Question 1.
(i) Can two right angles be complementary?
(ii) Can two right angles be supplementary?
(iii) Can two adjacent angles be complementary?
(iv) Can two adjacent angles be supplementary?
(v) Can two obtuse angles be adjacent?
(vi) Can an acute angle be adjacent to an obtuse angle?
(vii) Can two right angles form a linear pair?
Solution:
(i) No, as the sum of two complementary angles is 90°.
(ii) Yes.
(iii) Yes.
(iv) Yes.
(v) Yes.
(vi) Yes.
(vii) Yes.

Question 2.

Find the complement of each of the following angles:

Solution:

(i) Complement of 25° = 90° − 25° = 65°

(ii) Complement of 63° = 90° − 63° = 27°

(iii) Complement of 57° = 90° − 57° = 33°

Question 3.

Find the supplement of each of the following angles:

Solution:

(i) Supplement of 105° is 180° − 105° = 75°

(ii) Supplement of 875° is 180° − 87° = 93°

(iii) Supplement of 142° is 180° − 142° = 38°

Question 4.

Identify which of the following pairs of angles are complementary and which are supplementary:

(i) 55°, 125°

(ii) 34°, 56°

(iii) 137°, 43°

(iv) 112°, 68°

(v) 45°, 45°

(vi) 72°, 18°

Solution:

(i) 55°, 125° are supplementary.

(ii) 34°, 56° are complementary.

(iii) 137°, 43° are supplementary.

(iv) 112°, 68° are supplementary.

(v) 45°, 45° are complementary.

(vi) 12°, 18° are complementary.

Question 5.

(i) Find the angle which is equal to its complement.

(ii) Find the angle which is equal to its supplement.

Solution:

(i) $\frac{90}{2} = 45°$

45° is complement to 45°

(ii) $\frac{180}{2} = 90°$

90° is supplement to 90°

Question 6.

Two complementary angles are $(x + 4)°$ and $(2x - 7)°$, find the value of x.

Solution:

$(x + 4)°$ and $(2x - 7)°$ are complementary angles

$x + 4 + 2x - 7 = 90°$

$\Rightarrow 3x - 3 = 90°$

$\Rightarrow 3x = 90° + 3 = 93°$

$x = 31°$

Question 7.

Two supplementary angles are in the ratio of 2 : 7, find the angles.

Solution:

Two supplementary angles in the ratio 2 : 7 and sum is 180°

$$\therefore \text{ First angle} = \frac{180°}{2+7} \times 2 = \frac{180°}{9} \times 2 = 40°$$

$$\text{and second angle} = \frac{180°}{9} \times 7 = 140°$$

Question 8.

Among two supplementary angles, the measure of the longer angle is 44° more than the measure of the smaller angle. Find their measures.

Solution:

Sura of two supplementary angles = 180°

Let smaller angle = x Then second angle = x + 44°

$x + x + 44° = 18°$

$\Rightarrow 2x = 180° - 44° = 136°$

$\Rightarrow 2x = 136°$

$\Rightarrow x = 68°$

One angle = 68°

and second angle = 68° + 44° = 112°

Question 9.

If an angle is half of its complement, find the measure of angles.

Solution:

Sum of complementary angles = 90°

Let on angle = x°

Then second angle = $\frac{x}{2}$

$x + \frac{x}{2} = 90°$

$\Rightarrow \frac{3x}{2} = 90°$

$\Rightarrow 3x = 90° \times 2 = 180°$

$\Rightarrow x = 60°$

One angle = 60°

and the other angle = $\frac{60}{2} = 30°$

Angles are 30°, 60°

Question 10.

Two adjacent angles are in the ratio 5 : 3 and they together form an angle of 128°, find these angles.

Solution:

