

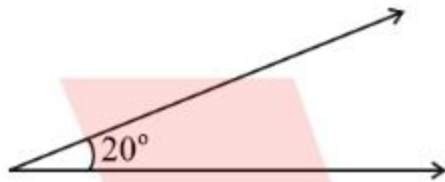
## CBSE NCERT Solutions for Class 7 Mathematics Chapter 5

### Back of Chapter Questions

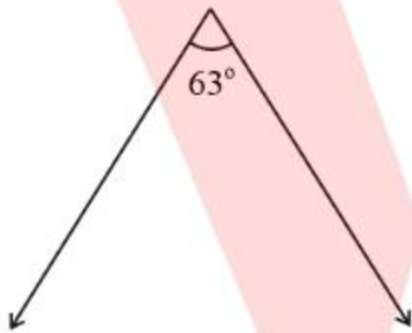
#### Exercise 5.1

1. Find the complement of the following angles:

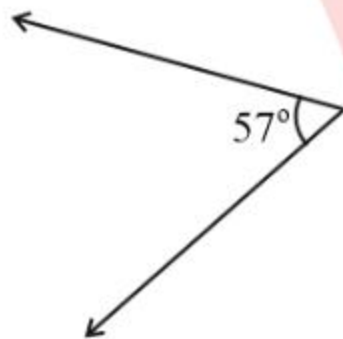
(i)



(ii)



(iii)



#### Solution:

- (i) We know that complement of an angle =  $90^\circ - \text{angle}$ .  
 Therefore, complement of  $20^\circ = 90^\circ - 20^\circ$   
 $= 70^\circ$

(ii) We know that complement of an angle =  $90^\circ - \text{angle}$ .

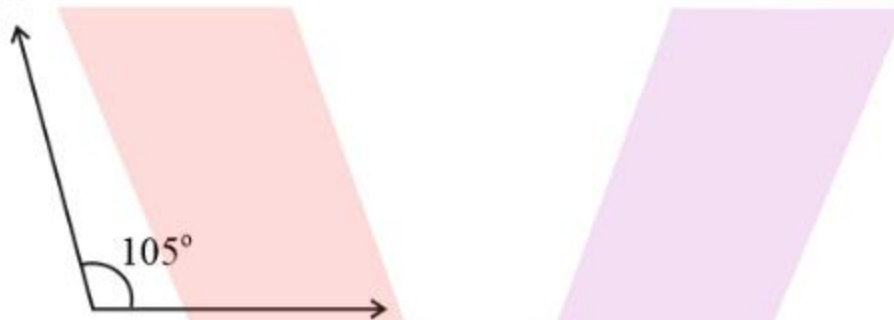
$$\begin{aligned} \text{Therefore, complement of } 63^\circ &= 90^\circ - 63^\circ \\ &= 27^\circ \end{aligned}$$

(iii) We know that complement of an angle =  $90^\circ - \text{angle}$ .

$$\begin{aligned} \text{Therefore, complement of } 57^\circ &= 90^\circ - 57^\circ \\ &= 33^\circ \end{aligned}$$

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

(i)



(ii)



(iii)



**Solution:**

(i) We know that, Supplement of an angle =  $180^\circ - \text{angle}$

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

(ii) We know that, Supplement of an angle =  $180^\circ - \text{angle}$

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

- (iii) We know that, Supplement of an angle =  $180^\circ - \text{angle}$   
 Therefore, Supplement of  $154^\circ = 180^\circ - 154^\circ$   
 $= 26^\circ$
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)  $80^\circ, 10^\circ$

**Solution:**

We know that the sum of the measures of supplementary angles is  $180^\circ$  and that of complementary angles is  $90^\circ$ .

- (i)  $65^\circ + 115^\circ = 180^\circ$   
 Therefore, given pair of angles is supplementary.
- (ii)  $63^\circ + 27^\circ = 90^\circ$   
 Therefore, given pair of angles is complementary.
- (iii)  $112^\circ + 68^\circ = 180^\circ$   
 Therefore, given pair of angles is supplementary.
- (iv)  $130^\circ + 50^\circ = 180^\circ$   
 Therefore, given pair of angles is supplementary.
- (v)  $45^\circ + 45^\circ = 90^\circ$   
 Therefore, given pair of angles is complementary.
- (vi)  $80^\circ + 10^\circ = 90^\circ$   
 Therefore, given pair of angles is complementary.
4. Find the angle which is equal to its complement.

