Exercise 5.2

Question 1:

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

(i) If *a*||*b*, then ∠1 = ∠5.
(ii) If ∠4 = ∠6, then *a*||*b*.
(iii) If ∠4 + ∠5 + 180°, then *a*||*b*.
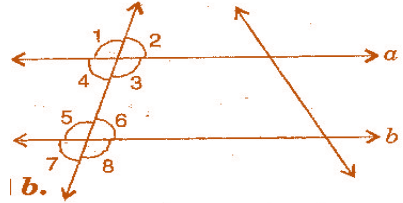
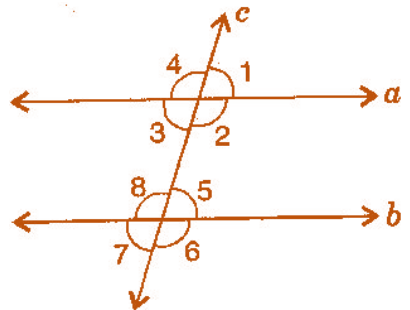### Answer 1:

(i) Given, *a*||*b*, then ∠1 = ∠5   [Corresponding angles]
     If two parallel lines are cut by a transversal, each pair of corresponding angles are equal in measure.

(ii) Given, ∠4 = ∠6, then *a*||*b*   [Alternate interior angles]
     When a transversal cuts two lines such that pairs of alternate interior angles are equal, the lines have to be parallel.

(iii) Given, ∠4 + ∠5 = 180°, then *a*||*b*   [Co-interior Angles]
     When a transversal cuts two lines, such that pairs of interior angles on the same side of transversal are supplementary, the lines have to be parallel.

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.
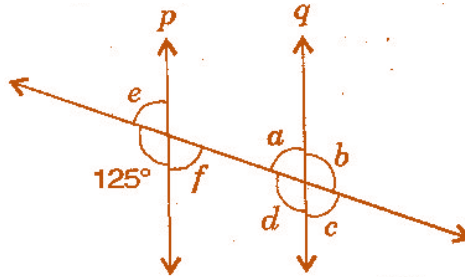
Answer 2:

(i) The pairs of corresponding angles:
     ∠1, ∠5; ∠2, ∠6; ∠4, ∠8 and ∠3, ∠7

(ii) The pairs of alternate interior angles are:
     ∠3, ∠5 and ∠2, ∠8

(iii) The pair of interior angles on the same side of the transversal:
     ∠3, ∠8 and ∠2, ∠5

(iv) The vertically opposite angles are:
     ∠1, ∠3; ∠2, ∠4; ∠6, ∠8 and ∠5, ∠7

Question 3:

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

Answer 3:

Given, $p\|q$ and cut by a transversal line.

∵ $\qquad 125°+e=180°$ $\qquad\qquad\qquad\qquad$ [Linear pair]

∴ $\qquad e=180°-125°=55°$ $\qquad\qquad\qquad\qquad$ ....(i)

Now $\quad e=f=55°$ $\qquad\qquad\qquad\qquad$ [Vertically opposite angles]

Also $\quad a=f=55°$ $\qquad\qquad\qquad\qquad$ [Alternate interior angles]

$\qquad a+b=180°$ $\qquad\qquad\qquad\qquad$ [Linear pair]

$\Rightarrow \qquad 55°+b=180°$ $\qquad\qquad\qquad\qquad$ [From equation (i)]

$\Rightarrow \qquad b=180°-55°=125°$

Now $\quad a=c=55°$ and $b=d=125°$ $\qquad\qquad$ [Vertically opposite angles]

Thus, $\quad a=55°, b=125°, c=55°, d=125°, e=55°$ and $f=55°$.

Question 4:

Find the values of x in each of the following figures if $l\|m$
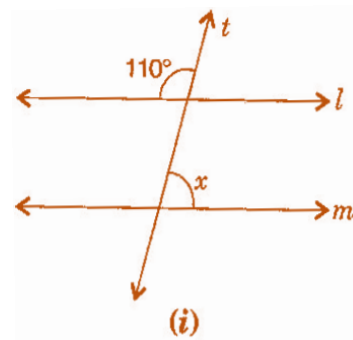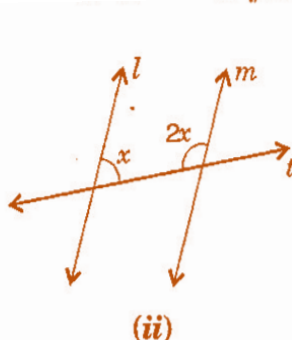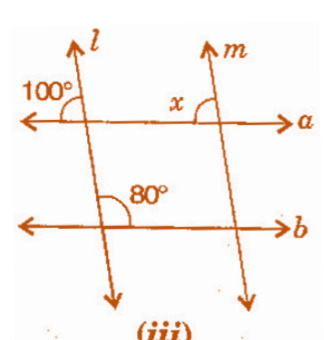
(i) $\qquad\qquad\qquad\qquad\qquad$ (ii) $\qquad\qquad\qquad\qquad\qquad$ (iii)

Answer 4:

(i) $\qquad$ Given, $l\|m$ and t is transversal line.

