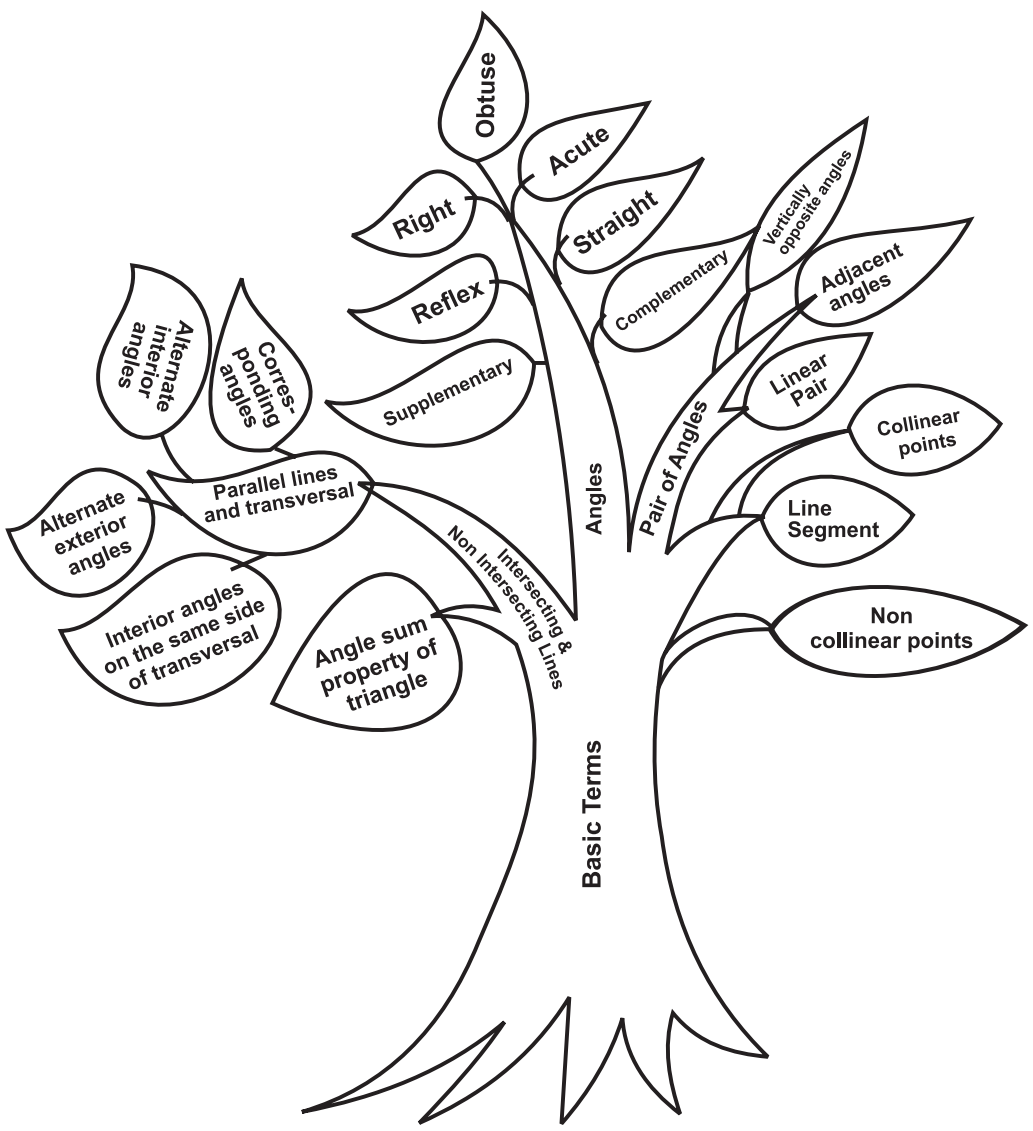
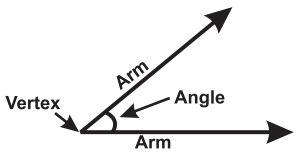
CHAPTER-6
LINES AND ANGLES

