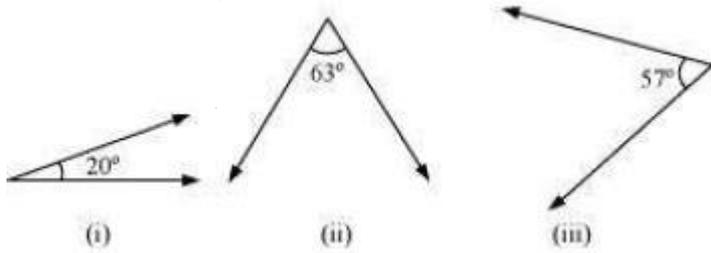


Chapter 5 – Lines and Angles Exercise 5.1

Question 1:

Find the complement of each of the following angles:



Answer:

The sum of the measures of complementary angles is 90° .

(i) 20°

$$\begin{aligned}\text{Complement} &= 90^\circ - 20^\circ \\ &= 70^\circ\end{aligned}$$

(ii) 63°

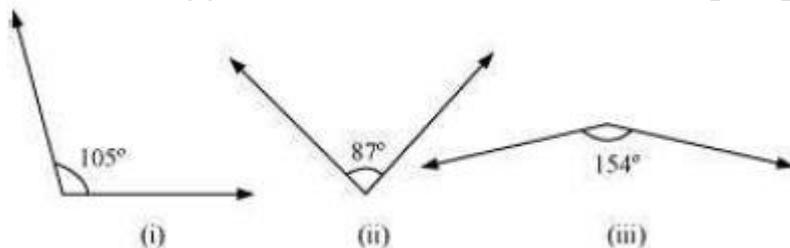
$$\begin{aligned}\text{Complement} &= 90^\circ - 63^\circ \\ &= 27^\circ\end{aligned}$$

(iii) 57°

$$\begin{aligned}\text{Complement} &= 90^\circ - 57^\circ \\ &= 33^\circ\end{aligned}$$

Question 2:

Find the supplement of each of the following angles:



Answer:

The sum of the measures of supplementary angles is 180° .

(i) 105°

$$\begin{aligned}\text{Supplement} &= 180^\circ - 105^\circ \\ &= 75^\circ\end{aligned}$$

(ii) 87°

$$\begin{aligned}\text{Supplement} &= 180^\circ - 87^\circ \\ &= 93^\circ\end{aligned}$$

(iii) 154°

$$\begin{aligned}\text{Supplement} &= 180^\circ - 154^\circ \\ &= 26^\circ\end{aligned}$$

Question 3:

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

(i) $65^\circ, 115^\circ$ (ii) $63^\circ, 27^\circ$

(iii) $112^\circ, 68^\circ$ (iv) $130^\circ, 50^\circ$

(v) $45^\circ, 45^\circ$ (vi) $80^\circ, 10^\circ$

Answer:

The sum of the measures of complementary angles is 90° and that of supplementary angles is 180° .

(i) $65^\circ, 115^\circ$

$$\text{Sum of the measures of these angles} = 65^\circ + 115^\circ = 180^\circ$$

\therefore These angles are supplementary angles.

(ii) $63^\circ, 27^\circ$

$$\text{Sum of the measures of these angles} = 63^\circ + 27^\circ = 90^\circ$$

\therefore These angles are complementary angles.

(iii) $112^\circ, 68^\circ$

$$\text{Sum of the measures of these angles} = 112^\circ + 68^\circ = 180^\circ$$

\therefore These angles are supplementary angles.

(iv) $130^\circ, 50^\circ$

$$\text{Sum of the measures of these angles} = 130^\circ + 50^\circ = 180^\circ$$

\therefore These angles are supplementary angles.

(v) $45^\circ, 45^\circ$

$$\text{Sum of the measures of these angles} = 45^\circ + 45^\circ = 90^\circ$$

\therefore These angles are complementary angles.

(vi) $80^\circ, 10^\circ$

Sum of the measures of these angles = $80^\circ + 10^\circ = 90^\circ$

\therefore These angles are complementary angles.

Question 4:

Find the angle which is equal to its complement.

Answer:

Let the angle be x .

