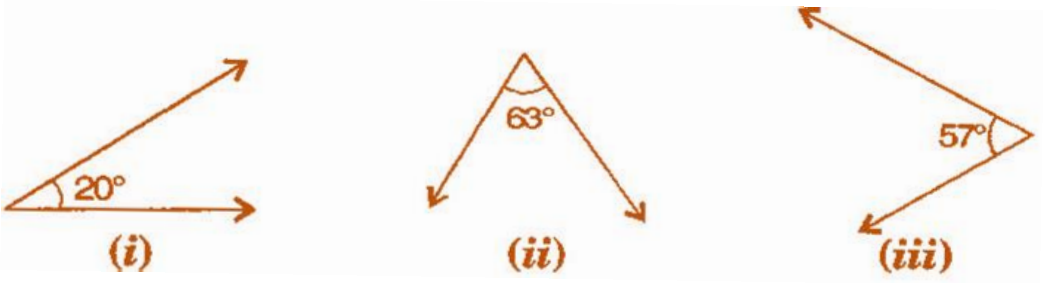
Exercise 5.1

Question 1:

Find the complement of each of the following angles:



Answer 1:

Complementary angle = 90° – given angle

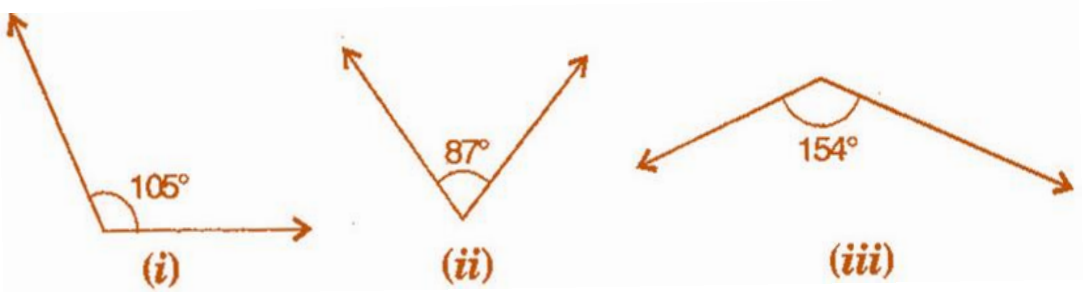
(i) Complement of $20^\circ = 90^\circ - 20^\circ = 70^\circ$

(ii) Complement of $63^\circ = 90^\circ - 63^\circ = 27^\circ$

(iii) Complement of $57^\circ = 90^\circ - 57^\circ = 33^\circ$

Question 2:

Find the supplement of each of the following angles:



Answer 2:

Supplementary angle = 180° – given angle

(i) Supplement of $105^\circ = 180^\circ - 105^\circ = 75^\circ$

(ii) Supplement of $87^\circ = 180^\circ - 87^\circ = 93^\circ$

(iii) Supplement of $154^\circ = 180^\circ - 154^\circ = 26^\circ$

Question 3:

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

(i) $65°, 115°$ (ii) $63°, 27°$ (iii) $112°, 68°$

(iv) $130°, 50°$ (v) $45°, 45°$ (vi) $80°, 10°$

Answer 3:

If sum of two angles is 180°, then they are called supplementary angles.

If sum of two angles is 90°, then they are called complementary angles.

(i) $65° + 115° = 180°$ These are supplementary angles.

(ii) $63° + 27° = 90°$ These are complementary angles.

(iii) $112° + 68° = 180°$ These are supplementary angles.

(iv) $130° + 50° = 180°$ These are supplementary angles.

(v) $45^\circ + 45^\circ = 90^\circ$ These are complementary angles.

(vi) $80° + 10° = 90°$ These are complementary angles.

Question 4:

Find the angle which is equal to its complement.

Answer 4:

Let one of the two equal complementary angles be x.

$\therefore \quad x + x = 90^\circ$

$\Rightarrow \quad 2x = 90^\circ$

$\Rightarrow \quad x = \frac{90^\circ}{2} = 45^\circ$

Thus, 45° is equal to its complement.

Question 5:

Find the angle which is equal to its supplement.

Answer 5:

Let x be two equal angles of its supplement.

Therefore, $x + x = 180°$ [Supplementary angles]

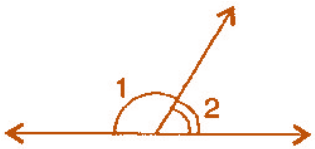
$\Rightarrow \quad 2x = 180°$

$\Rightarrow \quad x = \frac{180°}{2} = 90^\circ$

Thus, 90° is equal to its supplement.

Question 6:

In the given figure, $\angle 1$ and $\angle 2$ are supplementary angles. If $\angle 1$ is decreased, what changes should take place in $\angle 2$ so that both the angles still remain supplementary?



Answer 6:

If $\angle 1$ is decreased then, $\angle 2$ will increase with the same measure, so that both the angles still remain supplementary.

Question 7:

Can two angles be supplementary if both of them are:

(i) acute (ii) obtuse (iii) right?

Answer 7:

(i) No, because sum of two acute angles is less than 180°.

(ii) No, because sum of two obtuse angles is more than 180°.

(iii) Yes, because sum of two right angles is 180°.

Question 8:

An angle is greater than 45°. Is its complementary angle greater than 45° or equal to 45° or less than 45° ?