MIND MAP

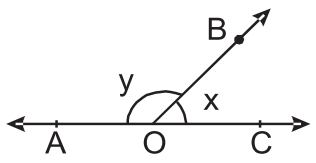


Key points

- Line is a collection of points which has only length, neither breadth nor thickness.
- **Line Segment:** A part or portion of a line with two end points.
- **Ray:** A part of a line with one end point.
- **Collinear points:** Three or more points lying on the same line.
- **Non-Collinear Points:** Three or more points which do not lie on same line.
- **Angle:** An angle is formed when two rays originate from the same end point. The rays making angle are called the arms and the end point is the vertex.

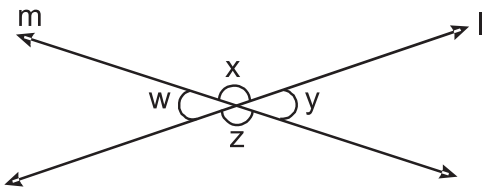


- **Acute Angle:** An angle measure between 0° and 90°
- **Right angle:** Angle exactly equal to 90°
- **Obtuse angle:** An angle greater than 90° but less than 180°
- **Straight angle:** An angle exactly equal to 180°
- **Reflex angle:** An angle greater than 180° but less than 90°
- **Complimentary angles:** A pair of angles whose sum is 90°
- **Supplementary angle:** A pair of angles whose sum is 180°
- **Complete angle:** An angle whose measure is 360°
- **Adjacent angles:** Two angles are adjacent if
  (i) they have a common vertex,
  (ii) a common arm,
  (iii) their non common arms are on opposite side of common arm.
- **Linear pair of angle:** A pair of adjacent angles whose sum is 180°



$\angle AOB$ and $\angle COB$ are forming linear pair.

- **Vertically opposite angles:** Angles formed by two intersecting lines on opposite side of the point of intersection.

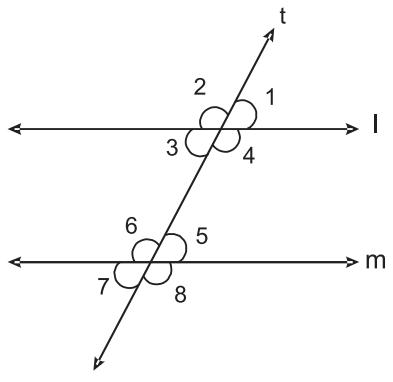


$\angle x = \angle z$
$\angle y = \angle w$

- **Intersecting lines:** Two lines are said to be intersecting when the perpendicular distance between the two lines is not same every where. They intersect at some point.
- **Non Intersecting lines:** Two lines are said to be non-intersecting lines when the perpendicular distance between them is same every where. They do not intersect. If these lines are in the same plane these are known as Parallel lines.
- **Transversal line:** In the given figure $l \parallel m$ and t is transversal then

(a) $\left.\begin{array}{l}\angle 1 = \angle 3 \\ \angle 2 = \angle 4 \\ \angle 5 = \angle 7 \\ \angle 6 = \angle 8\end{array}\right]$ Vertically opposite angle

(b) $\left.\begin{array}{l}\angle 1 = \angle 5 \\ \angle 2 = \angle 6 \\ \angle 3 = \angle 7 \\ \angle 4 = \angle 8\end{array}\right]$ Corresponding angle



(c) $\left.\begin{array}{l}\angle 3 = \angle 5 \\ \angle 4 = \angle 6\end{array}\right]$ Alternate Interior angle

(d) $\left.\begin{array}{l}\angle 2 = \angle 8 \\ \angle 1 = \angle 7\end{array}\right]$ Alternate Exterior angle

(e) $\left.\begin{array}{l}\angle 3 + \angle 6 = 180° \\ \angle 4 + \angle 5 = 180°\end{array}\right]$ Angles on the same sides of a transversal are supplementary.

$\angle 3, \angle 6$ and $\angle 4, \angle 5$ are called co-interior angles or allied angles or consecutive interior angles.

