Exercise: 6.2 **(Page No: 103)**

1. In Fig. 6.28, find the values of x and y and then show that AB || CD.

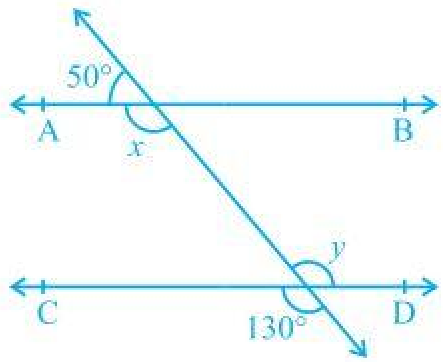


Fig. 6.28

Solution:

We know that a linear pair is equal to 180°.

So, x + 50° = 180°

∴ x = 130°

We also know that vertically opposite angles are equal.

So, y = 130°

In two parallel lines, the alternate interior angles are equal. In this,

x = y = 130°

This proves that alternate interior angles are equal and so, AB || CD.

2. In Fig. 6.29, if AB || CD, CD || EF and y : z = 3 : 7, find x.

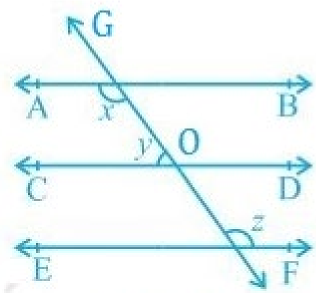


Fig. 6.29

Solution:

It is known that AB // CD and CD //EF

As the angles on the same side of a transversal line sums up to 180°,

x + y = 180° -----(i)

Also,

∠O = z (Since they are corresponding angles)

and, y + ∠O = 180° (Since they are a linear pair)

So, y + z = 180°

Now, let y = 3w and hence, z = 7w (As y : z = 3 : 7)

∴ 3w + 7w = 180°

Or, 10 w = 180°

So, w = 18°

Now, y = 3 × 18° = 54°

and, z = 7 × 18° = 126°

Now, angle x can be calculated from equation (i)

x + y = 180°

Or, x + 54° = 180°

∴ x = 126°

3. In Fig. 6.30, if AB || CD, EF ⊥ CD and ∠GED = 126°, find ∠AGE, ∠GEF and ∠FGE.

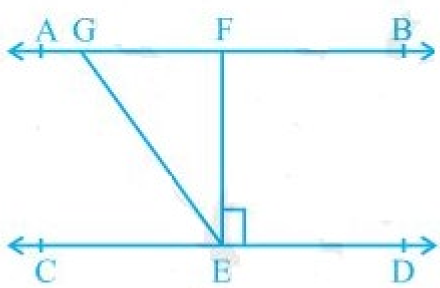


Fig. 6.30

Solution:

Since AB || CD GE is a transversal.

It is given that ∠GED = 126°

So, ∠GED = ∠AGE = 126° (As they are alternate interior angles)

Also,

∠GED = ∠GEF + ∠FED

As

$EF \perp CD$, $\angle FED = 90°$

$\therefore \angle GED = \angle GEF + 90°$

Or, $\angle GEF = 126 - 90° = 36°$

Again, $\angle FGE + \angle GED = 180°$ (Transversal)

Putting the value of $\angle GED = 126°$ we get,

$\angle FGE = 54°$

So,

$\angle AGE = 126°$

$\angle GEF = 36°$ and

$\angle FGE = 54°$

4. In Fig. 6.31, if PQ || ST, $\angle PQR = 110°$ and $\angle RST = 130°$, find $\angle QRS$.
[Hint : Draw a line parallel to ST through point R.]

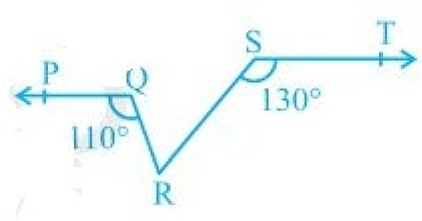
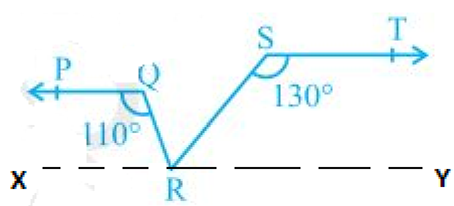


Fig. 6.31

Solution:

First, construct a line XY parallel to PQ.



We know that the angles on the same side of transversal is equal to 180°.