**Solution:**

Let the angle =  $a$

It is given that its complement =  $a$

We know that the sum of the measures of complementary angles is  $90^\circ$ .  
Therefore,

$$a + a = 90^\circ$$

$$\Rightarrow 2a = 90^\circ$$

$$\Rightarrow a = 45^\circ$$

Therefore,  $45^\circ$  is the angle which is equal to its complement.

5. Find the angle which is equal to its supplement.

**Solution:**

Let the angle =  $a$

It is given that its supplement =  $a$

We know that the sum of the measures of supplementary angles is  $180^\circ$ .  
Therefore,

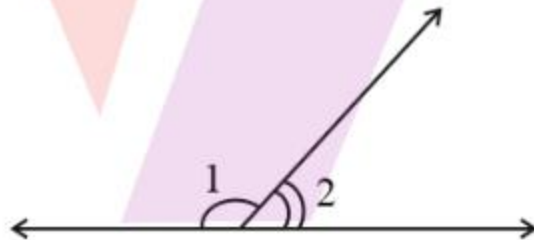
$$a + a = 180^\circ$$

$$\Rightarrow 2a = 180^\circ$$

$$\Rightarrow a = 90^\circ$$

Therefore,  $90^\circ$  is the angle which is equal to its supplement.

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.



**Solution:**

We know that the sum of the measures of supplementary angles is  $180^\circ$ .

$$\text{Therefore, } \angle 1 + \angle 2 = 180^\circ$$

$$\angle 2 = 180^\circ - \angle 1$$

So, if  $\angle 1$  is decreased then  $\angle 2$  will increase so that both angles still remain supplementary.

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



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

**Solution:**

We know that the sum of the measures of supplementary angles is  $180^\circ$ .

- (i) If both angles are acute (less than  $90^\circ$ ), then their sum can never be  $180^\circ$ . Therefore, two angles cannot be supplementary if both of them are acute.
  - (ii) If both angles are obtuse (greater than  $90^\circ$ ), then their sum is always greater than  $180^\circ$ . Therefore, two angles cannot be supplementary if both of them are obtuse.
  - (iii) If both angles are right angle (equal to  $90^\circ$ ), then their sum is always equal to  $180^\circ$ . Therefore, two angles can be supplementary if both of them are right.
8. An angle is greater than  $45^\circ$ . Is its complementary angle greater than  $45^\circ$  or equal to  $45^\circ$  or less than  $45^\circ$ ?

**Solution:**

Let A and B are two angles making a complementary angle pair.

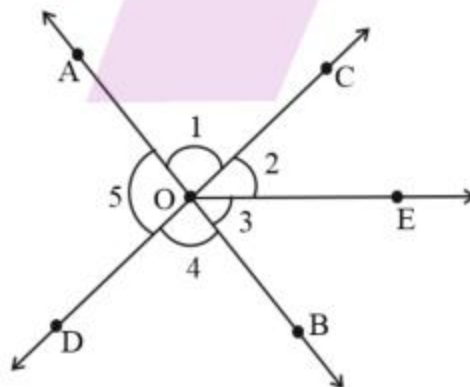
Let A is greater than  $45^\circ$ .

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

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

So, if A is greater than  $45^\circ$ , then B will be less than  $45^\circ$ .

9. In the adjoining figure:



- (i) Is  $\angle 1$  adjacent to  $\angle 2$ ?
- (ii) Is  $\angle AOC$  adjacent to  $\angle AOE$ ?

