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

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

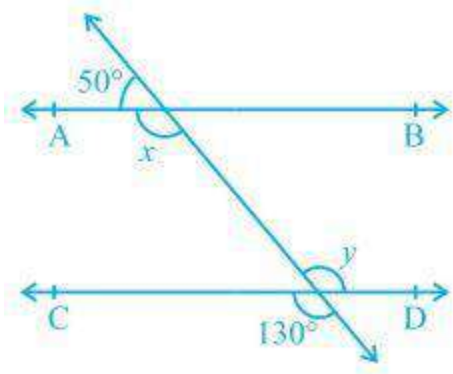


Fig. 6.28

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.

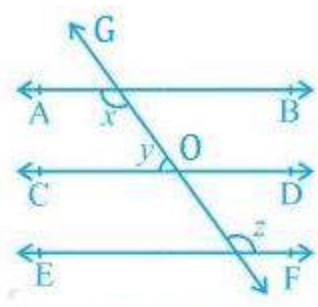


Fig. 6.29

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.

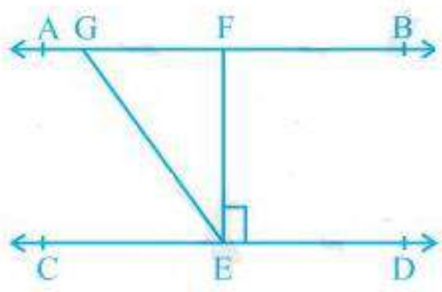


Fig. 6.30

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⊥ CD, ∠FED = 90°

∴ ∠GED = ∠GEF+90°

Or, ∠GEF = 126° – 90° = 36°

Again, ∠FGE +∠GED = 180° (Transversal)

Putting the value of ∠GED = 126° we get,

∠FGE = 54°

So,

∠AGE = 126°

∠GEF = 36° and

∠FGE = 54°

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

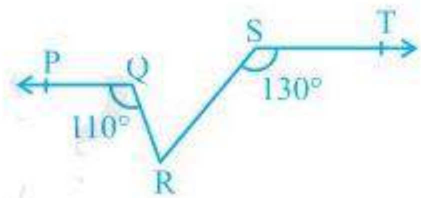
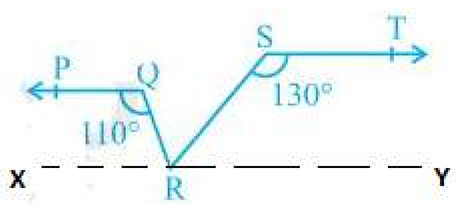


Fig. 6.31

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, ∠PQR+∠QRX = 180°

Or,∠QRX = 180°-110°

∴ ∠QRX = 70°

Similarly,

∠RST +∠SRY = 180°

Or, ∠SRY = 180°- 130°

∴ ∠SRY = 50°

Now, for the linear pairs on the line XY-

∠QRX+∠QRS+∠SRY = 180°

Putting their respective values, we get,

∠QRS = 180° - 70° - 50°

Hence, ∠QRS = 60°

5. In Fig. 6.32, if AB ∥ CD, ∠APQ = 50° and ∠PRD = 127°, find x and y.

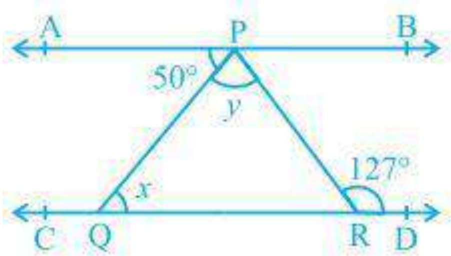


Fig. 6.32

Solution:

From the diagram,

∠APQ = ∠PQR (Alternate interior angles)

Now, putting the value of ∠APQ = 50° and ∠PQR = x we get,

x = 50°

Also,

∠APR = ∠PRD (Alternate interior angles)

Or, ∠APR = 127° (As it is given that ∠PRD = 127°)

We know that

∠APR = ∠APQ+∠QPR

Now, putting values of ∠QPR = y and ∠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 ǁ CD.

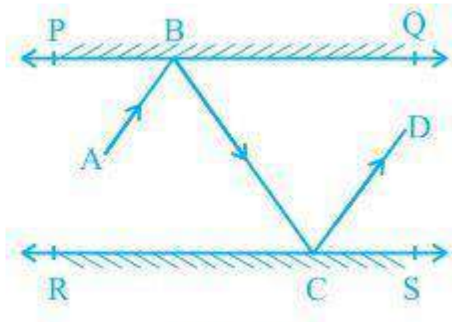


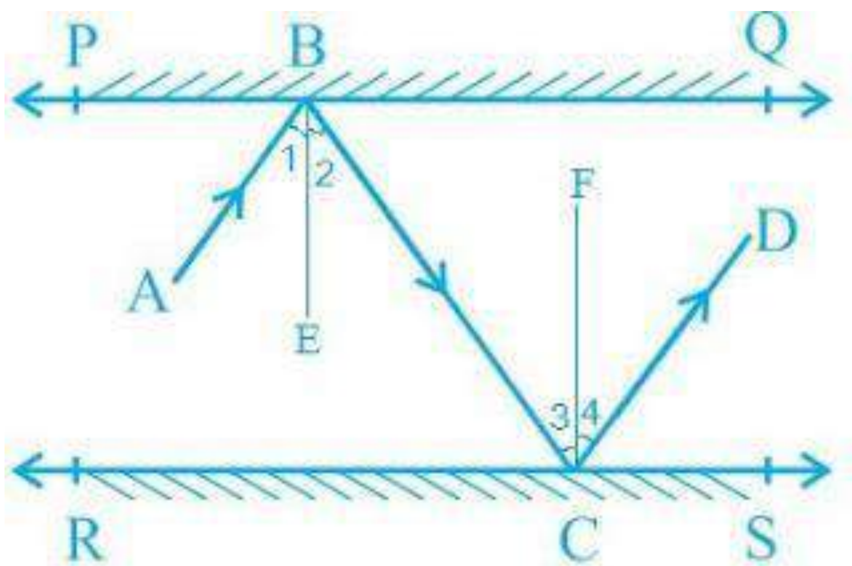
Fig. 6.33

Solution:

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

Now, since PQ ǁ RS,

So, BE ǁ 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 $\parallel$ CD alternate interior angles are equal)