So, $\angle PQR + \angle QRX = 180°$

Or, $\angle QRX = 180° - 110°$

$\therefore \angle QRX = 70°$

Similarly,

$\angle RST + \angle SRY = 180°$

Or, $\angle SRY = 180° - 130°$

$\therefore \angle SRY = 50°$

Now, for the linear
pairs on the line XY-

$\angle QRX + \angle QRS + \angle SRY = 180°$

Putting their respective values we get,

$\angle QRS = 180° - 70° - 50°$

Or, $\angle QRS = 60°$

5. In Fig. 6.32, if AB || CD, $\angle APQ = 50°$ and $\angle PRD = 127°$, find x and y.

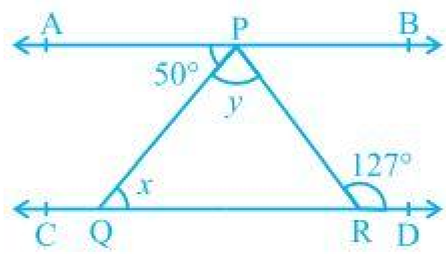


Fig. 6.32

Solution:

From the diagram,

$\angle APQ = \angle PQR$ (Alternate interior angles)

Now, putting the value of $\angle APQ = 50°$ and $\angle PQR = x$ we get,

x = 50°

Also,

$\angle APR = \angle PRD$ (Alternate interior angles)

Or, $\angle APR = 127°$ (As it is given that $\angle PRD = 127°$)

We know that

$\angle APR = \angle APQ + \angle QPR$

Now, putting values of $\angle QPR = y$ and $\angle APR = 127°$ we get,

127° = 50° + y

Or, y = 77°

Thus, the values of x and y are calculated as:

x = 50° and

y = 77°

6. In Fig. 6.33, 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.

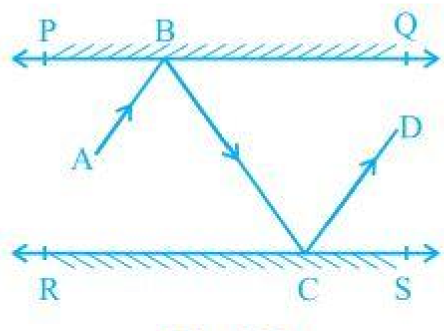


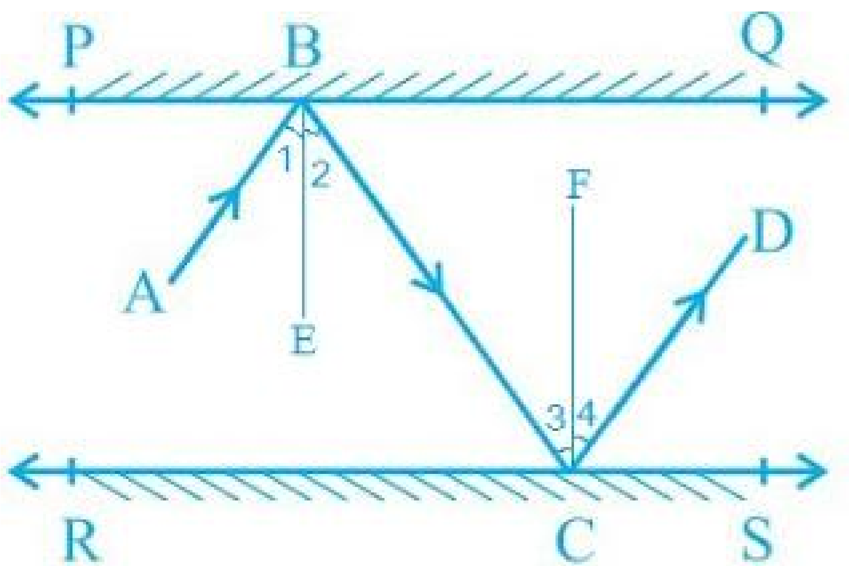
Fig. 6.33

Solution:

First, draw two lines BE and CF such that BE ⊥ PQ and CF ⊥ RS.

Now, since PQ || RS,

So, BE || CF



We know that,

Angle of incidence = Angle of reflection (By the law of reflection)

So,

$\angle 1 = \angle 2$ and

$\angle 3 = \angle 4$

We also know that alternate interior angles are equal. Here, BE ⊥ CF and the transversal line BC cuts them at B and C

So, $\angle 2 = \angle 3$ (As they are alternate interior angles)

Now, $\angle 1 + \angle 2 = \angle 3 + \angle 4$

Or, $\angle ABC = \angle DCB$

So, AB // CD (alternate interior angles are equal)