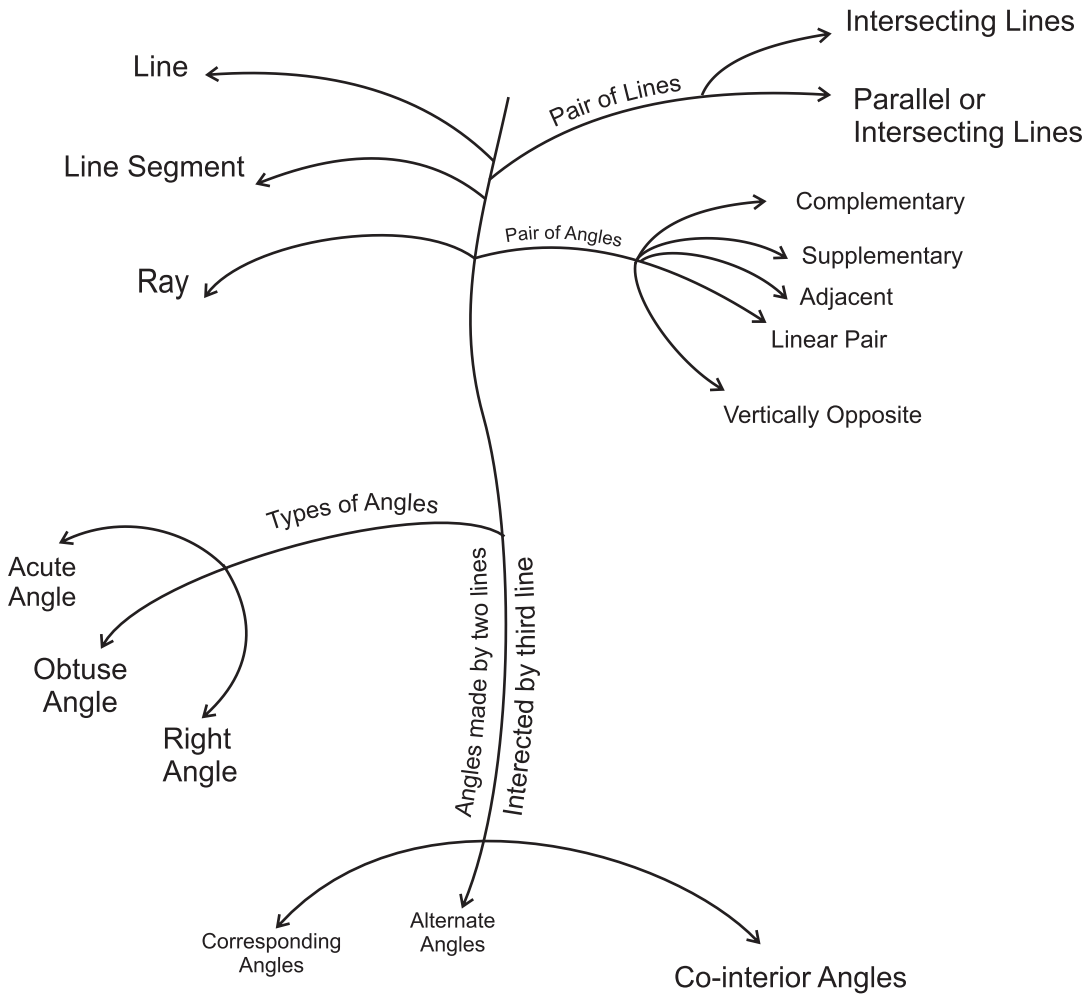
CHAPTER-6

LINES & ANGLES MIND MAP

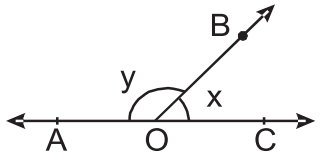


CHAPTER-6

LINES AND ANGLES

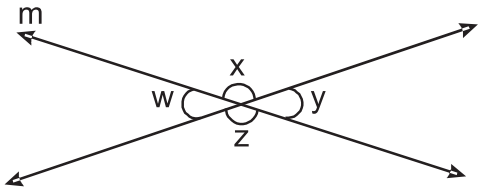
KEY POINTS

- 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.
- **Angle :** An angle is formed when two rays originate from the same end point. The rays making an 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 360°
- **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 sides of common arm.
- **Linear pair of angle :** A pair of adjacent angles whose sum is 180°



