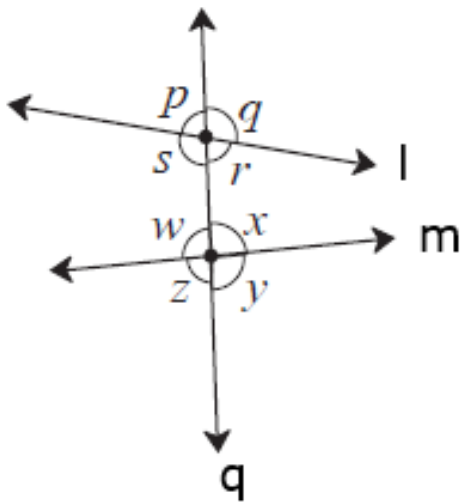


Parallel Lines And Transversals

Practice set 2.1

Q. 1. In the adjoining figure, each angle is shown by a letter. Fill in the boxes with the help of the figure.



Corresponding angles.

(1) $\angle p$ and [] (2) $\angle q$ and []

(3) $\angle r$ and [] (4) $\angle s$ and []

Interior alternate angles.

(5) $\angle s$ and [] (6) $\angle w$ and []

Answer : • Given: Line q is transversal is to line m and line l .

• To find corresponding angles of

1) $\angle p$

2) $\angle q$

3) $\angle r$

4) $\angle s$

• Explanation:

If we go by the definition, the definition of corresponding angles tells us, if the arms on the transversal of a pair of angles are in the same direction and the other arms are on the same side of the transversal, then it is called a pair of corresponding angles.

So, now in the above given figure we have say, line q making transversal to line m and line l.

1) For $\angle p$, $\angle w$ is the angle which is in the same side and same direction of transversal so $\angle w$ is the corresponding angle to $\angle p$.

2) For $\angle q$, $\angle x$ is the angle which is in the same side and same direction of transversal so $\angle x$ is the corresponding angle to $\angle q$.

3) For $\angle r$, $\angle y$ is the angle which is in the same side and same direction of transversal so $\angle r$ is the corresponding angle to $\angle y$.

4) For $\angle s$, $\angle z$ is the angle which is in the same side and same direction of transversal so $\angle s$ is the corresponding angle to $\angle z$.

Now for Interior Alternate angles

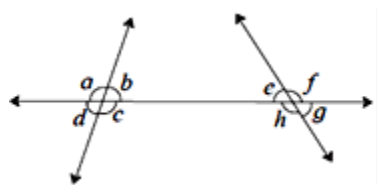
Pairs of angles which are on the opposite sides of transversal and their arms on the transversal show opposite directions is called a pair of alternate angles.

When these angles are in the inner side they are called Interior alternate angles.

5) For $\angle s$ the angle which is in the inner side as well as on the opposite side of transversal and its arm show opposite direction is $\angle x$. So $\angle s$ and $\angle x$ form pair of Interior Alternate angle.

6) For $\angle w$ the angle which is in the inner side as well as on the opposite side of transversal and its arm show opposite direction is $\angle r$. So $\angle w$ and $\angle r$ form pair of Interior Alternate angle.

Q. 2. Observe the angles shown in the figure and write the following pair of angles.



(1) Interior alternate angles

(2) Corresponding angles

(3) Interior angles

Answer : • Given: Line q is transversal is to line m and line l.

• To find: (1) Interior alternate angles

(2) Corresponding angles

(3) Interior angles

(1) Now for Interior Alternate angles

Pairs of angles which are on the opposite sides of transversal and their arms on the transversal show opposite directions is called a pair of alternate angles.

When these angles are in the inner side they are called Interior alternate angles.

1) For $\angle b$ the angle which is in the inner side as well as on the opposite side of transversal and its arm show opposite direction is $\angle h$. So $\angle b$ and $\angle h$ form pair of Interior Alternate angle.

2) For $\angle c$ the angle which is in the inner side as well as on the opposite side of transversal and its arm show opposite direction is $\angle e$. So $\angle c$ and $\angle e$ form pair of Interior Alternate angle.

(2) Corresponding angles

If we go by the definition, the definition of corresponding angles tells us, if the arms on the transversal of a pair of angles are in the same direction and the other arms are on the same side of the transversal, then it is called a pair of corresponding angles.

So, now in the above given figure we have say, line q making transversal to line m and line l .

1) For $\angle a$, $\angle e$ is the angle which is in the same side and same direction of transversal so $\angle a$ is the corresponding angle to $\angle e$.

2) For $\angle b$, $\angle f$ is the angle which is in the same side and same direction of transversal so $\angle b$ is the corresponding angle to $\angle f$.

