 70°$

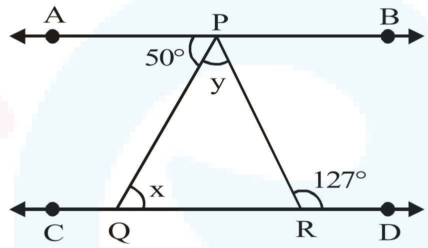
and $\angle YRS = 50°$

Now, $\angle QRX + \angle QRS + \angle YRS = 180°$

$\Rightarrow 70° + \angle QRS + 50° = 180°$

$\Rightarrow \angle QRS = 60°$

Q4. In figure, if AB || CD, $\angle APQ = 50°$ and $\angle PRD = 127°$, find x and y.



Sol. AB||CD [given]

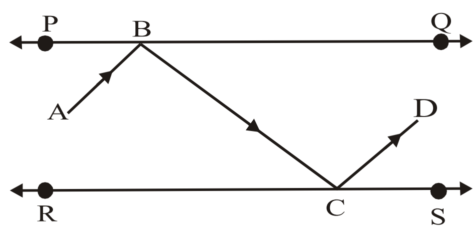
$x = \angle APQ = 50°$ [Alternate angles]

$\angle APQ + y = \angle PRD = 127°$ [Alternate angles]

$50° + y = 127°$

$y = 127° - 50° = 77°$

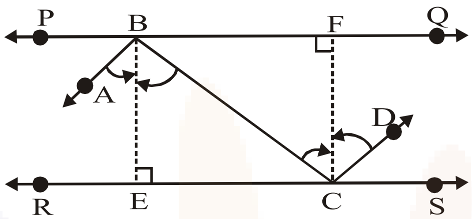
Q5. In figure, PQ and RS are two mirrors placed parallel to each other. An incident ray AB strikes the mirror PQ at B, the reflected ray moves along the path BC and strikes the mirror RS at C and again reflects back along CD. Prove that AB || CD.



Sol. We draw BE $\perp$ RS, then BE is also $\perp$ PQ

($\because$ PQ $\parallel$ RS)

We draw CF $\perp$ PQ. Here, also CF $\perp$ RS



Here, if we consider PQ as transversal intersecting lines BE and CF, then each pair of corresponding angles is equal. (each equal to 90°)

Thus, we have BE $\parallel$ CF.

Now, $\angle ABE = \angle CBE$

(Angle of incidence = Angle of reflection)

$\Rightarrow \angle ABE = \angle CBE = \frac{1}{2} \times \angle ABC$ ...(1)

Similarly, $\angle BCF = \angle FCD = \frac{1}{2} \times \angle DCB$ ...(2)

Now, BE $\parallel$ CF

$\Rightarrow \angle CBE = \angle BCF$ (alternate angles)

$\Rightarrow \frac{1}{2} \times \angle ABC = \frac{1}{2} \times \angle DCB$ {by (1) and (2)}

$\Rightarrow \angle ABC = \angle DCB$

$\Rightarrow$ AB $\parallel$ CD