Chapter 6
Lines and Angles
Exercise 6.2

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

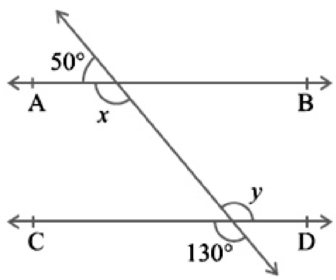


Fig. 6.28

Answer:

From the figure:

$x + 50^o = 180^o$ (Linear pair)

$x = 180^o - 50^o$

$x = 130^o$

And,

$y = 130^o$ (Vertically opposite angles)

Now,

$x = y = 130^o$ (Alternate interior angles)

Hence,

The theorem says that when the lines are parallel, that the alternate interior angles are equal. And thus the lines must be parallel.

AB ∥ CD

Question: 2 In Fig. 6.29, if AB ∥ CD, CD ∥ EF and y : z = 3 : 7, Find x.

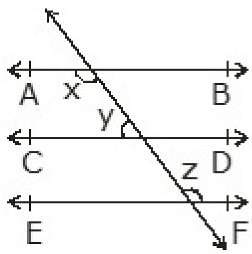
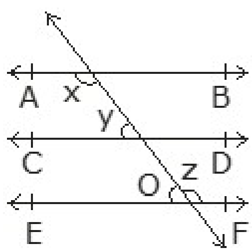


Fig. 6.29

Ans.



It is given in the question that:

AB ∥ CD,

Thus, ∠x + ∠y = 180°

(Interior angles on same side of transversal)

(1) Also,AB ∥ CD and CD ∥ EF

Thus, AB ∥ EF

⇒ ∠x = ∠z (Alternate interior angles)

(2)From (1) and (2) we can say that,

∠z + ∠y = 180°

(3) [Angles will be supplementary]It is given that,∠y : ∠z = 3 : 7
(4)Let ∠y = 3 a and ∠z = 7

a Putting these values in (2)

3a + 7a = 180°

10a = 180°a

= 18°∠z = 7a

z = 7 x 18°

∠z = 126°

As ∠z = ∠x∠x = 126°

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

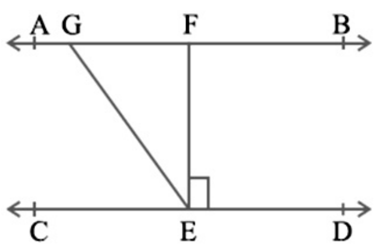


Fig. 6.30

Ans.:

It is given in the question that:

AB ∥ CD

EF perpendicular CD

∠GED = 126^o

Now, according to the question,

∠FED = 90^o (EF perpendicular CD)

Now,

∠AGE = ∠GED (Since, AB parallel CD and GE is transversal, hence alternate interior angles)

Therefore,

∠AGE = 126^o

And,

∠GEF = ∠GED - ∠FED

∠GEF = $126^o – 90^o$

∠GEF = 36^o

Now,

∠FGE + ∠AGE = 180^o (Linear pair)

∠FGE = $180^o – 126^o$

∠FGE = 54^o

Question: 4 In Fig. 6.31, if PQ ∥ ST, ∠ PQR = 110° and∠ RST = 130°, find ∠ QRS.

[Hint: Draw a line parallel to ST through point R.]

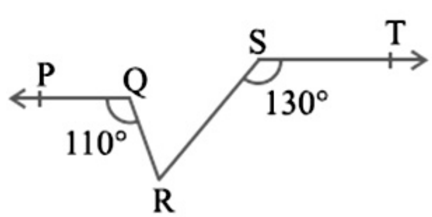


Fig. 6.31

Ans.:

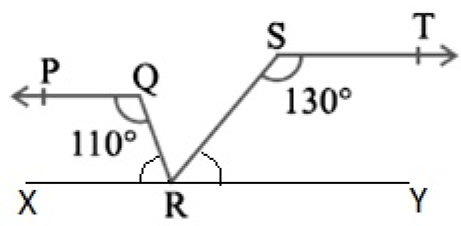
It is given in the question that:

PQ parallel ST,

∠PQR = 110° and,

∠RST = 130°

Construction: Draw a line XY parallel to PQ and ST



∠PQR + ∠QRX = 180° (Angles on the same side of transversal)

110° + ∠QRX = 180°

∠QRX = 70°

And,

∠RST + ∠SRY = 180° (Angles on the same side of transversal)

130° + ∠SRY = 180°

∠SRY = 50°

Now,

∠QRX + ∠SRY + ∠QRS = 180° (Angle made on a straight line)

70° + 50° + ∠QRS = 180°

∠QRS = 60°

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

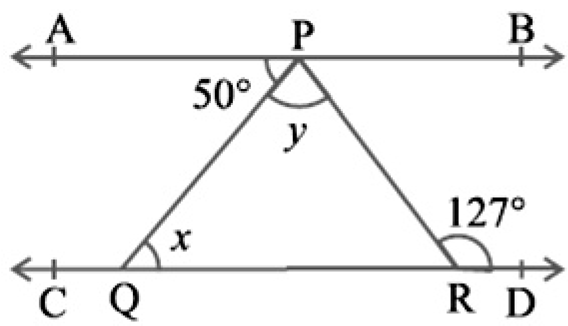


Fig. 6.32

Ans.;

It is given in the question that:

AB parallel CD,

$\angle APQ = 50^o$ and,

$\angle PRD = 127^o$

According to question,

$x = 50^o$ (Alternate interior angle)

$\angle PRD + \angle PRQ = 180^o$ (Angles on the straight line are supplementary)

$127^o + \angle PRQ = 18^{0o}$

$\angle PRQ = 53^o$

Now,

In Δ PQR,

$x + y + \angle PRQ = 180^o$ (Sum of interior angles of a triangle)

$y + 50^o + \angle PRQ = 180^o$

$y + 50^o + 53^o = 180^o$

$y + 103^o = 180^o$

y = 77°

Question: 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.

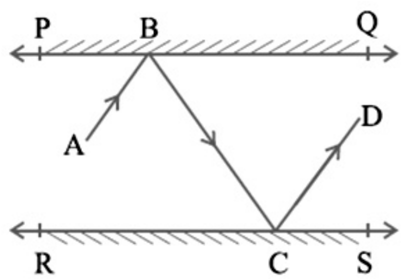


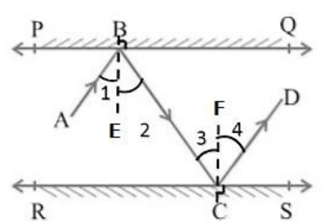
Fig. 6.33

Ans.:

Given: Two mirrors are parallel to each other, PQ∥RS

To Prove: AB ∥ CD

Proof:



Take two perpendiculars BE and CF, As the mirrors are parallel to each other their perpendiculars will also be parallel thus BE ∥ CF

According to laws of reflection, we know that:

Angle of incidence = Angle of reflection

∠1 = ∠2 and,

∠3 = ∠4 (i)

And,

$\angle 2 = \angle 3$ (Alternate interior angles, since BE, is parallel to CF and a trasversal line BC cuts them at B and C respectively) (ii)

We need to prove that $\angle ABC = \angle DCB \angle ABC = \angle 1 + \angle 2$ and $\angle DCB = \angle 3 + \angle 4$

From (i) and (ii), we get

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

$\Rightarrow \angle ABC = \angle DCB$

$\Rightarrow$ AB parallel CD (Alternate interior angles)

Hence, Proved.