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

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



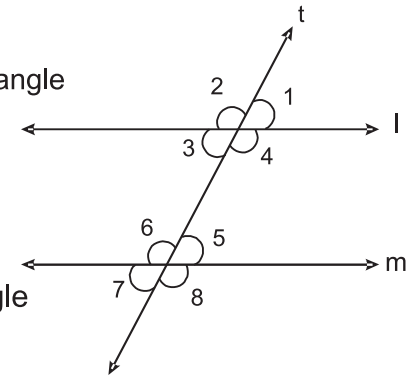
$\angle x = \angle z$
$\angle y = \angle w$

- **Intersecting lines:** Two lines are said to be intersecting when the perpendicular distance between the two lines is not same every where. They meet at one 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 meet. If these lines are in the same plane these are known as **Parallel lines.**

- **Transversal line :** In the given figure l || 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) $\left.\begin{array}{l}\angle 3 + \angle 6 = 180^\circ\\ \angle 4 + \angle 5 = 180^\circ\end{array}\right]$ 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.

LINES & ANGLES

Part-A

1. An angle which is greater than 180º & less than 360º is-

   a) Obtuse Angle b) Straight Angle

   c) Reflex Angle d) Complete Angle

2. 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

3. Reflex angle of 110^0 is -

   a) 70º b) 90°

   c) 250° d) 190°

4. If an angle is equal its complement, then the angle is –

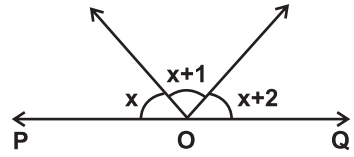
   a) 90° b) 0°

   c) 48° d) 45

5. If the figure POQ is a straight line. The three adjacent angles are consecutive numbers, the measure of these angles is –

   a) 50°, 60°, 70° b) 59°, 60°, 61°

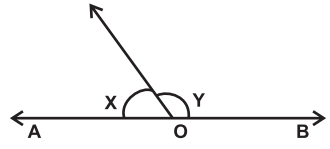
   c) 58°, 60°, 62° d) All are correct



6. In the figure, twice of x is 30^0 less than y, then the values of x & y are respectively, given OB & OA are opposite rays.

   a) 130°, 50° b) 50°, 130°

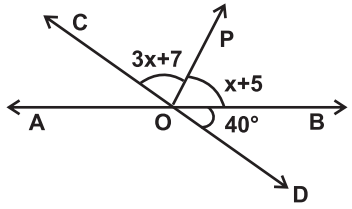
   c) 100°, 80° d) 75°, 105



7. One of the angles of a pair of supplementary angles is 2° more than its supplement, the angles are :-

a) 90°, 90° b) 88°, 92°

c) 89°, 91° d) All are correct



8. In the figure *AB & CD* are two straight lines intersecting at *O, OP* is a ray. What is the measure of $\angle AOD$.

a) 40° b) 100°

c) 140° d) 128°

9. If the difference between two supplementary angles is 40 then the angles are -

a) 40°,140° b) 80°, 100°

c) 110°, 70° d) 65°, 115°

10. The angles which is four times more than its complement is

a) 120° b) 144°

c) 150° d) 100°

11. An exterior angle of a triangle is 100° & its two interior opposite angles are equal. Measure of there equal angles are –

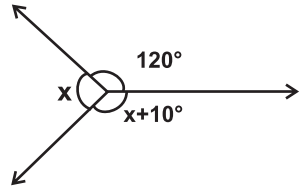
a) 40° b) 50°

c) 80° d) 90°

12. The value of *x* in the figure is

a) 230° b) 100°

c) 120° d) 115°



13. Which of the following options is correct :-

A pair of adjacent angles have.

(i) Common vertex

(ii) Common Arm.