Complement of this angle is also x .

The sum of the measures of a complementary angle pair is 90° .

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

$$2x = 90^\circ$$

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

Question 5:

Find the angle which is equal to its supplement.

Answer:

Let the angle be x .

Supplement of this angle is also x .

The sum of the measures of a supplementary angle pair is 180° .

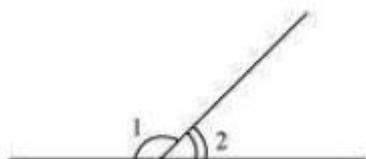
$$\therefore x + x = 180^\circ$$

$$2x = 180^\circ$$

$$x = 90^\circ$$

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:

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

If $\angle 1$ is reduced, then $\angle 2$ should be increased by the same measure so that this angle pair remains supplementary.

Question 7:

Can two angles be supplementary if both of them are:

(i) Acute? (ii) Obtuse? (iii) Right?

Answer:

(i) No. Acute angle is always lesser than 90° . It can be observed that two angles, even of 89° , cannot add up to 180° . Therefore, two acute angles cannot be in a supplementary angle pair.

(ii) No. Obtuse angle is always greater than 90° . It can be observed that two angles, even of 91° , will always add up to more than 180° . Therefore, two obtuse angles cannot be in a supplementary angle pair.

(iii) Yes. Right angles are of 90° and $90^\circ + 90^\circ = 180^\circ$

Therefore, two right angles form a supplementary angle pair together.

Question 8:

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

Answer:

Let A and B are two angles making a complementary angle pair and A is greater than 45° .

$$A + B = 90^\circ$$

$$B = 90^\circ - A$$

Therefore, B will be lesser than 45° .

Question 9:

In the adjoining figure:

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

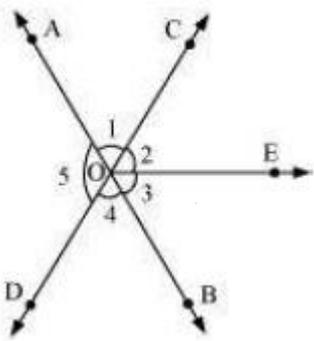
(ii) Is $\angle AOC$ adjacent to $\angle AOE$?

(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:

(i) Yes. Since they have a common vertex O and also a common arm OC. Also, their non-common arms, OA and OE, are on either side of the common arm.

(ii) No. They have a common vertex O and also a common arm OA. However, their non-common arms, OC and OE, are on the same side of the common arm. Therefore, these are not adjacent to each other.

(iii) Yes. Since they have a common vertex O and a common arm OE. Also, their non-common arms, OC and OD, are opposite rays.

(iv) Yes. Since $\angle BOD$ and $\angle DOA$ have a common vertex O and their non-common arms are opposite to each other.

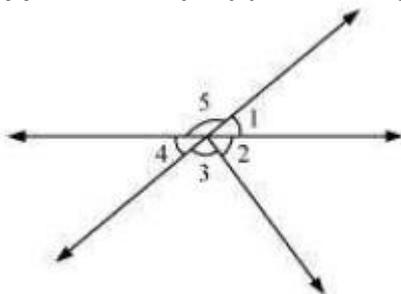
(v) Yes. Since these are formed due to the intersection of two straight lines (AB and CD).

(vi) $\angle COB$ is the vertically opposite angle of $\angle 5$ as these are formed due to the intersection of two straight lines, AB and CD.

Question 10:

Indicate which pairs of angles are:

(i) Vertically opposite angles. (ii) Linear pairs.



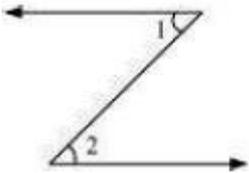
Answer:

(i) $\angle 1$ and $\angle 4$, $\angle 5$ and $\angle 2 + \angle 3$ are vertically opposite angles as these are formed due to the intersection of two straight lines.