- Sum of all interior angles of a triangle is 180°.
- Two lines which are parallel to the third line are also parallel to each other.

Very Short Answer Questions (1 mark)

1. If an angle is equal to its complement, then the angle is

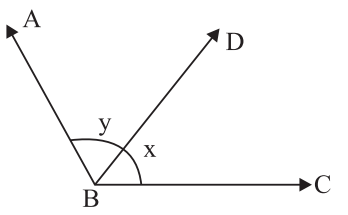
(a) 90° (b) 0°

(c) 48° (d) 45°

2. In the given fig. for what value of $x + y$, ABC will be a straight line?

(a) 90° (b) 180°

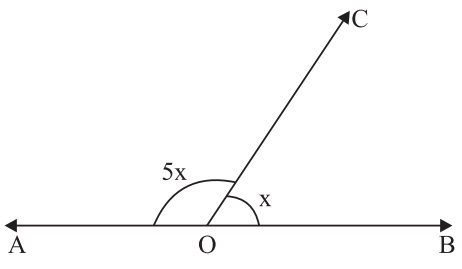
(c) 360° (d) 270°



3. In fig. $\angle AOC$ and $\angle BOC$ form a linear pair. Determine the value of x

(a) 30° (b) 150°

(c) 15° (d) 75°



4. The reflex angle of 110° is

(a) 70° (b) 90°

(c) 250° (d) 190°

5. One of the angles of a pair of supplementary angle is 10° more than its supplement, the angles are:

(a) 90°, 90° (b) 86°, 94°

(c) 85°, 95° (d) 42.5°, 47.5°

6. If three or more points does not lie on the same straight line, the points are called

(a) Concurrent points (b) Collinear points

(c) Non-collinear points (d) Adjacent point

7. If angles x and y form a linear pair and $x - 2y = 30°$, then the value of y is

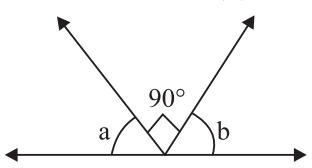
(a) 50° (b) 110°

(c) 210° (d) 60°

8. In the figure, AB is a straight line, then the value of $(a + b)$ is

(a) 0° (b) 90°

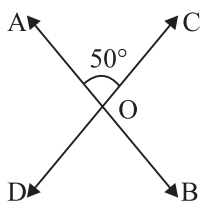
(c) 180° (d) 60°



9. If $\angle AOC = 50°$ then the value of $\angle BOD$ is _____

(a) 50° (b) 40°

(c) 130° (d) 25°



10. If two parallel lines are intersected by a transversal, then the interior angles on the same side of transversal are

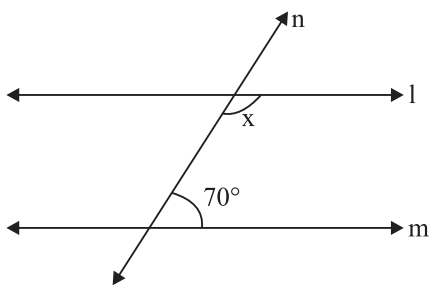
(a) equal (b) Adjacent

(c) supplementary (d) complementary

11. In figure, $l \parallel m$ value of x is _____

(a) 70° (b) 35°

(c) 210° (d) 110°



12. Three parallel lines intersect at _____ points

(a) one (b) two

(c) three (d) zero

13. If one angle of *a* linear pair is acute, then the other angle will be

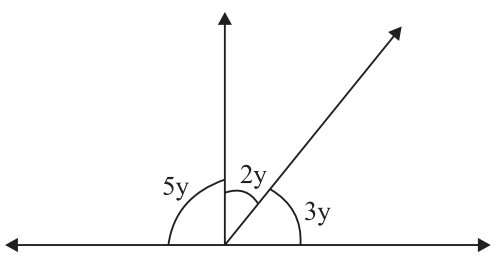
(a) right angle (b) obtuse angle

(c) acute angle (d) straight angle

14. In the given figure, the value of *y* is

(a) 18° (b) 9°

(c) 30° (d) 36°



15. A ray has only _____ end point.

16. A line segment has a _____ length.

17. If two lines are non-intersecting, then they will be _____.

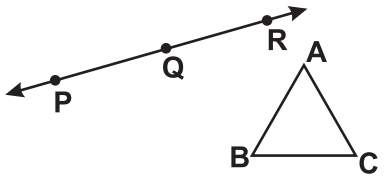
18. An angle whose measure is more than 0° but less than 90°, is called an _____ angle.