(iii) Non Common arms are an opposite sides of common arms

(iv) Non Common arms are on the same side of common arms.

a) (i) & (ii) are sufficient

b) (i), (ii) & (iii) are sufficient

c) (i), (ii) & (iv) are sufficient

d) All are sufficient

14. Angles x & y forms a linear pair and $x+2y = 30°$, the value of y is

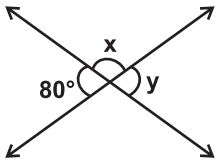
a) 70° b) 110°

c) 210° d) 60°

15. The degree measure of x & y respectively in the figure are –

a) 80°, 100° b) 100°, 80°

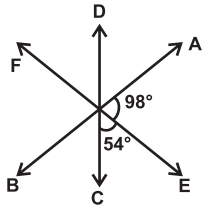
c) 80°, 80° d) 100°, 100°



16. In the figure AB, CD & EF are three Straight lines intersecting at O. The measure of $\angle AOF$ is –

a) 98° b) 152°

c) 54° d) 82°



17. If $\angle ABC + \angle DEF = 180^0$, name the pair of angles $\angle ABC$ & $\angle DEF$

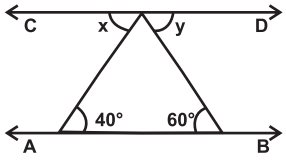
a) Adjacent Angles b) Complementary Angles

c) Supplementary Angle d) V.O.A

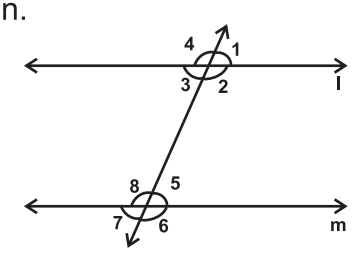
18. In the figure, $AB \parallel CD$, What is $x+y$.

a) 40° b) 60°

c) 100° d) 80°



19. From the Figure, choose the correct option.



(i) $\angle 1$ & $\angle 8$ are alternate angles

(ii) $\angle 1$ & $\angle 7$ are alternate angles

(iii) $\angle 3$ & $\angle 5$ are alternate angles

(iv) $\angle 4$ & $\angle 8$ are corresponding angles

(v) $\angle 2$ & $\angle 6$ are not corresponding angles.

(vi) $\angle 3$ & $\angle 8$ are interior angles on the same side of the transversal.

a) (i), (iii), (iv), (v) are correct b) (i), (ii), (iii) are correct

c) (ii), (iii), (iv), (vi) are correct d) (ii), (iii), (iv), (v) are correct.

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

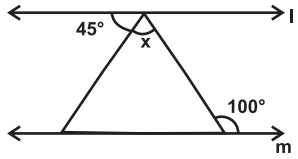
a) equal b) adjacent

c) Supplementary d) Complementary

21. In the figure, measure of *x* is –

a) 65° b) 55°

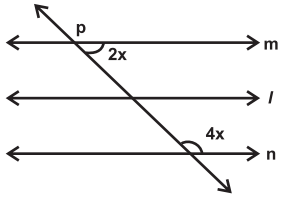
c) 100° d) 80°



22. In the figure, $l \parallel m$ & $l \parallel n$ then *x* is –

a) 90° b) 45°

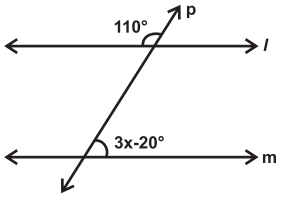
c) 30° d) 60°



23. In the figure, if $l \parallel m$ what is *x*.

a) 30° b) 70°

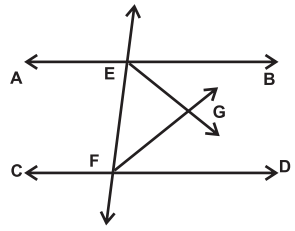
c) 43° d) 37°



24. In the figure, $AB \parallel CD$, EG & FG are *Bi* Sectors of $\angle BEF$ & $\angle DFE$ respectively, the $m\angle FGE$ is –

a) 45° b) 90°

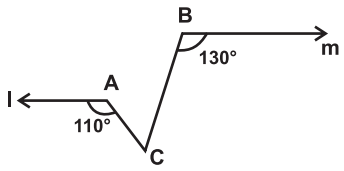
c) 60° d) 100°



25. In the figure, $l \parallel m$ such that $\angle A = 110°$ & $\angle B = 130°$ then m $\angle ACB$ is

a) 50° b) 60°

c) 70° d) 120°



26. The ratio of two interior angles on the same side of the transversal is 2 : 3, the measure of difference of both the angles is –