3) For $\angle d$, $\angle h$ is the angle which is in the same side and same direction of transversal so $\angle d$ is the corresponding angle to $\angle h$.

4) For $\angle c$, $\angle g$ is the angle which is in the same side and same direction of transversal so $\angle c$ is the corresponding angle to $\angle g$.

(3) Interior angles

A pair of angles which are on the same side of the transversal and inside the given lines is called a pair of interior angles.

So, we get only two such pairs of angles.



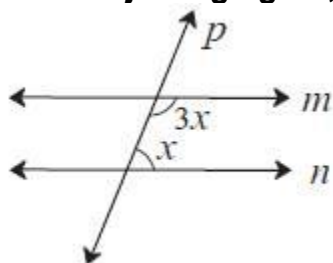
1) $\angle b$ has $\angle e$ on the same side of transversal and inside the given line. So $\angle b$ and $\angle e$ form pair of interior angles.

2) $\angle c$ has $\angle h$ on the same side of transversal and inside the given line. So $\angle c$ and $\angle h$ form pair of interior angles.

Practice set 2.2

Q. 1. A. Choose the correct alternative.

In the adjoining figure, if line $m \parallel$ line n and line p is a transversal then find x .



A. 135°

B. 90°

C. 45°

D. 40°

Answer : • Given: Line $m \parallel$ line n and line p is a transversal

• To find: The value of x .

Now in the given figure we have $3x$ and x . $3x$ and x form a pair of interior angle.

Now by the property of interior angles we know that, each pair of interior angles formed by two parallel lines and their transversal is of supplementary angles i.e. 180° .

$$\therefore x + 3x = 180 (\because \text{Property of interior angles.})$$

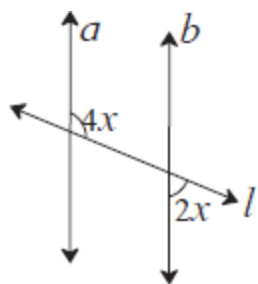
$$\Rightarrow 4x = 180$$

$$\Rightarrow x = \frac{180}{4} = 45^\circ$$

\therefore The value of x is 45° .

Q. 1. B. Choose the correct alternative.

In the adjoining figure, if line $a \parallel$ line b and line l is a transversal then find x .



A. 90°

B. 60°

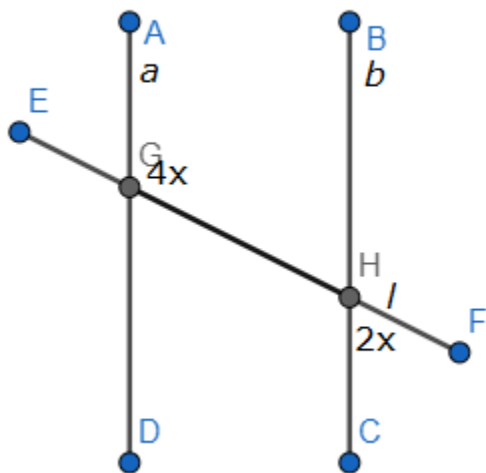
C. 45°

D. 30°

Answer : • Given: Line $a \parallel$ line b and line l is a transversal

• To find: Value of x .

Now from the figure we can see



$\angle GHB = \angle CHF$ (\because opposite angles are same)

$\Rightarrow \angle GHB = 2x$

$\angle AGB + \angle BHG = 180^\circ$ (\because Property of interior angles.)

$\therefore 4x + 2x = 180^\circ$

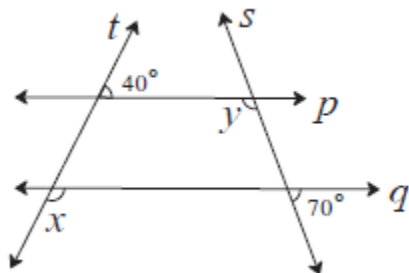
$\Rightarrow 6x = 180^\circ$

$$\Rightarrow x = \frac{180}{60} = 30^\circ$$

\therefore The value of x is 30°

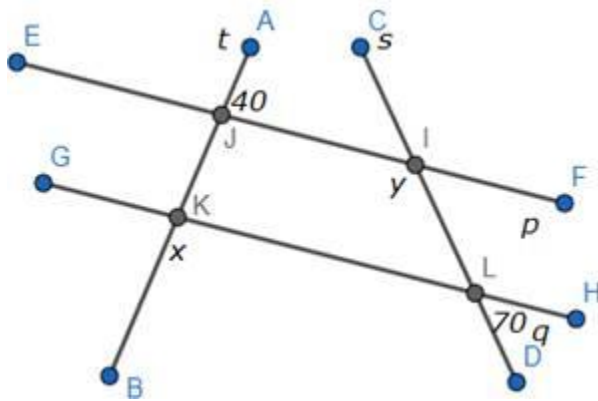
Option (D)

Q. 2. In the adjoining figure line $p \parallel$ line q . Line t and line s are transversals. Find the measure of $\angle x$ and $\angle y$ using the measures of angles given in the figure.



