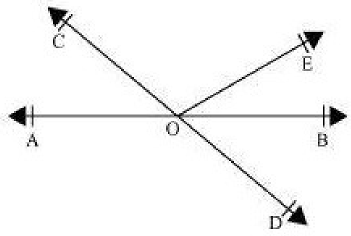
MATHS -9 (CH-06 – LINES & ANGLES)

MATHS -9 (CH-06 -6.1- LINES & ANGLES)

Question 1:

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



Answer 1:

AB is a straight line, rays OC and OE stand on it.

$\therefore \angle AOC + \angle COE + \angle BOE = 180°$

$\Rightarrow (\angle AOC + \angle BOE) + \angle COE = 180°$

$\Rightarrow 70° + \angle COE = 180°$

$\Rightarrow \angle COE = 180° - 70° = 110°$

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

CD is a straight line, rays OE and OB stand on it.

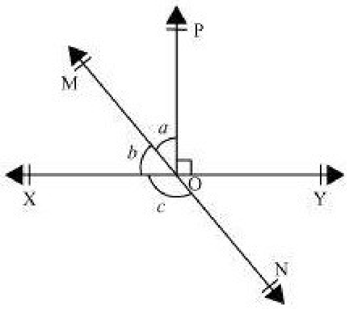
$\therefore \angle COE + \angle BOE + \angle BOD = 180°$

$\Rightarrow 110° + \angle BOE + 40° = 180°$

$\Rightarrow \angle BOE = 180° - 150° = 30°$

Question 2:

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

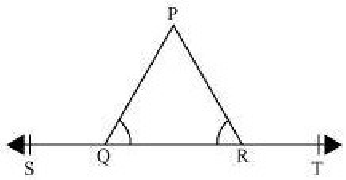


Answer 2:

Let the common ratio between a and b be x.
$\therefore a = 2x$, and $b = 3x$
XY is a straight line, rays OM and OP stand on it.
$\therefore \angle XOM + \angle MOP + \angle POY = 180^\circ$
$b + a + \angle POY = 180^\circ$
$3x + 2x + 90^\circ = 180^\circ$
$5x = 90^\circ$
$x = 18^\circ$
$a = 2x = 2 \times 18 = 36^\circ$
$b = 3x = 3 \times 18 = 54^\circ$
MN is a straight line. Ray OX stands on it.
$\therefore b + c = 180^\circ$ (Linear Pair)
$54^\circ + c = 180^\circ$
$c = 180^\circ - 54^\circ = 126^\circ$
$\therefore c = 126^\circ$

Question 3:

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

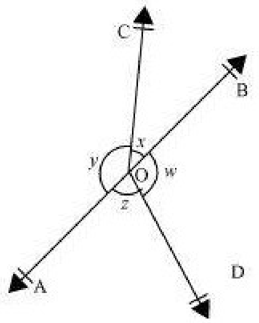


Answer 3:

In the given figure, ST is a straight line and ray QP stands on it.
$\therefore \angle PQS + \angle PQR = 180^\circ$ (Linear Pair)
$\angle PQR = 180^\circ - \angle PQS$ (1)
$\angle PRT + \angle PRQ = 180^\circ$ (Linear Pair)
$\angle PRQ = 180^\circ - \angle PRT$ (2)
It is given that $\angle PQR = \angle PRQ$.
Equating equations (1) and (2), we obtain
$180^\circ - \angle PQS = 180^\circ - \angle PRT$
$\angle PQS = \angle PRT$

Question 4:

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



Answer 4:

It can be observed that,

$x + y + z + w = 360°$ (Complete angle)

It is given that,

$x + y = z + w$

$\therefore x + y + x + y = 360°$

$2(x + y) = 360°$

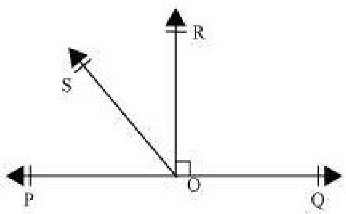
$x + y = 180°$

Since x and y form a linear pair, AOB is a line.