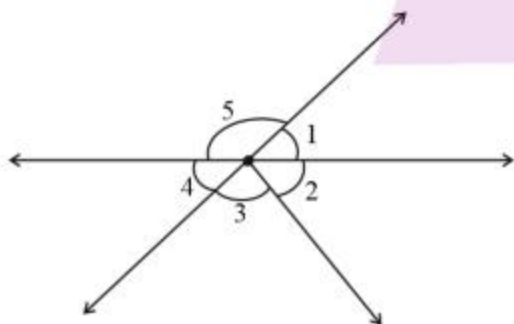
- (iii) Do  $\angle COE$  and  $\angle EOD$  form a linear pair?
- (iv) Are  $\angle BOD$  and  $\angle DOA$  supplementary?
- (v) Is  $\angle 1$  vertically opposite to  $\angle 4$ ?
- (vi) What is the vertically opposite angle of  $\angle 5$ ?

**Solution:**

- (i) Yes. Since both 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. Therefore,  $\angle 1$  adjacent to  $\angle 2$ .
- (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, they 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. Therefore,  $\angle COE$  and  $\angle EOD$  form a linear pair.
- (iv) Yes. Since  $\angle BOD$  and  $\angle DOA$  have a common vertex  $O$  and their non-common arms are opposite to each other. Therefore,  $\angle BOD$  and  $\angle DOA$  are supplementary.
- (v) Yes. Since  $\angle 1$  and  $\angle 4$  are formed due to the intersection of two straight lines  $AB$  and  $CD$ . Therefore,  $\angle 1$  vertically opposite to  $\angle 4$ .
- (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  $CD$ .

10. Indicate which pairs of angles are:

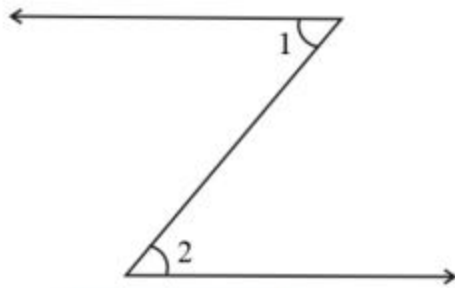
- (i) Vertically opposite angles.
- (ii) Linear pairs.



**Solution:**

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

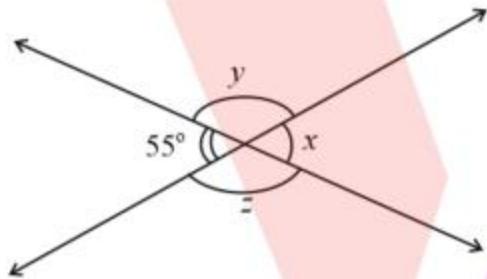


**Solution:**

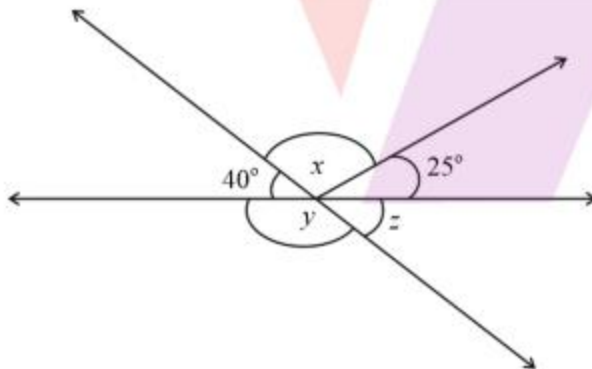
$\angle 1$  and  $\angle 2$  are not adjacent angles because their vertex is not common.

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

(i)



(ii)



**Solution:**

- (i) Since  $\angle x$  and  $\angle 55^\circ$  are vertically opposite angles.  
Therefore,  $\angle x = 55^\circ$   
And  $\angle x + \angle y = 180^\circ$  (Linear pair)



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

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

Since,  $\angle y = \angle z$  (Vertically opposite angles)

$$\text{Therefore, } \angle z = 125^\circ$$

Therefore, values of  $x, y$  and  $z$  are  $55^\circ, 125^\circ$  and  $125^\circ$  respectively.

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

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

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

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

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

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

Therefore, values of  $x, y$  and  $z$  are  $115^\circ, 140^\circ$  and  $40^\circ$  respectively.