Answer : • Given: Line $p \parallel$ line q , line t and line s are transversals.

• To find: The measure of $\angle x$ and $\angle y$.



Here we can see

$\angle KLD = \angle HLD$ (\because Opposite angles are equal)

$$\Rightarrow \angle KLD = 70^\circ$$

$\angle KLI + \angle JIL = 180^\circ$ (\because Property of interior angles.)

$$\therefore 70 + Y = 180^\circ$$

$$\Rightarrow Y = 110^\circ$$

∴ The value of y is 110°

Also,

$$\angle BKL + \angle JKL = 180^\circ \text{ (Linear pair)}$$

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

$$\therefore \angle JKL = 180 - x \dots (1)$$

$$\angle KJI + \angle AJI = 180^\circ \text{ (Linear pair)}$$

$$\Rightarrow 40 + \angle KJI = 180^\circ$$

$$\therefore \angle KJI = 140^\circ \dots (2)$$

Now,

$$\angle KJI + \angle JKL = 180^\circ \text{ (} \because \text{Property of interior angles.)}$$

$$140 + 180 - x = 180 \text{ (From 1 and 2)}$$

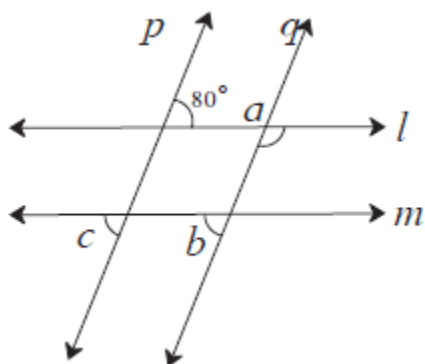
$$\Rightarrow -x = 180 - 180 - 140$$

$$\Rightarrow -x = 1 - 140^\circ$$

$$\therefore x = 140^\circ$$

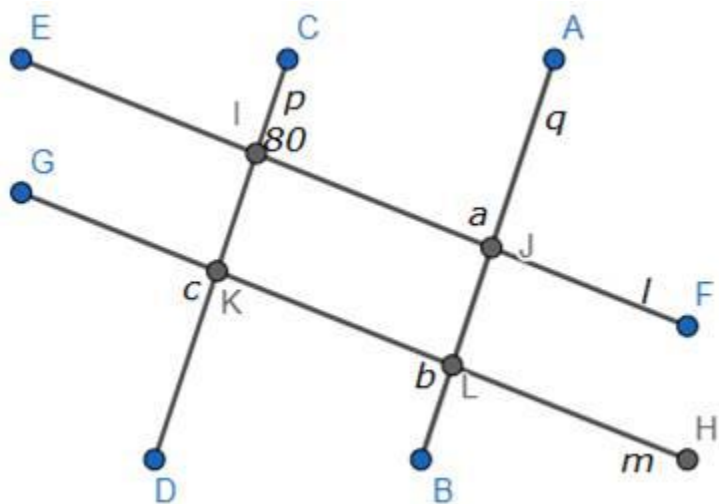
∴ The value of x is 140° .

Q. 3. In the adjoining figure. line $p \parallel$ line q . line $l \parallel$ line m . Find measures of $\angle a$, $\angle b$, and $\angle c$, using the measures of given angles. Justify your answers.



Answer : • Given: Line $p \parallel$ line q , line $l \parallel$ line m .

- To find: The measure of $\angle a$, $\angle b$ and $\angle c$.



Now in this figure

$$\angle CIJ + \angle AJI = 180^\circ \quad (\because \text{Exterior angles are supplementary})$$