Sum of two adjacent angles = 128°

and ratio between them = 5 : 3

Let first angle = 5x

Then second angle = 3x

5x + 3x = 128°

$\Rightarrow$ 8x = 128°

$\Rightarrow$ x = 16°
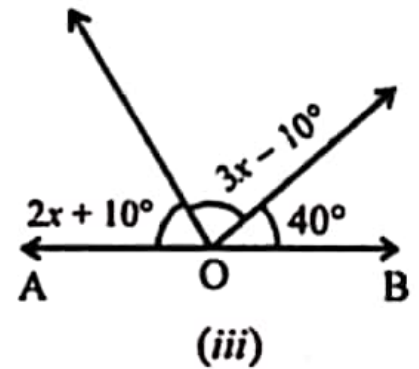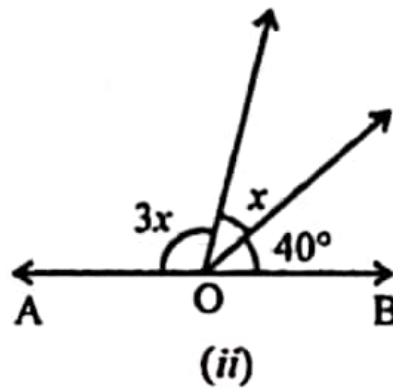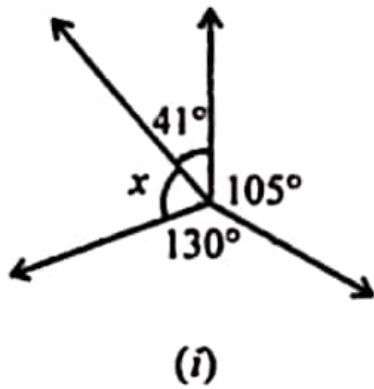
First angle = 5x = 5 × 16° = 80°

and second angle = 3x = 3 × 16 = 48°

Question 11.

Find the value of x in each of the following diagrams:

(i)   (ii)   (iii)

Solution:

In the given figure,

(i) $105° + 41° + x° + 130° = 360°$

(Angles at a point)

$\Rightarrow 276° + x = 360°$

$\Rightarrow X = 360° - 276° = 84°$

$\Rightarrow X = 84°$

(ii) In the given figure,

$3x + x + 40° = 180°$

(Angles on one side of a straight line)

$\Rightarrow 4x = 180° - 40° = 140°$

$\Rightarrow X = 35°$

(iii) In the given figure,

$2x + 10 + 3x - 10 + 40 = 180°$

(Angles on one side of a straight line)

$\Rightarrow 5x + 40° = 180°$
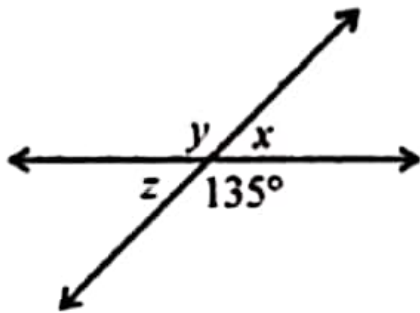
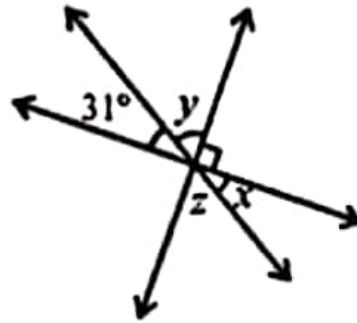$\Rightarrow 5x = 180° - 40° = 140°$

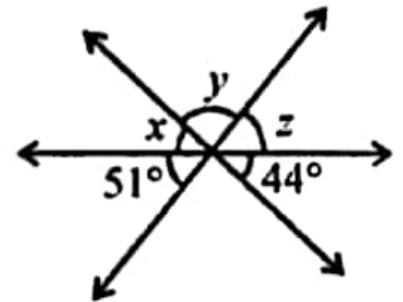$\Rightarrow x = 28°$

Question 12.

Find the values of x, y and z in each of the following diagrams:

(i)   (ii)   (iii)

Solution:

(i) In the given figure,

Given $z = 135°$

$y = 135°$ (Vertically opposite angles)

But $x + y = 180°$ (Linear pair)

$\Rightarrow x + 135° = 180°$

$\Rightarrow x = 180° - 135° = 45°$

But $z = x$ (Vertically opposite angles)

$z = 45°$

Hence, $x = 45°$, $y = 135°$, $z = 45°$

(ii) In the given figure,

Given $\angle = 31°$

x = 31° (Vertically opposite angles)

But 31° + y + 90° = 180°

(Angles on one side of a straight line)

$\Rightarrow$ y + 121° = 180°

$\Rightarrow$ y = 180° − 121° = 59°

But z = y (Vertically opposite angles)

z = 59°

Hence, x = 31°, y = 59°, z = 59°

(iii) In the given figure,

Given $\angle$s are 51° and 44°

Let $\angle 1 = 44°$ and $\angle 2 = 51°$

x = 44° (Vertically opposite angles)

and $\angle 2 = \angle z$, z = 51° (Vertically opposite angles)

$\angle 1 = \angle x$

But x + y + z = 180° (Angles on one side of a line)