19. A straight angle has _____ right angles.

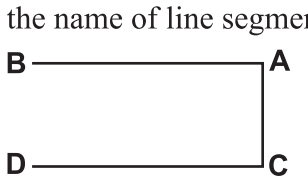
20. An angle whose measure is more than 180° but less than 360° is called _____ angle.

21. If an angle is equal to its supplement, then its measure is _____.

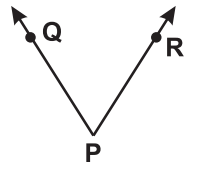
22. In the given figure, identify group of collinear points from (*P*, *Q*, *R*) and (*A*, *B*, *C*)



23. In the given figure, write the name of line segment whose one end point is B.

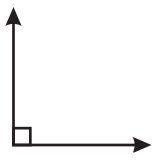


24. In the given figure, name the vertex of the angle.



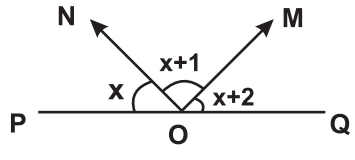
25. In the above figure, name the two arms of the angle.

26. Which type of angle is formed in the given figure

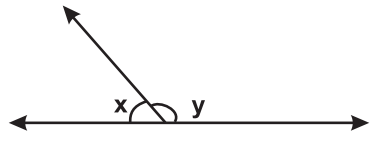


Short Answer type-I Questions (2 Marks)

27. In the given figure *POQ* is a straight line and*OM* and O*N* are two rays. The three adjacent angles so formed are consecutive numbers. Find the value of x.

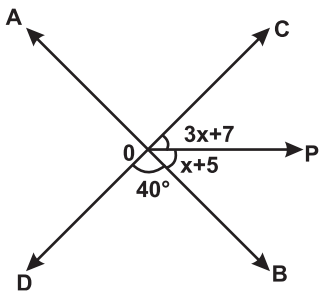


28. If angle x and y form linear pair and twice of x is 30° less than y, then find the value of x and y.



29. One of the angles of a pair of supplementary angles is 2° more than its supplement. Find the angles.

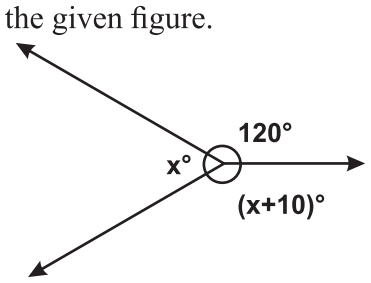
30. In the given figure *AB* and *CD* are two straight lines intersecting at *O* and *OP* is a ray. What is the measure of $\angle AOD$? Also find the value of x.



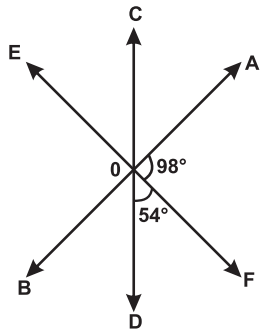
31. If the difference between two supplementary angles is 40°, then find smaller angle.

32. Find the angle which is four times more than its complement.

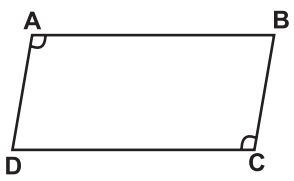
33. Find the value of x in the given figure.



