

EXERCISE 5.1

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1. Find the complement of each of the following angles:

(i)



Solution:-

Two angles are said to be complementary if the sum of their measures is 90° .

The given angle is 20°

Let the measure of its complement be x° .

Then,

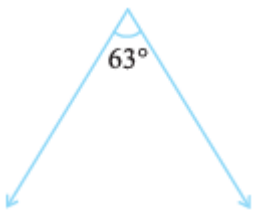
$$= x + 20^\circ = 90^\circ$$

$$= x = 90^\circ - 20^\circ$$

$$= x = 70^\circ$$

Hence, the complement of the given angle measures 70° .

(ii)



Solution:-

Two angles are said to be complementary if the sum of their measures is 90° .

The given angle is 63°

Let the measure of its complement be x° .

Then,

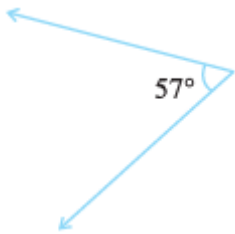
$$= x + 63^\circ = 90^\circ$$

$$= x = 90^\circ - 63^\circ$$

$$= x = 27^\circ$$

Hence, the complement of the given angle measures 27° .

(iii)



Solution:-

Two angles are said to be complementary if the sum of their measures is 90° .

The given angle is 57°

Let the measure of its complement be x° .

Then,

$$= x + 57^\circ = 90^\circ$$

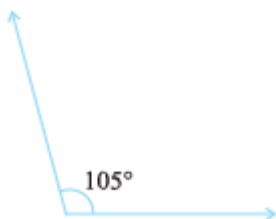
$$= x = 90^\circ - 57^\circ$$

$$= x = 33^\circ$$

Hence, the complement of the given angle measures 33° .

2. Find the supplement of each of the following angles:

(i)



Solution:-

Two angles are said to be supplementary if the sum of their measures is 180° .

The given angle is 105°

Let the measure of its supplement be x° .

Then,

$$= x + 105^\circ = 180^\circ$$

$$= x = 180^\circ - 105^\circ$$

$$= x = 75^\circ$$

Hence, the supplement of the given angle measures 75° .

(ii)



Solution:-

Two angles are said to be supplementary if the sum of their measures is 180° .

The given angle is 87°

Let the measure of its supplement be x° .

Then,

$$= x + 87^\circ = 180^\circ$$

$$= x = 180^\circ - 87^\circ$$

$$= x = 93^\circ$$

Hence, the supplement of the given angle measures 93° .

(iii)



Solution:-

Two angles are said to be supplementary if the sum of their measures is 180° .

The given angle is 154°

Let the measure of its supplement be x° .

Then,

$$= x + 154^\circ = 180^\circ$$

$$= x = 180^\circ - 154^\circ$$

$$= x = 26^\circ$$

Hence, the supplement of the given angle measures 26° .

3. Identify which of the following pairs of angles are complementary and which are supplementary.

(i) 65° , 115°

Solution:-

We have to find the sum of given angles to identify whether the angles are complementary or supplementary.

Then,

$$= 65^\circ + 115^\circ$$

$$= 180^\circ$$

If the sum of two angle measures is 180° , then the two angles are said to be supplementary.

\therefore These angles are supplementary angles.

(ii) 63° , 27°

Solution:-

We have to find the sum of given angles to identify whether the angles are complementary or supplementary.

Then,

$$= 63^\circ + 27^\circ$$

$$= 90^\circ$$

If the sum of two angle measures is 90° , then the two angles are said to be complementary.

\therefore These angles are complementary angles.

(iii) 112° , 68°

Solution:-

We have to find the sum of given angles to identify whether the angles are complementary or supplementary.

Then,

$$= 112^\circ + 68^\circ$$

$$= 180^\circ$$

If the sum of two angle measures is 180° , then the two angles are said to be supplementary.

\therefore These angles are supplementary angles.

(iv) 130° , 50°

Solution:-

We have to find the sum of given angles to identify whether the angles are complementary or supplementary.

Then,

$$= 130^\circ + 50^\circ$$

$$= 180^\circ$$

If the sum of two angle measures is 180° , then the two angles are said to be supplementary.

\therefore These angles are supplementary angles.

(v) 45° , 45°

Solution:-

We have to find the sum of given angles to identify whether the angles are complementary or supplementary.

Then,

$$= 45^\circ + 45^\circ$$

$$= 90^\circ$$

If the sum of two angle measures is 90° , then the two angles are said to be complementary.

\therefore These angles are complementary angles.

(vi) 80° , 10°

Solution:-

We have to find the sum of given angles to identify whether the angles are complementary or supplementary.

Then,

$$= 80^\circ + 10^\circ$$

$$= 90^\circ$$

If the sum of two angle measures is 90° , then the two angles are said to be complementary.

\therefore These angles are complementary angles.

4. Find the angles which are equal to their complement.

Solution:-

Let the measure of the required angle be x° .

We know that the sum of measures of complementary angle pair is 90° .