13. Fill in the blanks:

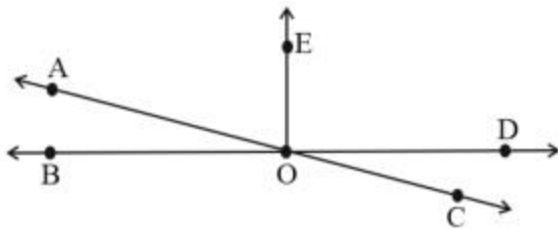
- (i) If two angles are complementary, then the sum of their measures is \_\_\_\_\_.
- (ii) If two angles are supplementary, then the sum of their measures is \_\_\_\_\_.
- (iii) Two angles forming a linear pair are \_\_\_\_\_.
- (iv) If two adjacent angles are supplementary, they form a \_\_\_\_\_.
- (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 \_\_\_\_\_.

**Solution:**

- (i)  $90^\circ$
- (ii)  $180^\circ$
- (iii) supplementary
- (iv) linear pair
- (v) equal
- (vi) obtuse angles



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



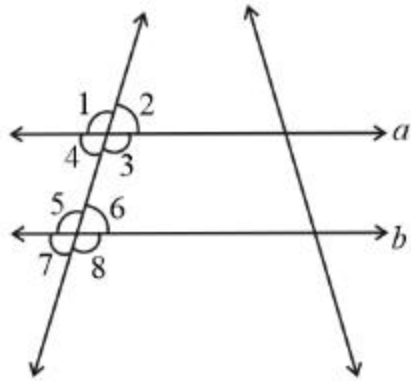
- (i) Obtuse vertically opposite angles
- (ii) Adjacent complementary angles
- (iii) Equal supplementary angles
- (iv) Unequal supplementary angles
- (v) Adjacent angles that do not form a linear pair

**Solution:**

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

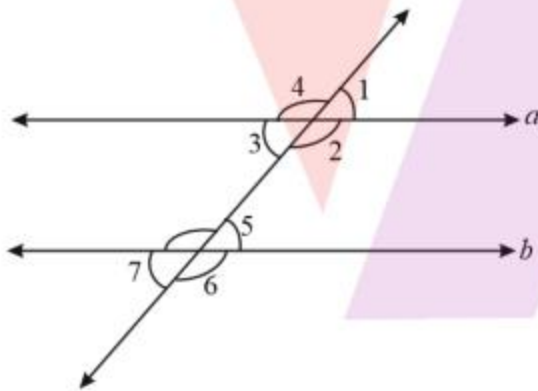
### Exercise 5.2

- I. 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  $a \parallel b$ .



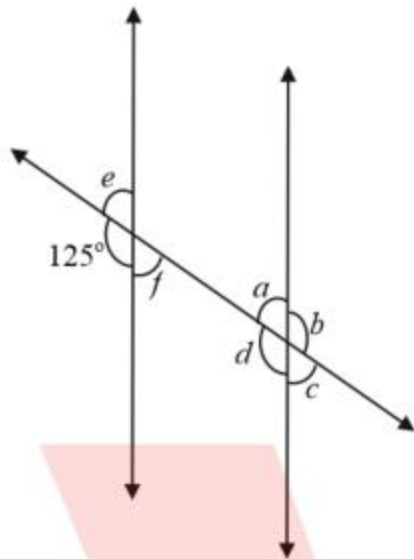
**Solution:**

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



**Solution:**

- (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  $\angle 8$
3. In the adjoining figure,  $p \parallel q$ . Find the unknown angles.



**Solution:**

$$\angle d = 125^\circ \text{ (Pair of corresponding angles)}$$

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

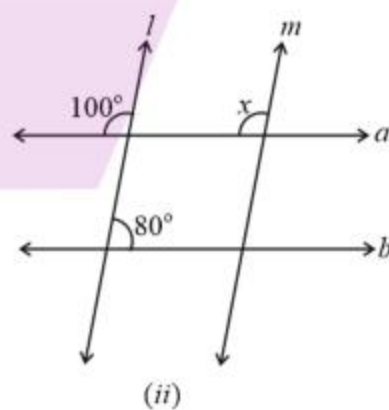
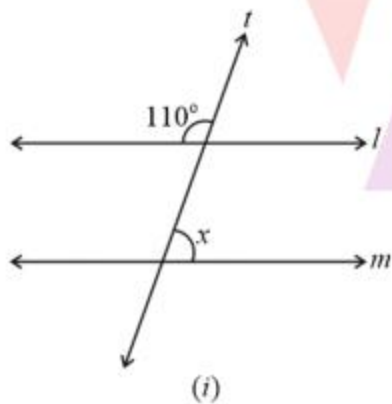
$$\angle f = \angle e = 55^\circ \text{ (Vertically opposite angles)}$$