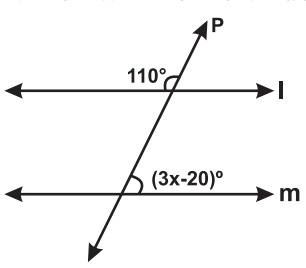
34. In the given figure, three straight lines AB, CD and EF intersect at point O Find the measure of $\angle BOC$.



35. In the given figure, $AB \parallel DC$ and $AD \parallel BC$. Prove that $\angle DAB = \angle DCB$.



36. In the given figure, if $l \parallel m$ then what is the value of x.

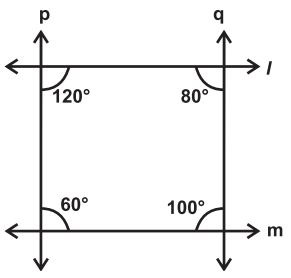


Short Answer Type-II Questions (3 marks)

37. By contributing money, 5 friends bought pizza. They want to divide equally among themselves. But one of them was given double share as he was very hungry. Find the angle of the piece of pizza each received.

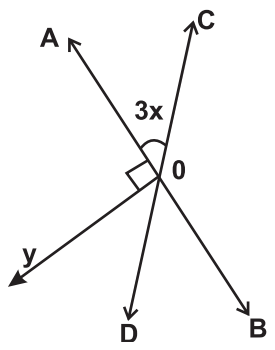
38. Prove that if two lines intersect then vertically opposite angles are equal.

39. In the figure, choose the pair of lines which are parallel. Give reasons also.

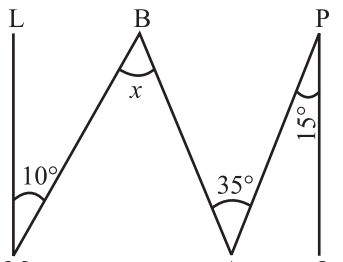


40. If one of the angle of two intersecting lines is right angle then prove that other three angles will also be right angles.

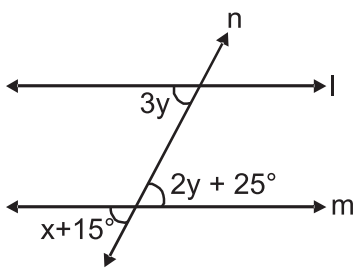
41. AB and CD are intersecting lines. OD is bisector of $\angle BOY$. Find x.



42. In the given figure $QP \parallel ML$, find the value of x.



43. In the given figure $l \parallel m$ and n is the transversal, find x.



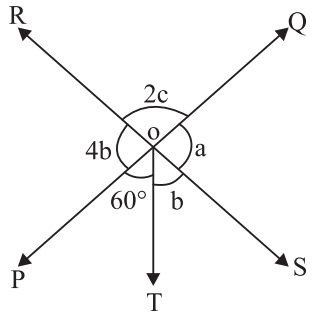
44. Two lines are respectively perpendicular to two parallel lines show that they are parallel to each other.

45. Prove that the bisectors of the angles of a linear pair form a right angle.

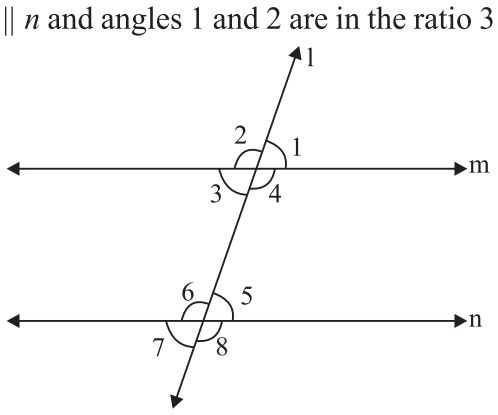
46. If two complementary angles are such that two times the measure of one is equal to three times the measure of the other. Find the measure of larger angle.

