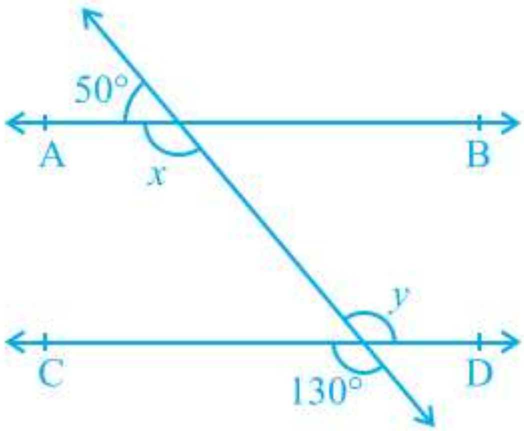
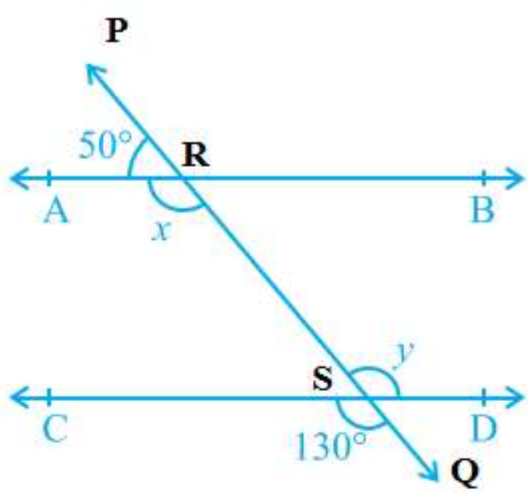
Lines and Angles: Exercise 6.2

Q.1 In figure, find the values of x and y and then show that AB || CD.

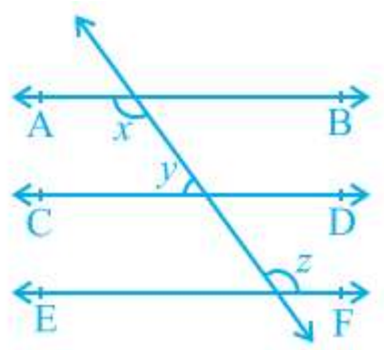


Sol. Given: AB || CD and transversal PQ intersects them at R and S respectively.
So, ∠ARS = ∠RSD (Alternate interior angles)

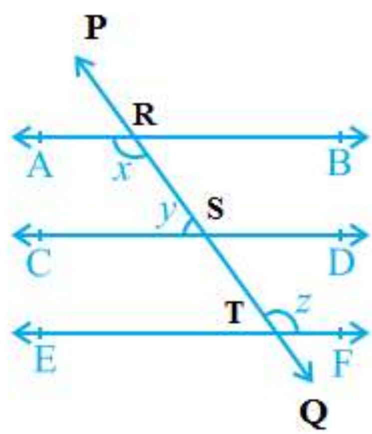


⇒ x = y
But ∠RSD=∠CSQ (Vertically opposite angles)
⇒ y = 130° (Given: ∠CSQ = 130°)
Thus, x = y = 130°

Q.2 In figure, if AB || CD, CD|| EF and y : z = 3 : 7 , find x.

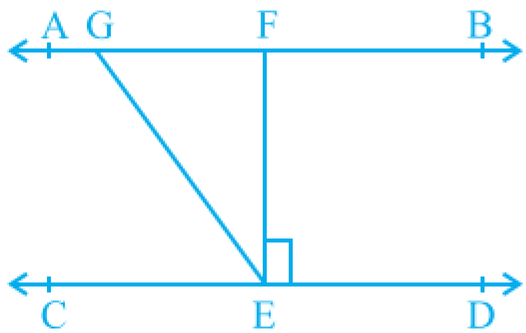


Sol. Given: CD|| EF and transversal PQ intersects them at S and T respectively.
So, ∠CST = ∠STF (Alternate interior angles)
⇒ 180° – y = z (Since, ∠y + ∠CST = 180° linear pair angles]
⇒ y + z = 180°
Given y : z = 3 : 7
The sum of ratios = 3 + 7 = 10



So, $y = \frac{3}{10} \times 180^\circ$
$= 3 \times 18^\circ = 54^\circ$
and $z = \frac{7}{10} \times 180^\circ$
$= 7 \times 18^\circ = 126^\circ$
Now, AB || CD and transversal PQ intersects them at R and S respectively.
So, ∠ARS + ∠RSC = 180° (Since, consecutive interior angles are supplementary)
⇒ x + y = 180°
⇒ x = 180° – y
= 180° – 54°
= 126° (Since, y = 54°o
Thus, x = 126°

Q.3 In figure, if AB || CD, EF ⊥ CD and ∠GED = 126°, find ∠AGE, ∠GEF and ∠FGE.



Sol. Given: AB || CD and transversal GE intersects them at points G and E respectively.