$$\angle c = \angle f = 55^\circ \text{ (Pair of corresponding angles)}$$

$$\angle a = \angle e = 55^\circ \text{ (Pair of corresponding angles)}$$

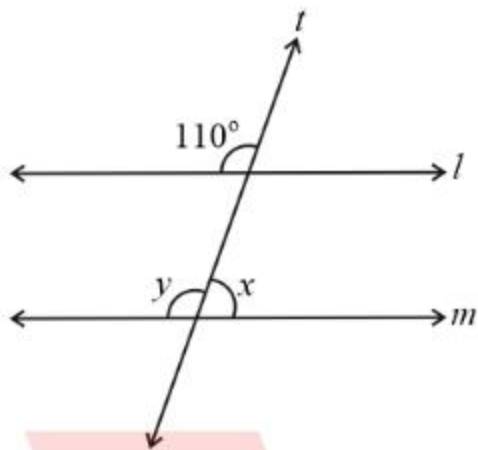
$$\angle b = \angle d = 125^\circ \text{ (Vertically opposite angles)}$$

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



**Solution:**

(i)



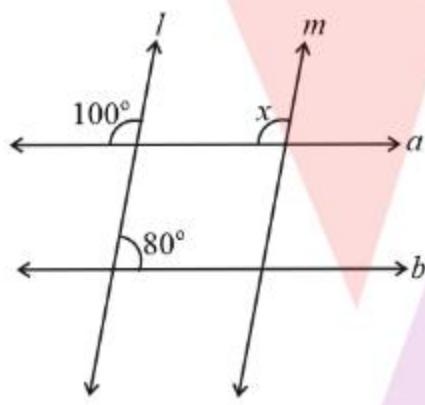
$$\angle y = 110^\circ \text{ (Pair of corresponding angles)}$$

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

$$\Rightarrow 110^\circ + \angle x = 180^\circ$$

$$\Rightarrow \angle x = 180^\circ - 110^\circ = 70^\circ$$

(ii)



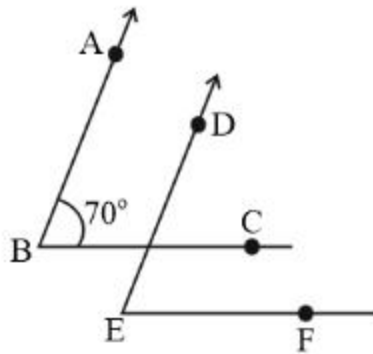
$$\angle x = 100^\circ \text{ (Pair of corresponding angle)}$$