Long Answer Questions (5 Marks)

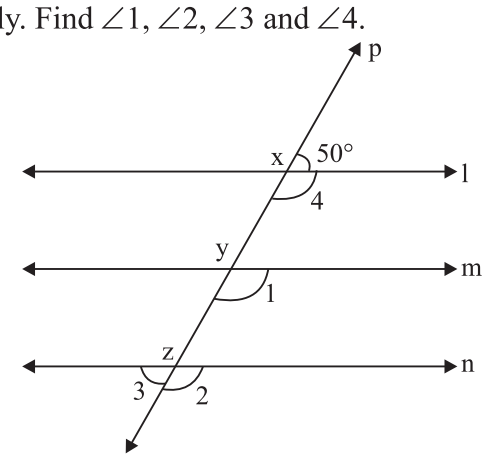
47. In the figure, two straight lines PQ and RS intersect each other at point O. If $\angle POT = 60°$. Find the value of a, b and c.



48. In figure, lines $m \parallel n$ and angles 1 and 2 are in the ratio 3: 2. Find all the angles

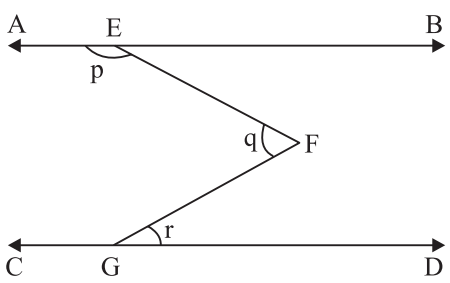


49. In figure l, m and n are parallel lines intersected by a transversal p at x, y and z respectively. Find $\angle 1$, $\angle 2$, $\angle 3$ and $\angle 4$.



50. If the arms of one angle are respectively parallel to the arms of another angle, then show that the two angles are either equal or supplementary.

51. In the given figure, $AB \parallel CD$. Prove that $p + q - r = 180°$



Chapter - 6
Lines and Angles
Answers

1. (d) 45°

2. (b) 180°

3. (a) 30°

4. (c) 250°

5. (c) 85°, 95°

6. (c) Non-collinear points

7. (a) 50°

8. (b) 90°

9. (a) 50°

10. (c) Supplementary

11. (d) 110°

12. (d) zero

13. (b) obtuse

14. (a) 18°

15. one

16. Definite

17. parallel

18. Acute

19. Two

20. Reflex

21. 90°

22. P, Q, R

23. $\overline{BA}$

24. P

25. PQ, PR

26. Right angle

27. 59°

28. $y - 2x = 30°$

$x = 50°, y = 130°$

29. 89°, 91°

30. $\angle AOD = 140°, \quad x = 32°$

31. 70°

32. 72°

33. 115°

34. 152°

35. Hint: Use the property that sum of interior angles on the same side of transversal are supplementary

36. 30°

37. 4 equal pieces = 60º, one double piece = 120º

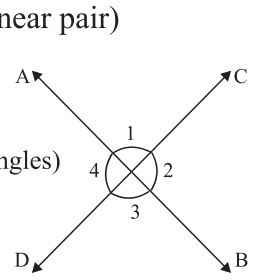
39. (Hint: $l \| m, p \| q$ because sum of interior angles on the same side of transversal is 180°.)

40. $\angle 1 = \angle 2 = 180°$ (linear pair)

$\Rightarrow \angle 2 = 90°$

$\angle 1 = \angle 3$, $\angle 2 = \angle 4$ (Vertically opposite angles)

$\Rightarrow \angle 3 = \angle 4 = 90°$



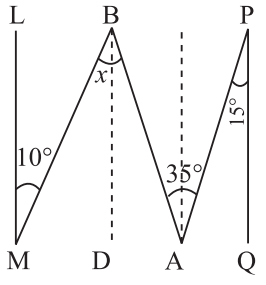
41. $x = 15°$

42. Draw $BD \parallel LM$ & $AC \parallel LM$ & $LM \parallel PQ$

$\angle PAC = \angle QPA = 15°$ (Alternate interior angles)