Question 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

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



Answer 5:

It is given that OR ⊥ PQ

$\therefore \angle POR = 90^\circ$

$\Rightarrow \angle POS + \angle SOR = 90^\circ$

$\angle ROS = 90^\circ - \angle POS$ ... (1)

$\angle QOR = 90^\circ$ (As OR ⊥ PQ)

$\angle QOS - \angle ROS = 90^\circ$

$\angle ROS = \angle QOS - 90^\circ$ ... (2)

On adding equations (1) and (2), we obtain

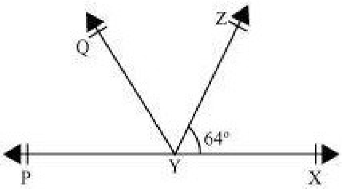
$2\angle ROS = \angle QOS - \angle POS$

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

Question 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 ∠ZYP, find ∠XYQ and reflex ∠QYP.

Answer 6:



It is given that line YQ bisects ∠PYZ.

Hence, $\angle QYP = \angle ZYQ$

It can be observed that PX is a line. Rays YQ and YZ stand on it.

$\therefore \angle XYZ + \angle ZYQ + \angle QYP = 180^\circ$

$\Rightarrow 64^\circ + 2\angle QYP = 180^\circ$

$\Rightarrow 2\angle QYP = 180^\circ - 64^\circ = 116^\circ$

$\Rightarrow \angle QYP = 58^\circ$

Also, $\angle ZYQ = \angle QYP = 58^\circ$

Reflex $\angle QYP = 360^\circ - 58^\circ = 302^\circ$

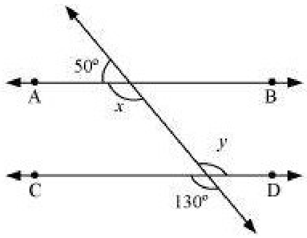
$\angle XYQ = \angle XYZ + \angle ZYQ$

$= 64^\circ + 58^\circ = 122^\circ$

MATHS -9 (CH-06 -6.2- LINES & ANGLES)

Question 1:

In the given figure, find the values of x and y and then show that AB || CD.

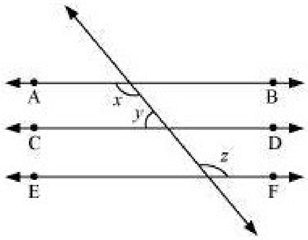


Answer 1:

It can be observed that,
$50° + x = 180°$ (Linear pair)
$x = 130°$ ... (1)
Also, $y = 130°$ (Vertically opposite angles)
As x and y are alternate interior angles for lines AB and CD and also measures of these angles are equal to each other, therefore, line AB || CD.

Question 2:

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

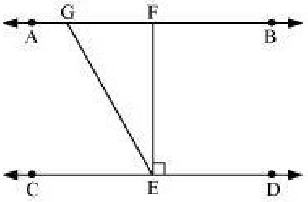


Answer 2:

It is given that AB || CD and CD || EF
∴ AB || CD || EF (Lines parallel to the same line are parallel to each other)
It can be observed that
$x = z$ (Alternate interior angles) … (1)
It is given that $y: z = 3: 7$
Let the common ratio between y and z be a.
∴ $y = 3a$ and $z = 7a$
Also, $x + y = 180^\circ$ (Co-interior angles on the same side of the transversal)
$z + y = 180^\circ$ [Using equation (1)]
$7a + 3a = 180^\circ$
$10a = 180^\circ$
$a = 18^\circ$
∴ $x = 7a = 7 \times 18^\circ = 126^\circ$

Question 3:

In the given figure, If AB || CD, EF ⊥ CD and ∠GED = 126°, find ∠AGE, ∠GEF and ∠FGE.

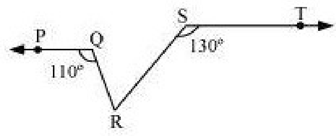


Answer 3:

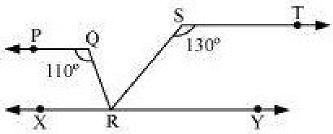
It is given that,
AB || CD
EF ⊥ CD
∠GED = 126°
⇒ ∠GEF + ∠FED = 126°
⇒ ∠GEF + 90° = 126°
⇒ ∠GEF = 36°
∠AGE and ∠GED are alternate interior angles.
⇒ ∠AGE = ∠GED = 126°
However, ∠AGE + ∠FGE = 180° (Linear pair)
⇒ 126° + ∠FGE = 180°
⇒ ∠FGE = 180° − 126° = 54°
∴ ∠AGE = 126°, ∠GEF = 36°, ∠FGE = 54°

Question 4:

In the given figure, if PQ || ST, ∠PQR = 110° and ∠RST = 130°, find ∠QRS.
[**Hint**: Draw a line parallel to ST through point R.]