Then,

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

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

$$= x = 90/2$$

$$= x = 45^\circ$$

Hence, the required angle measure is 45° .

5. Find the angles which are equal to their supplement.

Solution:-

Let the measure of the required angle be x° .

We know that the sum of measures of supplementary angle pair is 180° .

Then,

$$= x + x = 180^\circ$$

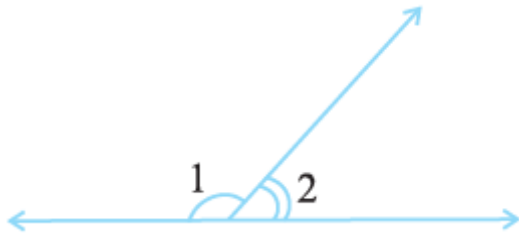
$$= 2x = 180^\circ$$

$$= x = 180/2$$

$$= x = 90^\circ$$

Hence, the required angle measure is 90° .

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 angles still remain supplementary?



Solution:-

From the question, it is given that

$\angle 1$ and $\angle 2$ are supplementary angles.

If $\angle 1$ is decreased, then $\angle 2$ must be increased by the same value. Hence, this angle pair remains supplementary.

7. Can two angles be supplementary if both of them are:

(i). Acute?

Solution:-

No. If two angles are acute, which means less than 90° , then they cannot be supplementary because their sum will always be less than 90° .

(ii). Obtuse?

Solution:-

No. If two angles are obtuse, which means more than 90° , then they cannot be supplementary because their sum will always be more than 180° .

(iii). Right?

Solution:-

Yes. If two angles are right, which means both measure 90° , then they can form a supplementary pair.

$$\therefore 90^\circ + 90^\circ = 180$$

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

Solution:-

Let us assume the complementary angles be p and q ,

We know that the sum of measures of complementary angle pair is 90° .

Then,

$$= p + q = 90^\circ$$

It is given in the question that $p > 45^\circ$

Adding q on both sides,

$$= p + q > 45^\circ + q$$

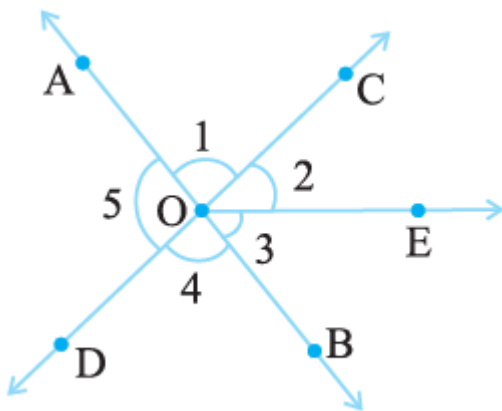
$$= 90^\circ > 45^\circ + q$$

$$= 90^\circ - 45^\circ > q$$

$$= q < 45^\circ$$

Hence, its complementary angle is less than 45° .

9. In the adjoining figure:



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

Solution:-

By observing the figure, we came to conclude that,

Yes, as $\angle 1$ and $\angle 2$ have a common vertex, i.e., O and a common arm, OC .

Their non-common arms, OA and OE, are on both sides of the common arm.

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

Solution:-

By observing the figure, we came to conclude that,

No, since they have a common vertex O and common arm OA.

But, they have no non-common arms on both sides of the common arm.

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

Solution:-

By observing the figure, we came to conclude that,

Yes, as $\angle COE$ and $\angle EOD$ have a common vertex, i.e. O and a common arm OE.

Their non-common arms, OC and OD, are on both sides of the common arm.

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

Solution:-

By observing the figure, we came to conclude that,

Yes, as $\angle BOD$ and $\angle DOA$ have a common vertex, i.e. O and a common arm OE.

Their non-common arms, OA and OB, are opposite to each other.

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

Solution:-

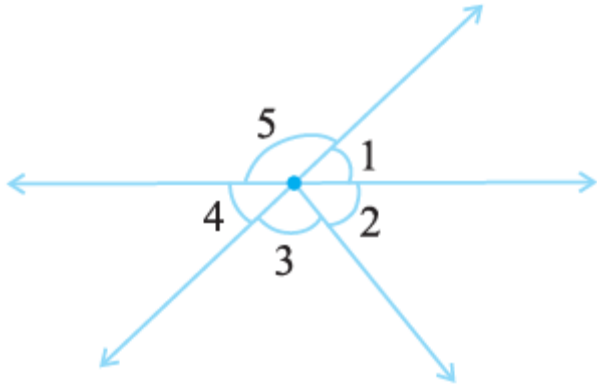
Yes, $\angle 1$ and $\angle 2$ are formed by the intersection of two straight lines AB and CD.

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

Solution:-

$\angle COB$ is the vertically opposite angle of $\angle 5$. Because these two angles are formed by the intersection of two straight lines AB and CD.

10. Indicate which pairs of angles are:



(i) Vertically opposite angles.

Solution:-

By observing the figure, we can say that

$\angle 1$ and $\angle 4$, $\angle 5$ and $\angle 2 + \angle 3$ are vertically opposite angles. Because these two angles are formed by the intersection of two straight lines.