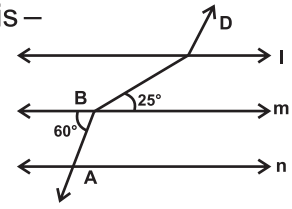
a) 36° b) 180°

c) 72° d) 108°

27. In the figure, $l \parallel m \parallel n$ and $AB \parallel CD$, then $\angle BCD$ is –

a) 120° b) 145°

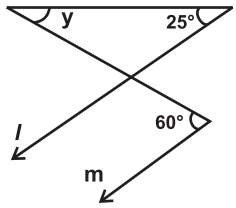
c) 85° d) 60°



28. In the figure $l \parallel m$, then $y =$ ———

a) 145° b) 120°

c) 60° d) 35°

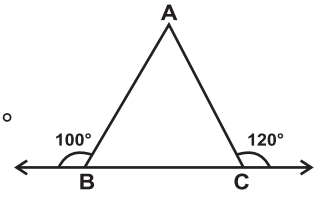


29. An exterior angle is drawn to a triangle, which is acute , then on the basis of angles what type of triangle is this –

a) Acute angled b) Obtuse angled

c) Right angled d) Scalene

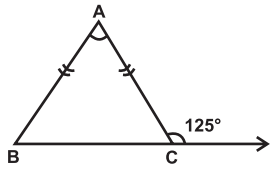
30. In the figure what is te m $\angle A$ =



a) 80° b) 60°

c) 40° d) 140°

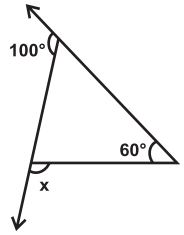
31. In the figure, if $AB = AC$ the $m\angle A$ is



a) 55° b) 75°

c) 70° d) 110°

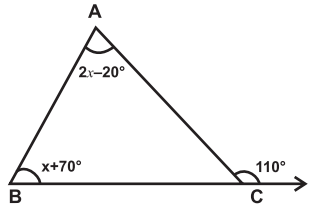
32. In the figure, measure of x is



a) 100° b) 140°

c) 60° d) 20°

33. In the figure, measure of $\angle$B is



a) 90° b) 20°

c) 110° d) 70°

34. If one of the angles of a triangles is 120°, then the angle between the interior bisectors of the other two angles is

a) 90° b) 30°

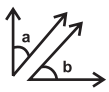
c) 150° d) 60°

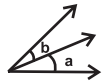
35. If one of the angles of a triangle is 62, then the angle between the exterior bisectors of the other two angles is

a) 31° b) 59°

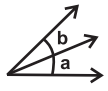
c) 121° d) 118°

36. If a & b forms a pair of adjacent angles then which figures proves it.

a) 

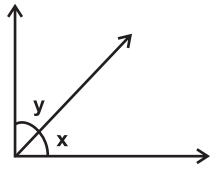
b) 

c) 

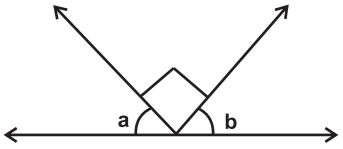
d) 

Fill in the blanks :–

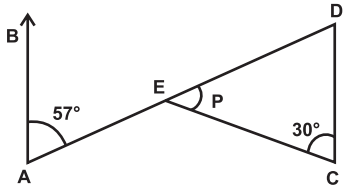
37. Two lines perpendicular to the same line are _____ to each other.
38. Two lines parallel to the same line are _____ to each other.
39. If one angle of a linear pair is acute, then its other angle will be _____
40. If the sum of two adjacent angles is 180°, then the _____ arms of the two angles are opposite rays.
41. If OB & OA are opposite rays, in the figure then the value of x+y is _____



42. If the figure AB is a straight line, then the valuer of a+b is _____



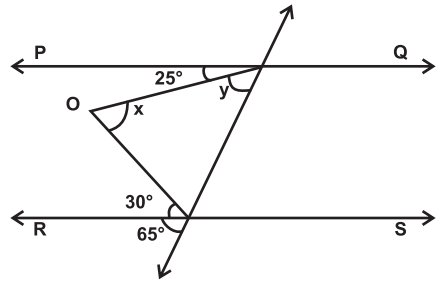
43. If (30–x)° is supplement of (125+2x)° then x is _____
44. If one of the angles of formed by two intersecting lines is a right angle then the lines are _____ to each other.
45. In the figure, if AB || CD then measure of p is



46. Exterior angle of a triangle is always _____ than either of its interior opposite angles.

PART-B

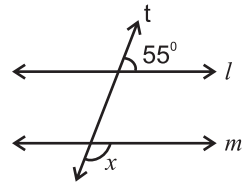
47. In the adjoining figure *PQ* || *RS* find *x and y.*



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

49. *BO* and *CO* are external bisector of $\angle B$ *and* $\angle C$ of Δ ABC Intersecting at O. If $\angle A = 60°$, $\angle ABC = 70°$, Find $\angle BOC$.