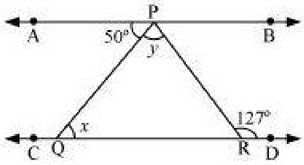
Answer 4:



Let us draw a line XY parallel to ST and passing through point R.
∠PQR + ∠QRX = 180° (Co-interior angles on the same side of transversal QR)
⇒ 110° + ∠QRX = 180°
⇒ ∠QRX = 70°
Also,
∠RST + ∠SRY = 180° (Co-interior angles on the same side of transversal SR)
130° + ∠SRY = 180°
∠SRY = 50°
XY is a straight line. RQ and RS stand on it.
∴ ∠QRX + ∠QRS + ∠SRY = 180°
70° + ∠QRS + 50° = 180°
∠QRS = 180° − 120° = 60°

Question 5:

In the given figure, if AB || CD, ∠APQ = 50° and ∠PRD = 127°, find *x* and *y*.

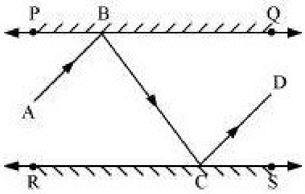


Answer 5:

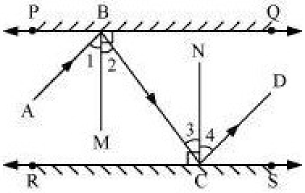
∠APR = ∠PRD (Alternate interior angles)
50° + *y* = 127°
y = 127° − 50°
y = 77°
Also, ∠APQ = ∠PQR (Alternate interior angles)
50° = *x*
∴ *x* = 50° and *y* = 77°

Question 6:

In the given 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.



Answer 6:

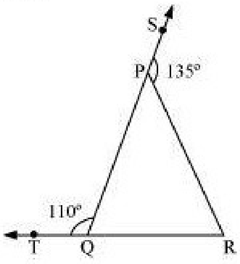


Let us draw BM ⊥ PQ and CN ⊥ RS.
As PQ || RS,
Therefore, BM || CN
Thus, BM and CN are two parallel lines and a transversal line BC cuts them at B and C respectively.
∴∠2 = ∠3 (Alternate interior angles)
However, ∠1 = ∠2 and ∠3 = ∠4 (By laws of reflection)
∴ ∠1 = ∠2 = ∠3 = ∠4
Also, ∠1 + ∠2 = ∠3 + ∠4
∠ABC = ∠DCB
However, these are alternate interior angles.
∴ AB || CD

MATHS -9 (CH-06 -6.3- LINES & ANGLES)

Question 1:

In the given figure, sides QP and RQ of ΔPQR are produced to points S and T respectively. If ∠SPR = 135º and ∠PQT = 110º, find ∠PRQ.

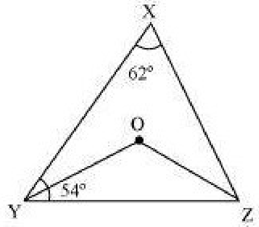


Answer 1:

It is given that,
∠SPR = 135° and ∠PQT = 110°
∠SPR + ∠QPR = 180° (Linear pair angles)
⇒ 135° + ∠QPR = 180°
⇒ ∠QPR = 45°
Also, ∠PQT + ∠PQR = 180° (Linear pair angles)
⇒ 110° + ∠PQR = 180°
⇒ ∠PQR = 70°
As the sum of all interior angles of a triangle is 180°, therefore, for ΔPQR,
∠QPR + ∠PQR + ∠PRQ = 180°
⇒ 45° + 70° + ∠PRQ = 180°
⇒ ∠PRQ = 180° − 115°
⇒ ∠PRQ = 65°

Question 2:

In the given figure, ∠X = 62°, ∠XYZ = 54°. If YO and ZO are the bisectors of ∠XYZ and ∠XZY respectively of ΔXYZ, find ∠OZY and ∠YOZ.