Answer 8:

Let the complementary angles be x and y, i.e., $x + y = 90^\circ$

It is given that $x > 45^\circ$

Adding y both sides, $x + y > 45^\circ + y$

$\Rightarrow \quad 90^\circ > 45^\circ + y$

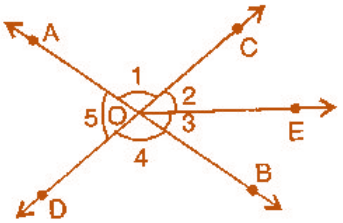
$\Rightarrow \quad 90^\circ - 45^\circ > y$

$\Rightarrow \quad y < 45^\circ$

Thus, its complementary angle is less than 45°.

Question 9:

In the adjoining figure:



(i) Is $\angle 1$ adjacent to $\angle 2$?

(ii) Is $\angle AOC$ adjacent to $\angle AOE$?

(iii) Do $\angle COE$ and $\angle EOD$ form a linear pair?

(iv) Are $\angle BOD$ and $\angle DOA$ supplementary?

(v) Is $\angle 1$ vertically opposite to $\angle 4$?

(vi) What is the vertically opposite angle of $\angle 5$?

Answer 9:

(i) Yes, in $\angle AOE$, OC is common arm.

(ii) No, they have no non-common arms on opposite side of common arm.

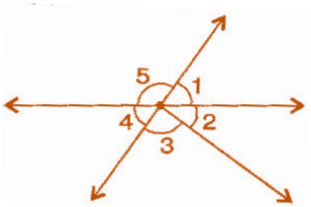
(iii) Yes, they form linear pair.

(iv) Yes, they are supplementary.

(v) Yes, they are vertically opposite angles.

(vi) Vertically opposite angles of $\angle 5$ is $\angle COB$.

Question 10:



Indicate which pairs of angles are:

(i) Vertically opposite angles?

(ii) Linear pairs?

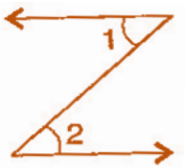
Answer 10:

(i) Vertically opposite angles, $\angle 1$ and $\angle 4$; $\angle 5$ and $\angle 2 + \angle 3$.

(ii) Linear pairs $\angle 1$ and $\angle 5$; $\angle 5$ and $\angle 4$.

Question 11:

In the following figure, is $\angle 1$ adjacent to $\angle 2$? Give reasons.

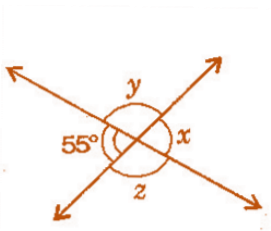


Answer 11:

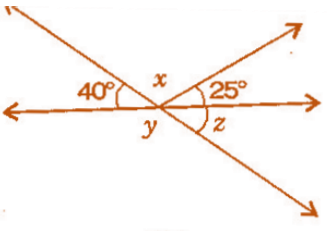
$\angle 1$ and $\angle 2$ are not adjacent angles because their vertex is not common.

Question 12:

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



(i)



(ii)

Answer 12:

(i) $x = 55°$ [Vertically opposite angles]

Now $55° + y = 180°$ [Linear pair]

$\Rightarrow$ $y = 180° - 55° = 125°$

Also $y = z = 125°$ [Vertically opposite angles]

Thus, $x = 55°, y = 125°$ and $z = 125°$.

(ii) $40° + x + 25° = 180°$ [Angles on straight line]

$\Rightarrow$ $65° + x = 180°$

$\Rightarrow$ $x = 180° - 65° = 115°$

Now $40° + y = 180°$ [Linear pair]

$\Rightarrow$ $y = 180° - 40° = 140°$ .....(i)

Also $y + z = 180°$ [Linear pair]

$\Rightarrow$ $140° + z = 180°$ [From equation (i)]

$\Rightarrow$ $z = 180° - 140° = 40°$

Thus, $x = 115°, y = 140°$ and $z = 40°$.

Question 13:

Fill in the blanks:

(i) If two angles are complementary, then the sum of their measures is _____.

(ii) If two angles are supplementary, then the sum of their measures is _____.

(iii) Two angles forming a linear pair are _____.

(iv) If two adjacent angles are supplementary, they form a _____.

(v) If two lines intersect a point, then the vertically opposite angles are always _____.

(vi) If two lines intersect at a point and if one pair of vertically opposite angles are acute angles, then the other pair of vertically opposite angles are _____.

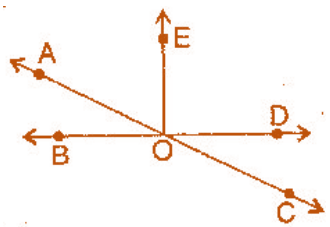
Answer 13:

(i) 90° (ii) 180° (iii) supplementary
(iv) linear pair (v) equal (vi) obtuse angles

Question 14:

In the adjoining figure, name the following pairs of angles:

(i) Obtuse vertically opposite angles.
(ii) Adjacent complementary angles.
(iii) Equal supplementary angles.
(iv) Unequal supplementary angles.
(v) Adjacent angles that do not form a linear pair.



Answer 14:

(i) Obtuse vertically opposite angles means greater than 90° and equal $\angle AOD = \angle BOC$.

(ii) Adjacent complementary angles means angles have common vertex, common arm, non-common arms are on either side of common arm and sum of angles is 90°.

(iii) Equal supplementary angles means sum of angles is 180° and supplement angles are equal.

(iv) Unequal supplementary angles means sum of angles is 180° and supplement angles are unequal.
i.e., $\angle AOE, \angle EOC$; $\angle AOD, \angle DOC$ and $\angle AOB, \angle BOC$

(v) Adjacent angles that do not form a linear pair mean, angles have common ray but the angles in a linear pair are not supplementary.
i.e., $\angle AOB, \angle AOE$; $\angle AOE, \angle EOD$ and $\angle EOD, \angle COD$