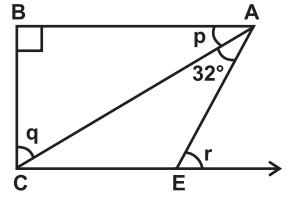
50. In the above question 18, if internal bisector of $\angle B$ and $\angle C$ intersect at P, prove that $\angle PBO = 90°$ and $\angle BOC + \angle BPC = 180°$



51. In the given figure if || *m* and *'t'* is the transversal find *x*.

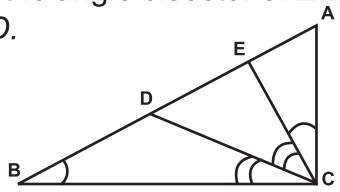
52. In the figure ,

    It *p : q = 11 : 19, AB* || *CE*, then find the values of p, q and r.

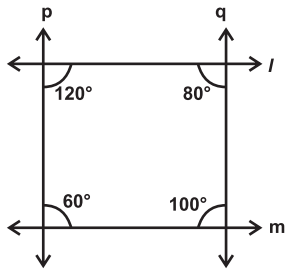


53. Prove that vertically opposite angles are equal.

54. In the figure, *CD* is the angle bisector of $\angle ECB$, $\angle B = \angle ACE$. Prove that $\angle ADC = \angle ACD$.

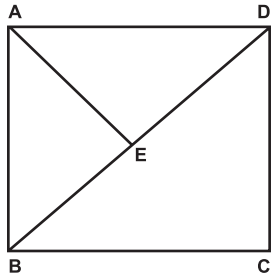


55. In the figure, choose the pair of lines which are parallel. Give reasons also.

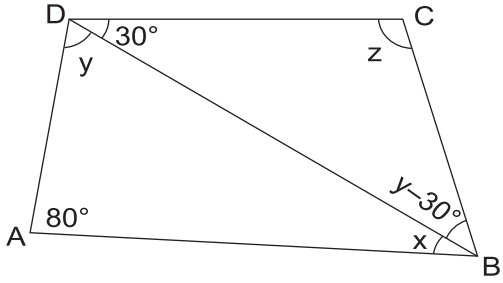


56. The angles of a triangle are $(x - 40°), (x-20°), (\frac{x}{2} - 10°)$
Find the value of x & then find the angles of the triangle.

57. In the figure, if $\angle AED = \angle BDC + \angle BAE$ then show that $AB \parallel CD$



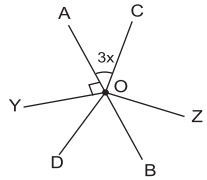
58. In the given figure if AB || DC and $\angle BDC = 30°$ $\angle BAD = 80°$ find $\angle x$, $\angle y$, $\angle z$.



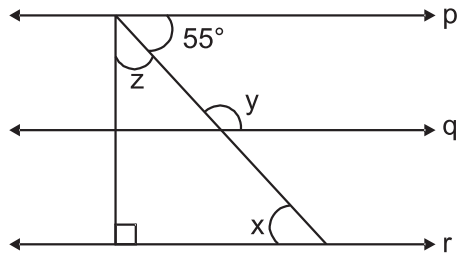
Part – C

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

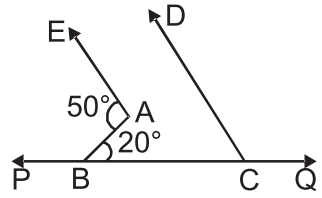
60. AB and CD are intersecting lines. OD is bisector of $\angle BOY$. Find x.



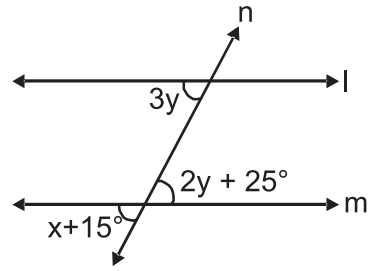
61. If p || q || r, find x, y, z from given figure.