So, $\angle AGE = \angle GED$ (Alternate interior angles)

$\Rightarrow \angle AGE = 126^\circ$ (Given $\angle GED = 126^\circ$)

$\angle GEF = \angle GED - \angle FED$

$= 126^\circ - 90^\circ$

$= 36^\circ$

and, $\angle FGE = \angle GEC$ (Alternate interior angles)

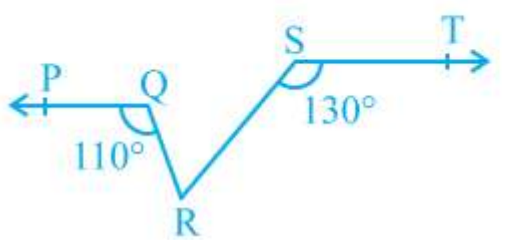
$\Rightarrow \angle FGE = 90^\circ - \angle GEF$

$= 90^\circ - 36^\circ$

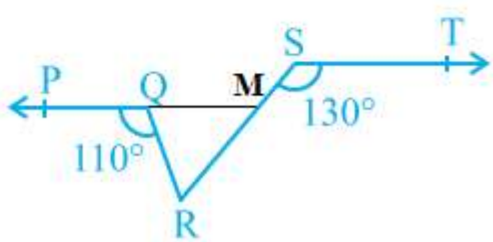
$= 54^\circ$

Thus, $\angle AGE = 126^\circ$, $\angle GEF = 36^\circ$ and $\angle FGE = 54^\circ$

Q.4 In figure, if PQ || ST, $\angle PQR = 110^\circ$ and $\angle RST = 130^\circ$, find $\angle QRS$.



Sol. If we produce PQ to intersect SR at point M as shown in figure.



From figure, PM || ST and transversal SM intersects them at M and R respectively.

So, $\angle SMQ = \angle TSM$ (Alternate interior angles)

$\Rightarrow \angle SMQ = 130^\circ$ (given: $\angle TSM = 130^\circ$)

Since $\angle SMQ + \angle QMR = 180^\circ$ (linear pairs angles)

$\Rightarrow \angle QMR = 180^\circ - 130^\circ$

$= 50^\circ$

From figure, ray RQ stands on PM at Q.

So, $\angle PQR + \angle RQM = 180^\circ$ (linear pairs angles)

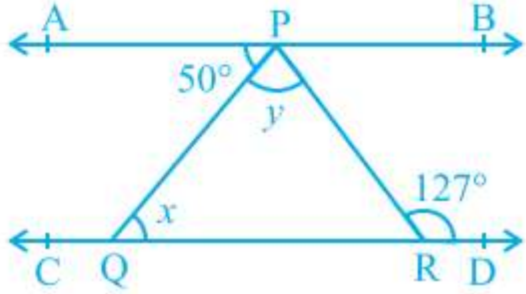
$\Rightarrow 110^\circ + \angle RQM = 180^\circ$

$\Rightarrow \angle RQM = 180^\circ - 110^\circ = 70^\circ$

So, $\angle QRS = 180^\circ - (70^\circ + 50^\circ)$

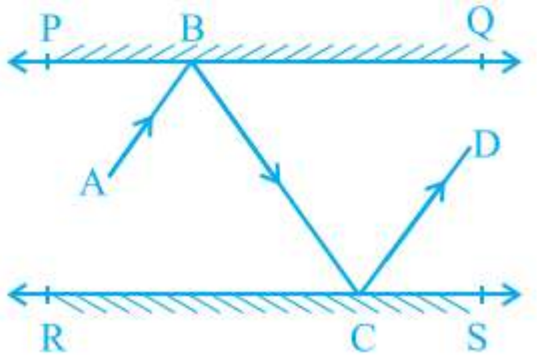
$= 60^\circ$ (Since, sum of the angles of a triangle = 180°)

Q.5 In figure, if AB || CD, ∠APQ = 50° and ∠PRD = 127°, find x and y.

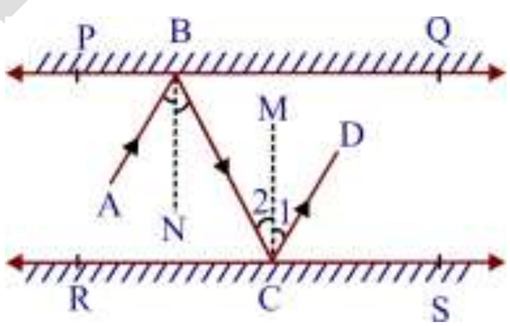


Sol. Given: AB || CD and transversal PQ intersects them at P and Q respectively.
So, ∠PQR = ∠APQ (Alternate interior angles)
⇒ x = 50° (Given ∠APQ = 50°)
Now, AB || CD and transversal PR intersects them at P and R respectively.
So, ∠APR = ∠PRD (Alternate interior angles)
⇒ ∠APQ + ∠QPR = 127° (Given: ∠PRD = 127°]
⇒ 50° + y = 127° (Given: ∠APQ = 50°)
⇒ y = 127° – 50° = 77°
Thus, x = 50° and y = 77°

Q.6 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. Given: Two plane mirrors PQ and RS are placed parallel to each other. An incident ray AB after reflection follows the path BC.



Draw the BN and CM are the normals to the plane mirrors PQ and RS respectively.
Since BN ⊥ PQ, CM ⊥ RS and PQ || RS
So, BN ⊥ RS
⇒ BN || CM
Therefore, BN and CM are two parallel lines and transversal BC intersects them at B and C respectively.
So, ∠2 = ∠3 (Alternative interior angles)

But, ∠1 = ∠2 and ∠3 = ∠4 (From the laws of reflection)
So,, ∠1 + ∠2 = ∠2 + ∠2 and ∠3 + ∠4 = ∠3 + ∠3
⇒ ∠1 + ∠2 = 2(∠2) and ∠3 + ∠4 = 2(∠3)
⇒ ∠1 + ∠2 = ∠3 + ∠4 (Since, ∠2 = ∠3 ⇒ 2(∠2) = 2(∠3))
⇒ ∠ABC=∠BCD
Therefore, lines AB and CD are intersected by transversal BC such that -
So, ∠ABC = ∠BCD (Since, alternate interior angles are equal)
Thus, AB || CD................Hence Proved.