$\Rightarrow$ 44° + 51° + y = 180°

$\Rightarrow$ 95° + y = 180°

$\Rightarrow$ y = 180° − 95° = 85°

y = 85°, z = 51°
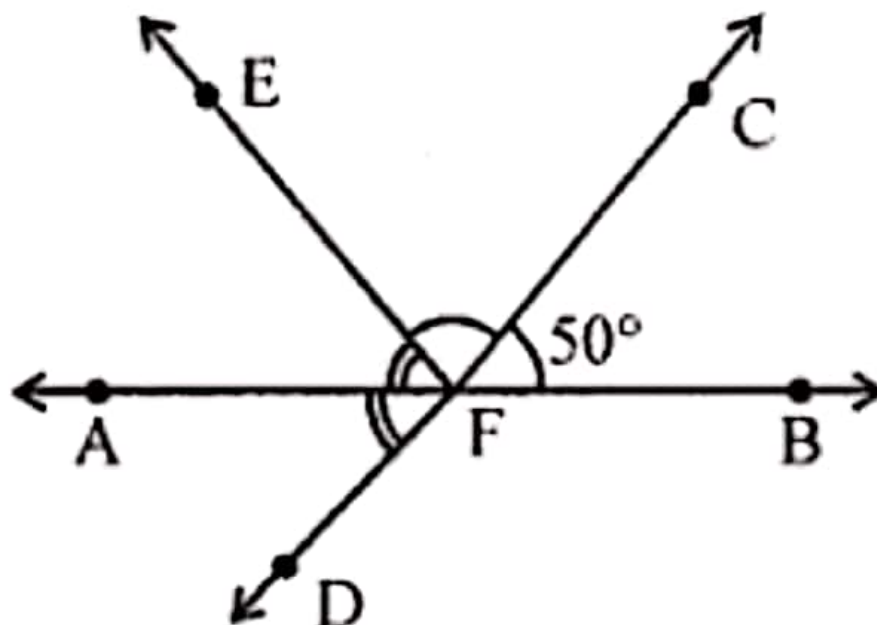
Hence, x = 44°, y = 85°, z = 51°

Question 13.

In the given figure, lines AB and CD intersect at F. If $\angle EFA = \angle AFD$ and $\angle CFB = 50°$, find $\angle EFC$.
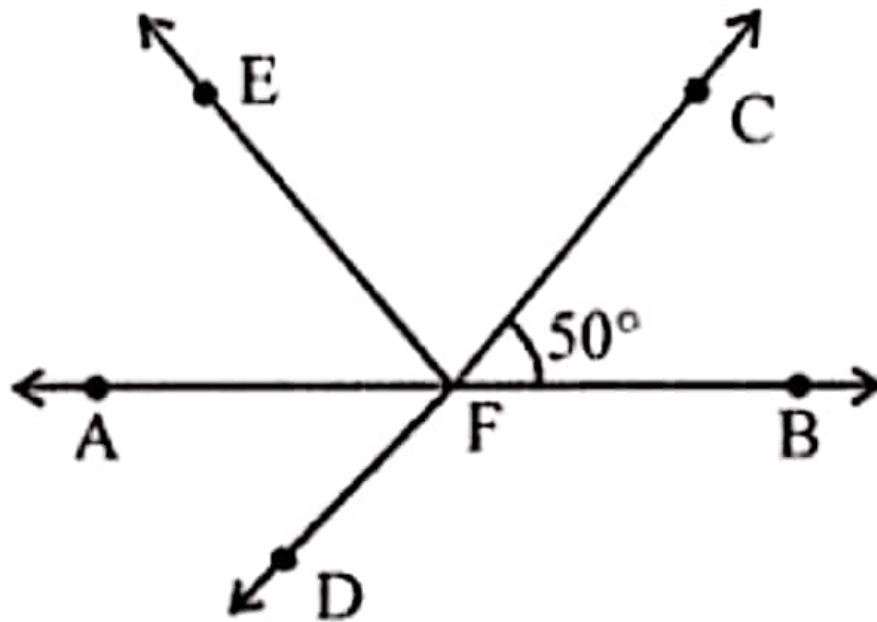
Solution:

In the given figure,

AB and CD intersect each other at F.

$\angle EFA = \angle AFD$ and $\angle CFB = 50°$

To find : $\angle EFC$

$\angle AFD = \angle BFC = 50°$ (Vertically opposite angles)

But $\angle EFA = \angle AFD$ (given) $= 50°$

Now, $\angle EFA + \angle EFC + \angle CFB = 180°$

(Angles on one side of straight line)

$\Rightarrow 50° + \angle EFC + 50° = 180°$

$\Rightarrow \angle EFC + 100° = 180°$

$\Rightarrow \angle EFC = 180° - 100° = 80°$

$\Rightarrow \angle EFC = 80°$