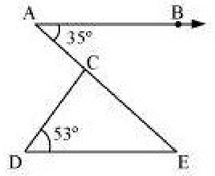


Answer 2:

As the sum of all interior angles of a triangle is 180°, therefore, for ΔXYZ,
∠X + ∠XYZ + ∠XZY = 180°
62° + 54° + ∠XZY = 180°
∠XZY = 180° − 116°
∠XZY = 64°
∠OZY = $\frac{64}{2}$ = 32° (OZ is the angle bisector of ∠XZY)
Similarly, ∠OYZ = $\frac{54}{2}$ = 27°
Using angle sum property for ΔOYZ, we obtain
∠OYZ + ∠YOZ + ∠OZY = 180°
27° + ∠YOZ + 32° = 180°
∠YOZ = 180° − 59°
∠YOZ = 121°

Question 3:

In the given figure, if AB || DE, ∠BAC = 35° and ∠CDE = 53°, find ∠DCE.

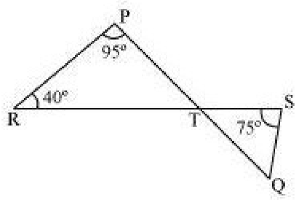


Answer 3:

AB || DE and AE is a transversal.
∠BAC = ∠CED (Alternate interior angles)
∴ ∠CED = 35°
In ΔCDE,
∠CDE + ∠CED + ∠DCE = 180° (Angle sum property of a triangle)
53° + 35° + ∠DCE = 180°
∠DCE = 180° − 88°
∠DCE = 92°

Question 4:

In the given figure, if lines PQ and RS intersect at point T, such that ∠PRT = 40°, ∠RPT = 95° and ∠TSQ = 75°, find ∠SQT.

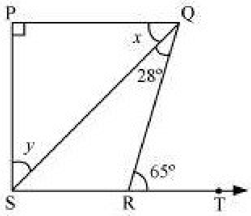


Answer 4:

Using angle sum property for ΔPRT, we obtain
∠PRT + ∠RPT + ∠PTR = 180°
40° + 95° + ∠PTR = 180°
∠PTR = 180° − 135°
∠PTR = 45°
∠STQ = ∠PTR = 45° (Vertically opposite angles)
∠STQ = 45°
By using angle sum property for ΔSTQ, we obtain
∠STQ + ∠SQT + ∠QST = 180°
45° + ∠SQT + 75° = 180°
∠SQT = 180° − 120°
∠SQT = 60°

Question 5:

In the given figure, if PQ ⊥ PS, PQ || SR, ∠SQR = 28° and ∠QRT = 65°, then find the values of x and y.

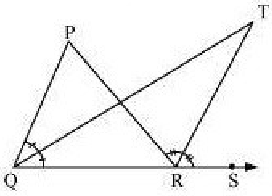


Answer 5:

It is given that PQ || SR and QR is a transversal line.
∠PQR = ∠QRT (Alternate interior angles)
$x + 28° = 65°$
$x = 65° - 28°$
$x = 37°$
By using the angle sum property for ΔSPQ, we obtain
∠SPQ + $x + y = 180°$
$90° + 37° + y = 180°$
$y = 180° - 127°$
$y = 53°$
$\therefore x = 37°$ and $y = 53°$

Question 6:

In the given figure, the side QR of ΔPQR is produced to a point S. If the bisectors of ∠PQR and ∠PRS meet at point T, then prove that ∠QTR= $\frac{1}{2}$ ∠QPR.



Answer 6:

In ΔQTR, ∠TRS is an exterior angle.
∴ ∠QTR + ∠TQR = ∠TRS
∠QTR = ∠TRS − ∠TQR (1)
For ΔPQR, ∠PRS is an external angle.
∴ ∠QPR + ∠PQR = ∠PRS
∠QPR + 2∠TQR = 2∠TRS (As QT and RT are angle bisectors)
∠QPR = 2(∠TRS − ∠TQR)
∠QPR = 2∠QTR [By using equation (1)]
∠QTR = $\frac{1}{2}$ ∠QPR