$\qquad\qquad$ ∴ $\qquad$ Interior vertically opposite angle between lines l and $t=110°$.

$\therefore \qquad 110° + x = 180°$ [Supplementary angles]

$\Rightarrow \qquad x = 180° - 110° = 70°$

(ii) Given, $l \| m$ and t is transversal line.

$x + 2x = 180$ [Interior opposite angles]

$\Rightarrow \qquad 3x = 180°$

$\Rightarrow \qquad x = \dfrac{180°}{3} = 60°$

(iii) Given, $l \| m$ and $a \| b$.
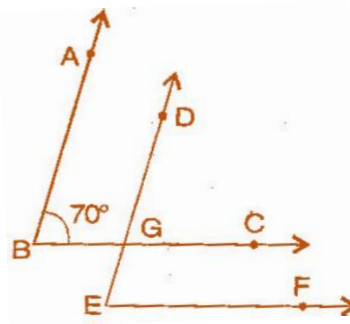
$x = 100°$ [Corresponding angles]

Question 5:

In the given figure, the arms of two angles are parallel. If $\triangle ABC = 70°$, then find:

(i) $\angle DGC$ (ii) $\angle DEF$

Answer 5:

(i) Given, AB ‖ DE and BC is a transversal line and $\angle ABC = 70°$

$\because \qquad \angle ABC = \angle DGC$ [Corresponding angles]

$\therefore \qquad \angle DGC = 70°$ ....(i)

(ii) Given, BC ‖ EF and DE is a transversal line and $\angle DGC = 70°$

$\because \qquad \angle DGC = \angle DEF$ [Corresponding angles]

$\therefore \qquad \angle DEF = 70°$ [From equation (i)]

Question 6:

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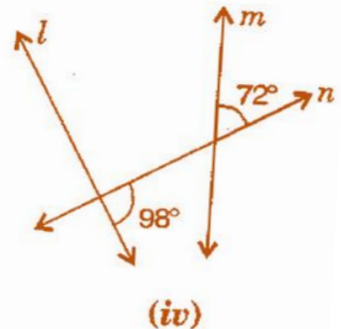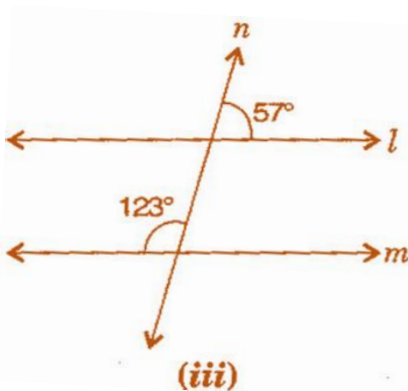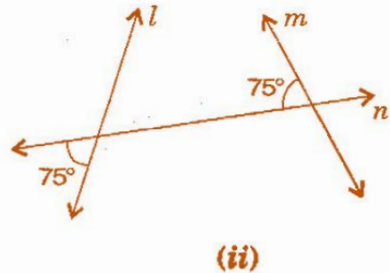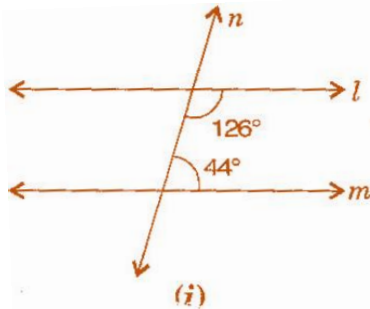
Answer 6:

(i) $126° + 44° = 170°$

       $l \parallel m$ because sum of interior opposite angles should be 180°.

(ii) $75° + 75° = 150°$

       $l \parallel m$ because sum of angles does not obey the property of parallel lines.

(iii) $57° + 123° = 180°$

       $l \parallel m$ due to supplementary angles property of parallel lines.

(iv) $98° + 72° = 170°$

       l is not parallel to m because sum of angles does not obey the property of parallel lines.