$\therefore \quad \angle CAB = 20°$

$x = 30°$

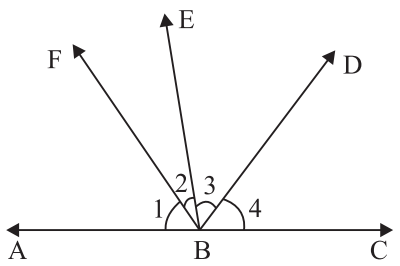


43. $3y = 2y + 25°$ (Alternate interior angles)

$x + 15° = 3y$ (Corresponding angles)

$x = 60°$

45. Given: $\angle ABE$ and $\angle EBC$ make linear pair BF and BD are bisectors of $\angle ABE$ and $\angle EBC$ respectively.



$\therefore \quad \angle ABE + \angle EBC = 180^0$

$$\frac{\angle ABE}{2} + \frac{\angle EBC}{2} = \frac{180^0}{2}$$

$\angle 2 + \angle 3 = 90^0$

$\angle FBD = 90°$

46. $2x = 3\ (90 - x)$

$\Rightarrow \quad x = 54°$

47. $5b + 60° = 180°$ (linear pair)

$\Rightarrow \quad b = 24°$

$a = 4b$ (vertically opp. $\angle$s)

$\Rightarrow \quad a = 96°$

$60° + b = 2c$ (vertically opp. $\angle$s)

$\Rightarrow \quad c = 42°$

48. $\angle 1 = \angle 5 = \angle 3 = \angle 7 = 108°$

$\angle 2 = \angle 6 = \angle 4 = \angle 8 = 72°$

49. $\angle 1 = \angle 2 = \angle 4 = 130°$

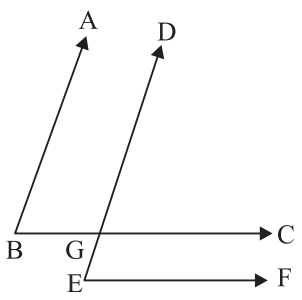
$\angle 3 = 50^o$

50. Case-1

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

$\therefore \quad BC \parallel EF$

$\angle ABC = \angle DEF$

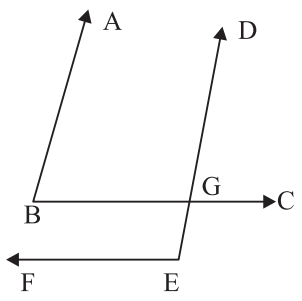


Case-2

$\angle ABC + \angle DGB = 180°$ (interior angles)

$\angle DGB = \angle DEF$ (corresponding angles)

$\angle ABC + \angle DEF = 180°$



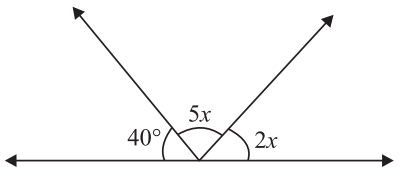
CHAPTER-6
LINES AND ANGLES
PRACTICE TEST

Time: 1 hr **M.M: 20**

1. If $\angle ABC = 142°$, find reflex $\angle ABC$. (1)

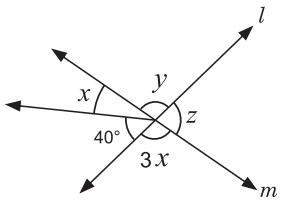
2. Two angles form a linear pair. If one of the angle is acute, what is the type of other angle. (1)

3. Find the value of x in the given figure. (2)



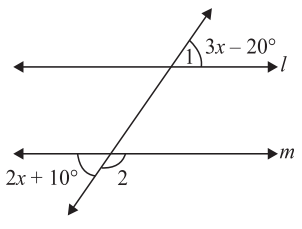
4. If the difference between two supplementary angles is 40° then find the angles. (2)

5. l and m are the intersecting lines in the given figure. Find the value of x, y and z. (3)



6. If complementary angles are in ratio 5 : 4 then find the angles. (3)

7. If $l \parallel m$ then find the angles $\angle 1$ and $\angle 2$. (3)



8. If $AB \parallel CD$, find the value of x, y and z. (5)