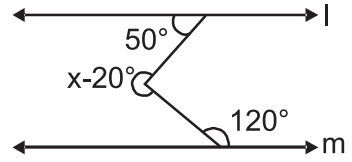
62. In the given figure find ∠DCB if AE || CD.



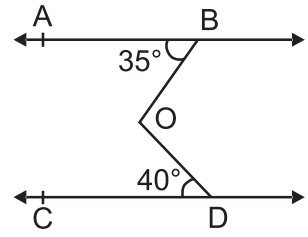
63. In the given figure l || m and n is the transversal, find x.



64. For what value of x, l || m.



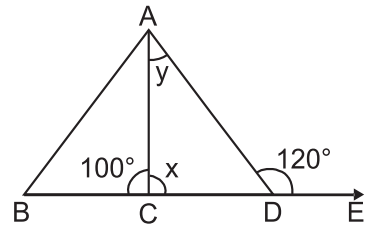
65. From the figure find reflex angle ∠BOD if AB || CD.



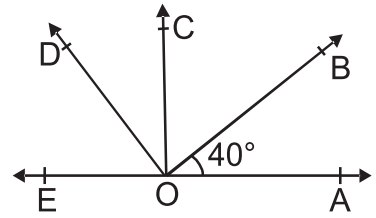
66. If the angles of a triangle are in the ratio 5 : 3 : 7 then show that the triangle is acute angled triangle.

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

68. As shown in the figure find x & y if $\angle ACB = 100°$, $\angle ADE = 120°$.



69. In the given figure $\angle DOB = 85°$, $\angle COA = 85°$, $\angle BOA = 40°$, find $\angle COB$ and $\angle DOC$.



70. Prove that the bisectors of the angles of a linear pair are at right angle.

71. 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.

72. Prove that the sum of all exterior angles of a triangle is 360°.

73. If the bisectors of $\angle Q$ and $\angle R$ of a triangle ΔPQR meet at point S, then prove that

$$\angle QSR = 90° + \frac{1}{2}\angle P$$

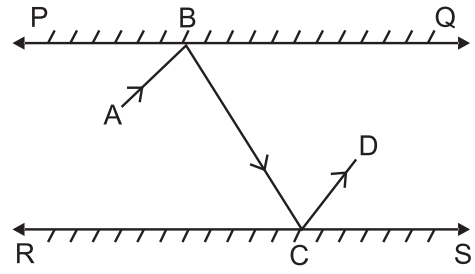
74. Show that if sum of the two angles of a triangle is equal to the third angle then the triangle is right angled triangle.

Part – D

75. If a transversal intersects two parallel lines prove that internal bisectors of the angle on the same side of a transversal meet at right angles.

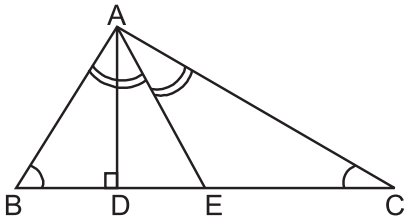
76. In the given figure PQ, RS are two mirrors placed parallel to each other. An incident ray AB strikes the mirror PQ at B; the reflected ray moves along the path BC again strikes the mirror RS at C and reflects back along CD.

Prove that AB || CD.



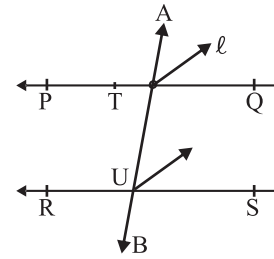
77. In the figure AE is the bisector of $\angle A$, $AD \perp BC$. Show that

$2(\angle ADE - \angle EAC) = \angle B + \angle C$



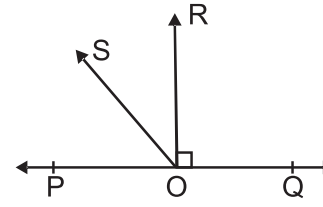
78. Prove that quadrilateral formed by the intersection of bisectors of interior angles made by a transversal on two parallel lines is a rectangle.

79. In the given figure $\ell \parallel m$ where ℓ and m are the bisectors of corresponding angles $\angle ATQ$ and $\angle TUS$ respectively Prove that PQ || RS.