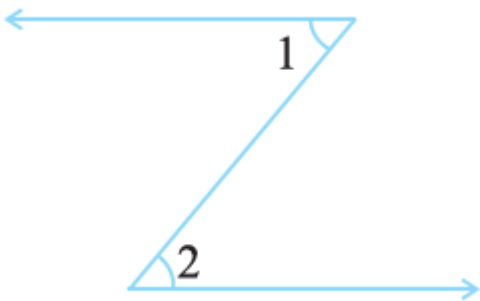
(ii) Linear pairs.

Solution:-

By observing the figure, we can say that,

$\angle 1$ and $\angle 5$, $\angle 5$ and $\angle 4$, as these have a common vertex and also have non-common arms opposite to each other.

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

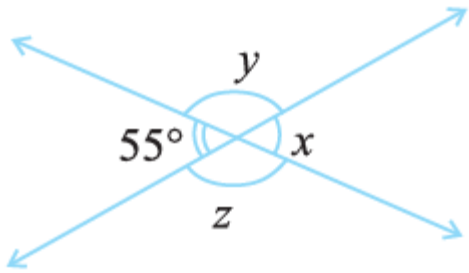


Solution:-

$\angle 1$ and $\angle 2$ are not adjacent angles because they are not lying on the same vertex.

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

(i)



Solution:-

$\angle x = 55^\circ$, because vertically opposite angles.

$\angle x + \angle y = 180^\circ \dots [\because \text{linear pair}]$

$$= 55^\circ + \angle y = 180^\circ$$

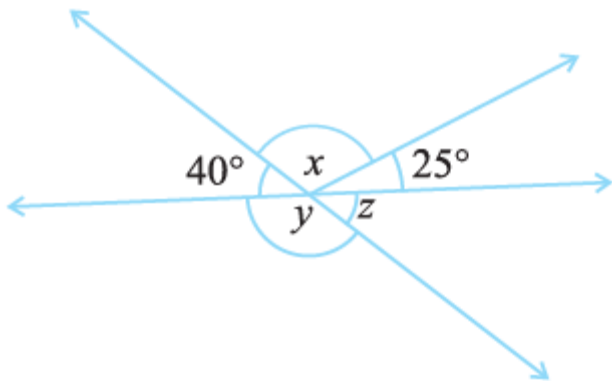
$$= \angle y = 180^\circ - 55^\circ$$

$$= \angle y = 125^\circ$$

Then, $\angle y = \angle z \dots [\because \text{vertically opposite angles}]$

$$\therefore \angle z = 125^\circ$$

(ii)



Solution:-

$\angle z = 40^\circ$, because vertically opposite angles.

$\angle y + \angle z = 180^\circ \dots [\because \text{linear pair}]$

$$= \angle y + 40^\circ = 180^\circ$$

$$= \angle y = 180^\circ - 40^\circ$$

$$= \angle y = 140^\circ$$

Then, $40 + \angle x + 25 = 180^\circ \dots$ [\because angles on straight line]

$$65 + \angle x = 180^\circ$$

$$\angle x = 180^\circ - 65$$

$$\therefore \angle x = 115^\circ$$

13. Fill in the blanks.

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

Solution:-

If two angles are complementary, then the sum of their measures is 90° .

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

Solution:-

If two angles are supplementary, then the sum of their measures is 180° .

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

Solution:-

Two angles forming a linear pair are supplementary.

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

Solution:-

If two adjacent angles are supplementary, they form a linear pair.

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

_____.

Solution:-

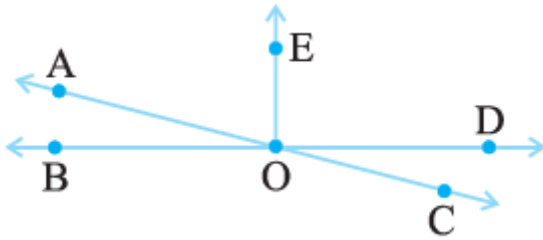
If two lines intersect at a point, then the vertically opposite angles are always equal.

(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 _____.

Solution:-

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 obtuse angles.

14. In the adjoining figure, name the following pairs of angles.



(i) **Obtuse vertically opposite angles**

Solution:-

$\angle AOD$ and $\angle BOC$ are obtuse vertically opposite angles in the given figure.

(ii) **Adjacent complementary angles**

Solution:-

$\angle EOA$ and $\angle AOB$ are adjacent complementary angles in the given figure.

(iii) **Equal supplementary angles**

Solution:-

$\angle EOB$ and $\angle EOD$ are the equal supplementary angles in the given figure.

(iv) **Unequal supplementary angles**

Solution:-

$\angle EOA$ and $\angle EOC$ are the unequal supplementary angles in the given figure.

(v) **Adjacent angles that do not form a linear pair**

Solution:-

$\angle AOB$ and $\angle AOE$, $\angle AOE$ and $\angle EOD$, $\angle EOD$ and $\angle COD$ are the adjacent angles that do not form a linear pair in the given figure.