$$\Rightarrow 80^\circ + a = 180^\circ$$

$$\Rightarrow a = 100^\circ$$

Also,

$$\angle AJI + \angle IJL = 180^\circ \quad (\text{Linear pair})$$

$$\Rightarrow 100^\circ + \angle IJL = 180^\circ$$

$$\therefore \angle IJL = 80^\circ$$

$$\angle BLK = \angle LJI = b \quad (\text{corresponding angles are equal})$$

$$\therefore b = 80^\circ$$

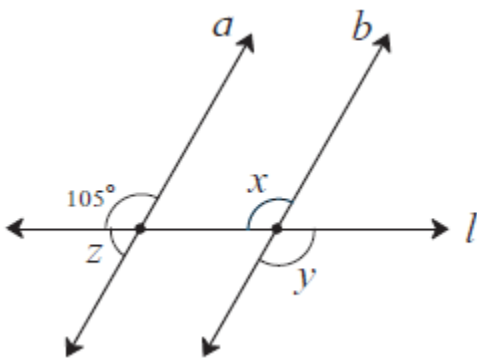
$$\angle EIK = \angle CIJ = 80^\circ \quad (\text{Opposite angles are equal})$$

$$\angle GKD = \angle EIK = c \quad (\text{corresponding angles are equal})$$

$$\therefore c = 80^\circ$$

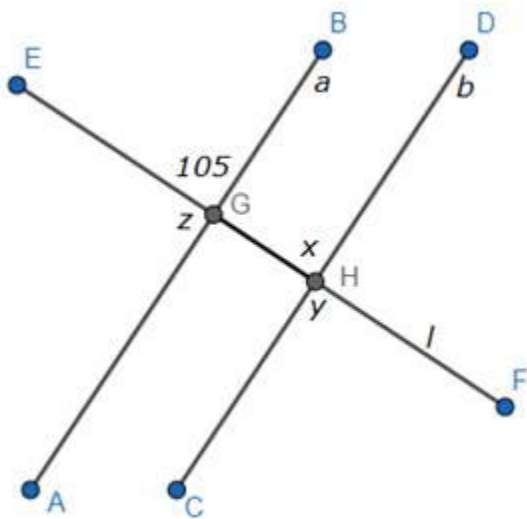
\therefore Values of a, b and c are $100^\circ, 80^\circ, 80^\circ$ respectively.

Q. 4. In the adjoining figure, line $a \parallel$ line b . line l is a transversal. Find the measures of $\angle x$, $\angle y$, $\angle z$ using the given information.



Answer : • Given: Line $a \parallel$ line b , line l is transversal.

• To find: The measure of $\angle x$, $\angle y$ and $\angle z$.



In, the figure above

$$\angle AGE = z$$

Also,

$$\angle AGE + \angle EGB = 180^\circ \text{ (Linear pair)}$$

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

$$z = 75^\circ$$

$$\angle GHD = x$$

$\angle EGB = \angle GHD$ (corresponding angles are equal)

$$\therefore x = 105^\circ$$

$$\angle DHF = y$$

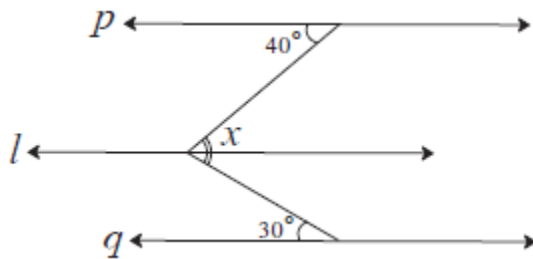
Also

$\angle DHF = \angle GHD$ (Opposite angles are equal)

$$\angle DHF = 105^\circ$$

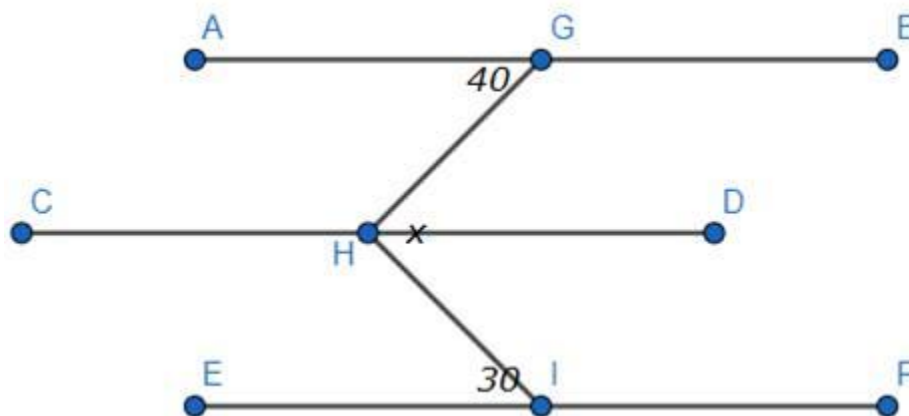
\therefore Values of x , y and z are $105^\circ, 105^\circ, 75^\circ$ respectively.

Q. 5. In the adjoining figure, line $p \parallel$ line $l \parallel$ line q . Find $\angle x$ with the help of the measures given in the figure.