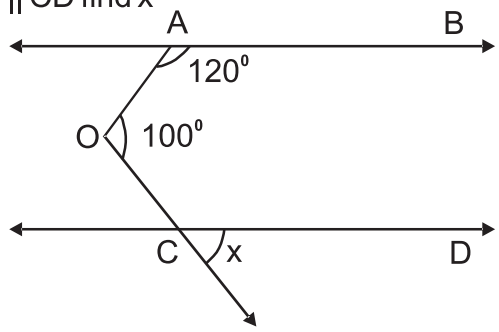


80. POQ is a straight line $RO \perp PQ$, SO is a ray from O then prove that

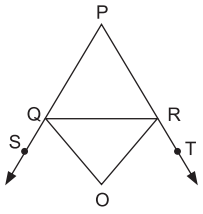
$$\angle ROS = \frac{1}{2}(\angle QOS - \angle POS)$$



81. (i) If AB || CD find x



82. In ΔPQR, sides PQ and PR are extended to S and T respectively. OQ and OR are bisector of $\angle RQS$ and $\angle QRT$ meeting at O. Show that



$2\angle QOR = \angle PQR + \angle QRP$

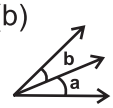
Chapter-6

LINES & ANGLES

ANSWERS

1. (c) Reflex Angle
2. (c) Non Collinear Points
3. (d) 250°
4. (d) 45°
5. (b) 59°, 60°, 61°
6. (b) 50°, 130°
7. (c) 89°, 91°
8. (c) 140°
9. (c) 110°, 70°
10. (c) 150°
11. (b) 50°
12. (d) 115°
13. (b) (i), (ii) & (iii) are sufficient
14. (a) 70°
15. (b) 100°, 80°
16. (d) 82°
17. (c) Supplementary Angles
18. (c) 100°
19. (c) (ii), (iii), (iv), (iv) are correct
20. (c) Supplementary
21. (b) 55°
22. (c) 30°
23. (a) 30°
24. (b) 90°
25. (b) 60°
26. (a) 36°
27. (b) 145°
28. (d) 35°
29. (b) Obtuse Angled Triangle.
30. (c) 40°
31. (c) 70°

32. (b) 140°
33. (a) 90°
34. (a) 90°
35. (b) 59°
36. (b)



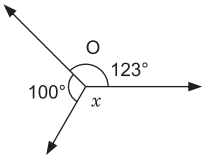
37. Parallel
38. Parallel
39. Obtuse
40. Non Common
41. 180°
42. 90°
43. 25°
44. Perpendicular
45. 93°
46. Greater
47. x = 55°, y = 40°
48. 4 Friends = 60°, 1 friend 60° x 2 = 120°
49. 60°
51. 125°
52. 33°, 57°, 65°
53. l || m
56. x = 100°, 60°, 80°, 40°
58. x = 30°, y= 70°, z = 110°
60. x = 15°
61. x = 55°, y = 125°, z = 35°
62. 30°
63. 60°
64. 270°
65. 285°
68. 80°, 40°
69. 45°, 40°
71. 54°
77. 17.5°
81. 40°

PRACTICE TEST
LINES AND ANGLES

Time : 50 Min. M.M. 20

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

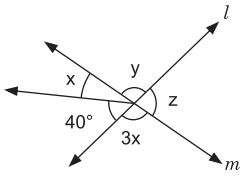
2. Two angles form a linear pair. If one of the angle is acute, what is the type of other angle? (1)

3. Find x in the given figure : 

(2)

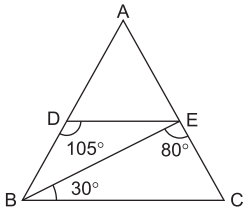
4. If two parallel lines intersected by a transversal, then name the pair of angles formed that are equal. (2)

5. In a ΔABC, $\angle A + \angle B = 125°$ and $\angle B + \angle C = 150°$. Find all the angle of ΔABC. (3)

6. l and m are the intersecting lines in the given figure. Find x, y and z. 

(3)

7. If two parallel lines are intersected by a transversal, then prove that the bisectors of the interior angles on both sides of transversal form a rectangle. (4)

8. ABC is a triangle in which DE || BC.
Find $\angle A$. 

(4)