5. In the given figure, the arms of two angles are parallel. If  $\angle ABC = 70^\circ$ , then find

(i)  $\angle DGC$

(ii)  $\angle DEF$

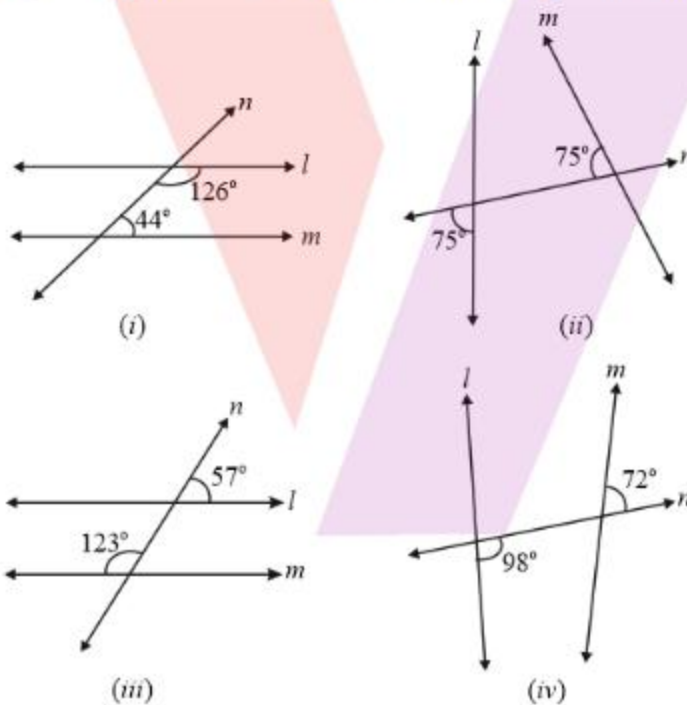




**Solution:**

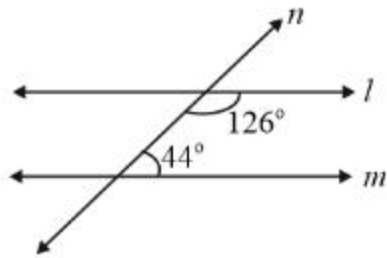
- (i) Given,  $AB \parallel DE$  and a transversal line  $BC$  is intersecting them.  
Therefore,  $\angle DGC = \angle ABC = 70^\circ$  (Pair of corresponding angles)
- (ii) Consider  $BC \parallel EF$  and a transversal line  $DE$  is intersecting them.  
Therefore,  $\angle DEF = \angle DGC = 70^\circ$  (Pair of corresponding angles)

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



**Solution:**

(i)



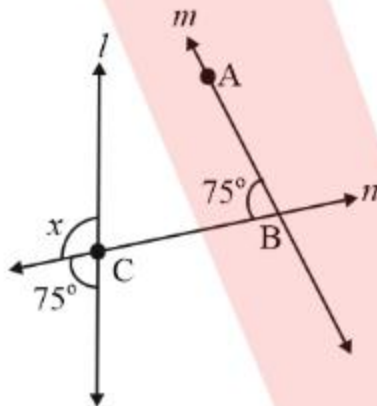
Since,  $n$  is the transversal line of two lines  $l$  and  $m$ .

Sum of interior angles on the same side of transversal =  $126^\circ + 44^\circ = 170^\circ$ .

As the sum of interior angle on the same side of transversal  $\neq 180^\circ$ .

Therefore,  $l$  is not parallel to  $m$ .

(ii)



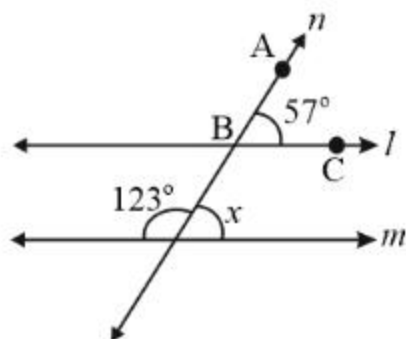
$x + 75^\circ = 180^\circ$  (Linear Pair)

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

For the lines  $l$  and  $m$  to be parallel to each other, their corresponding angles  $\angle ABC$  and  $x$  should be equal.

But they are not equal. So,  $l$  is not parallel to  $m$ .

(iii)

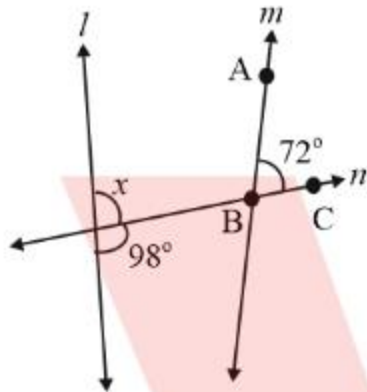


$$x + 123^\circ = 180^\circ \text{ (Linear Pair)}$$

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

For the lines  $l$  and  $m$  to be parallel to each other, their corresponding angles  $\angle ABC$  and  $x$  should be equal. Since, they are equal. Therefore,  $l$  is parallel to  $m$ .

(iv)



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

$$\Rightarrow x = 180^\circ - 98^\circ = 82^\circ$$

For the lines  $l$  and  $m$  to be parallel to each other, their corresponding angles  $\angle ABC$  and  $x$  should be equal.

But actually they are not equal. So,  $l$  is not parallel to  $m$ .