Answer : • Given: line $p \parallel$ line $l \parallel$ line q .

• To find: Value x



Now, In the above figure $\angle GHD = x$

Also,

$$\angle GHD = \angle GHD + \angle IHD$$

$$\angle AGH = \angle GHD \quad (\because \text{Alternate angles are equal}) \dots (1)$$

$$\angle EIH = \angle DHI \quad (\because \text{Alternate angles are equal}) \dots (2)$$

From (1) and (2) we get,

$$\angle GHD = 40^\circ$$

$$\angle DHI = 30^\circ$$

We know

$$\angle GHD = \angle GHD + \angle IHD$$

$$\angle GHD = 40^\circ + 30^\circ$$

$$\angle GHD = 70^\circ$$

But,

$$\angle GHD = x$$

$$\therefore x = 70^\circ$$

\therefore The value of x is 70° .

Practice set 2.3

Q. 1. Draw a line l . Take a point A outside the line. Through point A draw a line parallel to line l .

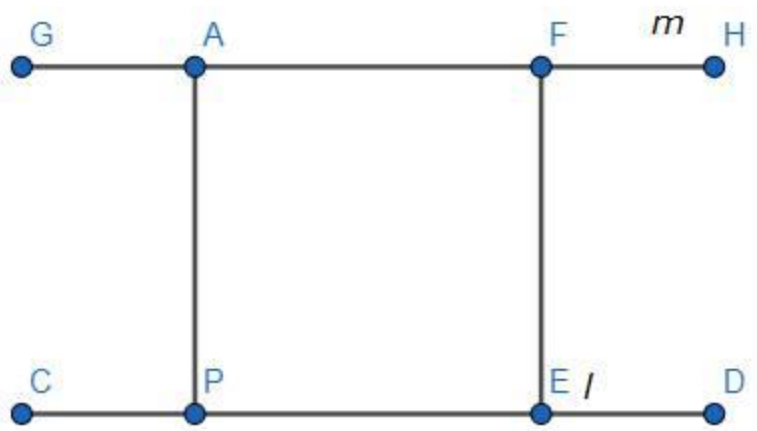
Answer : Here we need draw a line l then take a point A outside the line and then through that point draw another line parallel to l .

Steps of construction:

- 1) Draw a line segment of any length. Mark it as CD.
- 2) Now from any point say P on that segment draw perpendicular at any distance above or below and name that point A.
- 3) Now take another perpendicular of same length as of AP, and in same direction.



- 4) Draw a line through those points.
- 5) This line is parallel to given line l .

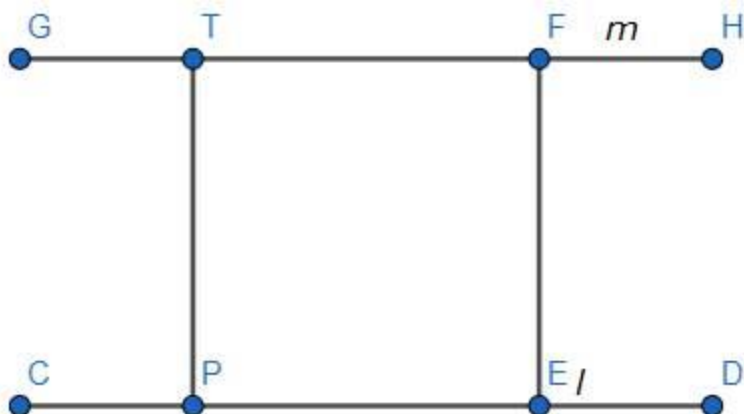


Q. 2. Draw a line l . Take a point T outside the line. Through point T draw a line parallel to line l .

Answer : Here we need draw a line l then take a point T outside the line and then through that point draw another line parallel to l .

Steps of construction:

- 1) Draw a line segment of any length. Mark it as CD.
- 2) Now from any point say P on that segment draw perpendicular at any distance above or below and name that point T.
- 3) Now take another perpendicular of same length as of TP, and in same direction.
- 4) Draw a line through those points.
- 5) This line is parallel to given line l .



Q. 3. Draw a line m . Draw a line n which is parallel to line m at a distance of 4 cm from it.

Answer : Method : Draw a line parallel to line l at a distance 4 cm.

Steps of construction :

- (1) Draw line l .
- (2) Take two points A and B on the line l .
- (3) Draw perpendiculars to the line l from points A and B.
- (4) On the perpendicular lines take points P and Q at a distance of 4cm from A and B respectively.
- (5) Draw line PQ.
- (6) Line PQ is a line parallel to the line l at a distance 4cm.