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

Question 11:

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

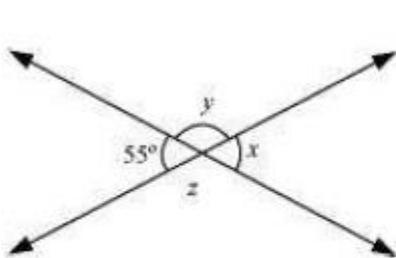


Answer:

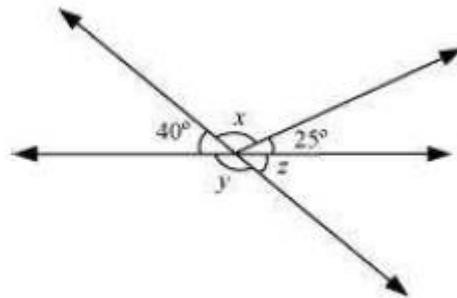
$\angle 1$ and $\angle 2$ are not adjacent angles because their vertex is not common.

Question 12:

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



(i)



(ii)

Answer:

(i) Since $\angle x$ and $\angle 55^\circ$ are vertically opposite angles,

$$\angle x = 55^\circ$$

$$\angle x + \angle y = 180^\circ \text{ (Linear pair)}$$

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

$$\angle y = 180^\circ - 55^\circ = 125^\circ$$

$$\angle y = \angle z \text{ (Vertically opposite angles)}$$

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

(ii) $\angle z = 40^\circ$ (Vertically opposite angles)

$$\angle y + \angle z = 180^\circ \text{ (Linear pair)}$$

$$\angle y = 180^\circ - 40^\circ = 140^\circ$$

$$40^\circ + \angle x + 25^\circ = 180^\circ \text{ (Angles on a straight line)}$$

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

$$\angle x = 180^\circ - 65^\circ = 115^\circ$$

Question 13:

Fill in the blanks:

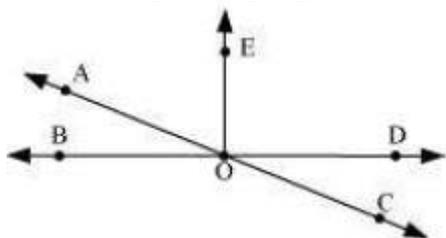
- (i) If two angles are complementary, then the sum of their measures is _____.
- (ii) If two angles are supplementary, then the sum of their measures is _____.
- (iii) Two angles forming a linear pair are _____.
- (iv) If two adjacent angles are supplementary, they form a _____.
- (v) If two lines intersect at 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:

- (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:

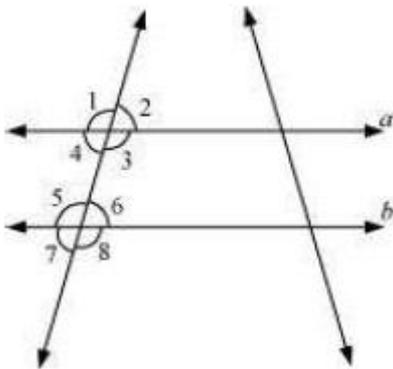
- (i) $\angle AOD, \angle BOC$
- (ii) $\angle EOA, \angle AOB$
- (iii) $\angle EOB, \angle EOD$
- (iv) $\angle EOA, \angle EOC$
- (v) $\angle AOB$ and $\angle AOE, \angle AOE$ and $\angle EOD, \angle EOD$ and $\angle COD$

Exercise 5.2

Question 1:

State the property that is used in each of the following statements?

- (i) If $a \parallel b$, then $\angle 1 = \angle 5$
- (ii) If $\angle 4 = \angle 6$, then $a \parallel b$
- (iii) If $\angle 4 + \angle 5 = 180^\circ$, then $a \parallel b$



Answer:

- (i) Corresponding angles property
- (ii) Alternate interior angles property
- (iii) Interior angles on the same side of transversal are supplementary.

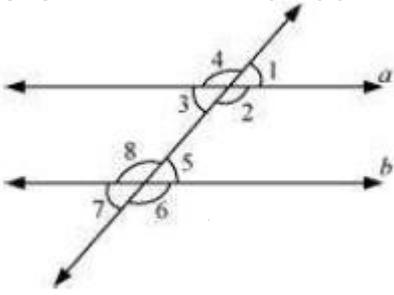
Question 2:

In the adjoining figure, identify

- (i) The pairs of corresponding angles
- (ii) The pairs of alternate interior angles

(iii) The pairs of interior angles on the same side of the transversal

(iv) The vertically opposite angles



Answer:

(i) $\angle 1$ and $\angle 5$, $\angle 2$ and $\angle 6$, $\angle 3$ and $\angle 7$, $\angle 4$ and $\angle 8$

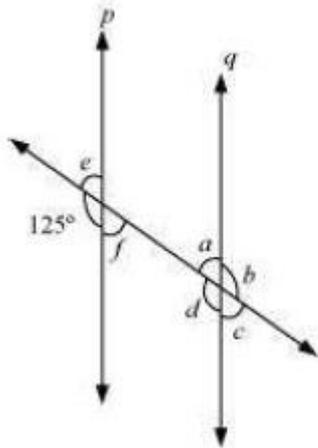
(ii) $\angle 2$ and $\angle 8$, $\angle 3$ and $\angle 5$

(iii) $\angle 2$ and $\angle 5$, $\angle 3$ and $\angle 8$

(iv) $\angle 1$ and $\angle 3$, $\angle 2$ and $\angle 4$, $\angle 5$ and $\angle 7$, $\angle 6$ and $\angle 8$

Question 3:

In the adjoining figure, $p \parallel q$. Find the unknown angles.



Answer:

$\angle d = 125^\circ$ (Corresponding angles)

$\angle e = 180^\circ - 125^\circ = 55^\circ$ (Linear pair)

$\angle f = \angle e = 55^\circ$ (Vertically opposite angles)

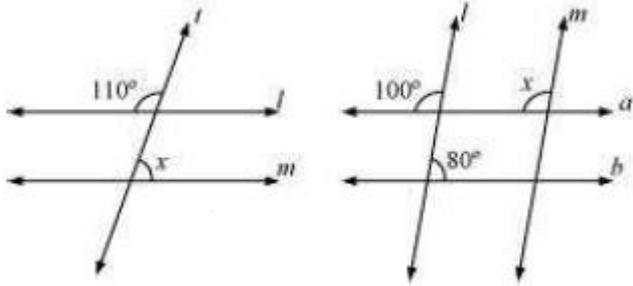
$\angle c = \angle f = 55^\circ$ (Corresponding angles)

$\angle a = \angle e = 55^\circ$ (Corresponding angles)

$\angle b = \angle d = 125^\circ$ (Vertically opposite angles)

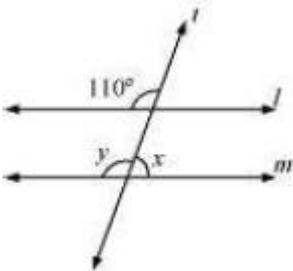
Question 4:

Find the value of x in each of the following figures if $l \parallel m$.



Answer:

(i)



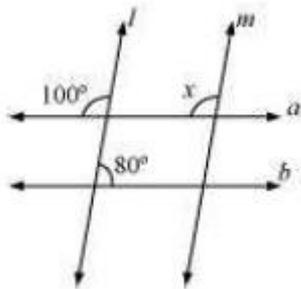
$$\angle y = 110^\circ \text{ (Corresponding angles)}$$

$$\angle x + \angle y = 180^\circ \text{ (Linear pair)}$$

$$\angle y = 180^\circ - 110^\circ$$

$$= 70^\circ$$

(ii)



$$\angle x = 100^\circ \text{ (Corresponding angles)}$$

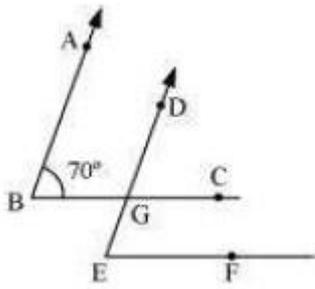
Question 5:

In the given figure, the arms of two angles are parallel.

If $\angle ABC = 70^\circ$, then find

(i) $\angle DGC$

(ii) $\angle DEF$



Answer:

(i) Consider that $AB \parallel DG$ and a transversal line BC is intersecting them.

$\angle DGC = \angle ABC$ (Corresponding angles)

$\angle DGC = 70^\circ$

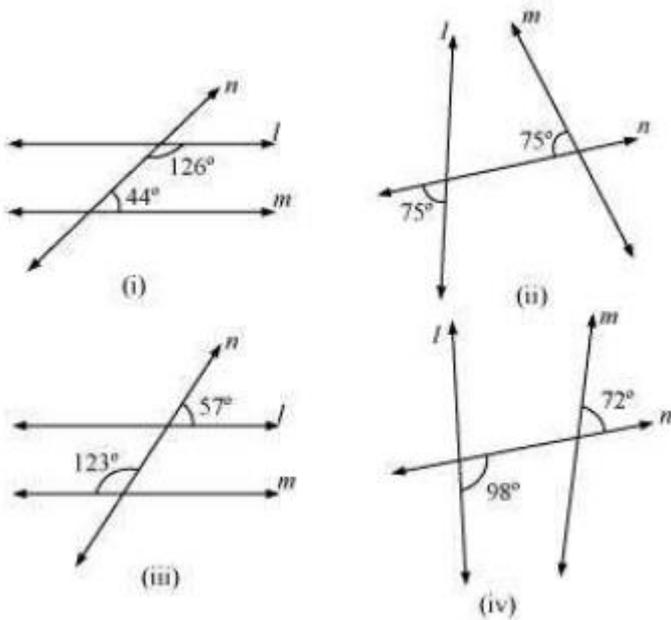
(ii) Consider that $BC \parallel EF$ and a transversal line DE is intersecting them.

$\angle DEF = \angle DGC$ (Corresponding angles)

$\angle DEF = 70^\circ$

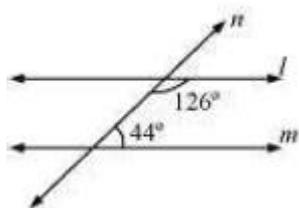
Question 6:

In the given figures below, decide whether l is parallel to m .



Answer:

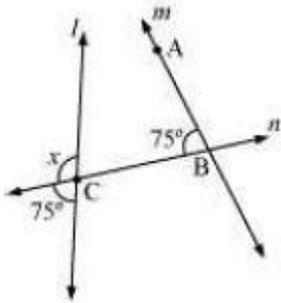
(i)



Consider two lines, l and m , and a transversal line n which is intersecting them. Sum

of the interior angles on the same side of transversal = $126^\circ + 44^\circ = 170^\circ$ As the sum of interior angles on the same side of transversal is not 180° , therefore, l is not parallel to m .

(ii)

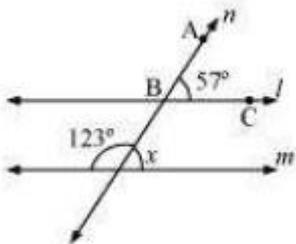


$$x + 75^\circ = 180^\circ \text{ (Linear pair on line l)}$$

$$x = 180^\circ - 75^\circ = 105^\circ$$

For l and m to be parallel to each other, corresponding angles ($\angle ABC$ and $\angle x$) should be equal. However, here their measures are 75° and 105° respectively. Hence, these lines are not parallel to each other.

(iii)

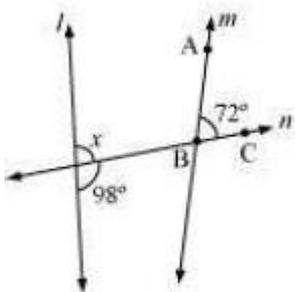


$$\angle x + 123^\circ = 180^\circ \text{ (Linear pair)}$$

$$\angle x = 180^\circ - 123^\circ = 57^\circ$$

For l and m to be parallel to each other, corresponding angles ($\angle ABC$ and $\angle x$) should be equal. Here, their measures are 57° and 57° respectively. Hence, these lines are parallel to each other.

iv.



$$98 + \angle x = 180^\circ \text{ (Linear pair)}$$

$$\angle x = 82^\circ$$

For l and m to be parallel to each other, corresponding angles ($\angle ABC$ and $\angle x$) should be equal. However, here their measures are 72° and 82° respectively. Hence, these lines are not parallel to each other.