



CHAPTER 5 : PARALLEL AND INTERSECTING LINES



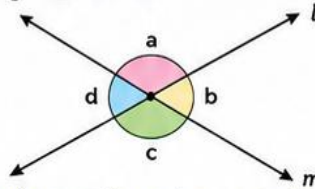
SUMMARY OF CONCEPTS

1. BASIC IDEAS

- ★ A line is a straight path that extends infinitely in both directions.
- ★ Two lines that meet at a point are said to **intersect**.
- ★ The point where they meet is called the **point of intersection**.
- ★ Two lines that never meet, however far they are extended on a plane, are called **parallel lines**.

2. INTERSECTING LINES

When two lines l and m intersect at a point, four angles are formed.



- Vertically opposite angles are equal.

$$\angle a = \angle c \quad \text{and} \quad \angle b = \angle d$$

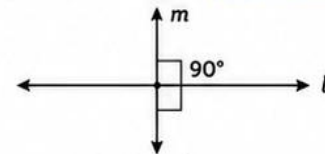
- Linear pairs add up to 180° .

$$\angle a + \angle b = 180^\circ \quad \angle b + \angle c = 180^\circ$$

(Similarly for other linear pairs)

3. PERPENDICULAR LINES

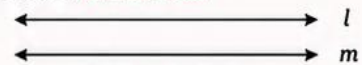
Two lines intersecting each other at right angles (90°) are called **perpendicular lines**.



Notation : $l \perp m$

4. PARALLEL LINES

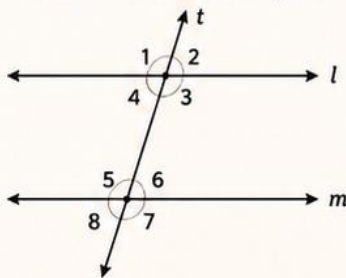
Two lines on the same plane that do not meet, however far they are extended, are called **parallel lines**.



Notation : $l \parallel m$

5. TRANSVERSAL AND ANGLES FORMED

A transversal is a line that intersects two (or more) lines at distinct points.



Corresponding angles

Angles in the same relative position at each intersection.

Pairs : (1,5), (2,6), (3,7), (4,8)

Alternate angles

Angles on opposite sides of the transversal and between the two lines.

Pairs : (3,6) and (4,5)

Interior angles on the same side

Angles between the two lines and on the same side of the transversal.

Pairs : (3,5) and (4,6)

Key Properties

- ✓ If a transversal intersects a pair of parallel lines, then corresponding angles are equal.
- ✓ If corresponding angles are equal, then the two lines are parallel.
- ✓ Alternate angles formed by a transversal intersecting a pair of parallel lines are equal.
- ✓ Interior angles on the same side of a transversal intersecting a pair of parallel lines add up to 180° .

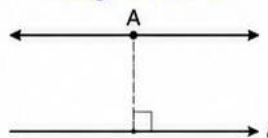
6. DRAWING PARALLEL LINES

Using Set Square

1. Draw a line l .
2. With a set square, draw a line perpendicular to l .
3. Shift the set square along a ruler and draw another perpendicular line.
4. The two perpendicular lines are parallel to each other.



Through a Point A



1. Draw a line perpendicular to l .
2. Through point A, draw a line perpendicular to this.
3. The new line through A is parallel to l .

7. IMPORTANT DEFINITIONS

- **Intersecting lines** : Lines that meet at a point.
- **Perpendicular lines** : Lines that intersect at right angles (90°).
- **Parallel lines** : Lines on the same plane that never meet.
- **Transversal** : A line that intersects two (or more) lines at distinct points.
- **Corresponding angles** : Angles in the same relative position.
- **Alternate angles** : Angles on opposite sides of the transversal and between the lines.
- **Interior angles on the same side** : Angles between the lines and on the same side of the transversal.
- **Linear pair** : A pair of adjacent angles whose sum is 180° .
- **Vertically opposite angles** : Opposite angles formed by two intersecting lines; they are equal.

8. QUICK REFERENCE

Concept	Condition	Result / Property
Vertically opposite angles	Two lines intersect	Opposite angles are equal ($\angle a = \angle c$, $\angle b = \angle d$)
Linear pair	Two adjacent angles on a straight line	Sum = 180°
Corresponding angles	Transversal cuts two lines	Equal (if lines are parallel)
Alternate angles	Transversal cuts two parallel lines	Equal
Interior angles on same side	Transversal cuts two parallel lines	Sum = 180°

9. REAL LIFE CONNECTIONS



Railway tracks are parallel.



Zebra crossings have parallel white lines.



Window frames have perpendicular horizontal and vertical lines.



Ladder rungs are parallel.

★ REMEMBER!

- ✓ Use a set square to draw perpendicular lines.
- ✓ Use equal corresponding angles to check if lines are parallel.
- ✓ Always identify the type of angles before applying any property.
- ✓ Visualise carefully and reason – that's geometry!

PARALLEL AND INTERSECTING LINES

WORKSHEET-1

Section A: MCQs (PART-1) ($10 \times 1 = 10$ marks)

1. When two lines meet at a point, they are called:

- a) Parallel lines
- b) Intersecting lines
- c) Perpendicular lines
- d) Curved lines

2. Two intersecting lines form:

- a) 2 angles
- b) 3 angles
- c) 4 angles
- d) 5 angles

3. Vertically opposite angles are:

- a) Supplementary
- b) Equal
- c) Complementary
- d) Unequal

4. The sum of a linear pair is:

- a) 90°
- b) 180°
- c) 270°
- d) 360°

5. Perpendicular lines intersect at:

- a) 45°
- b) 60°
- c) 90°
- d) 180°

6. Parallel lines:

- a) Meet at one point
- b) Meet at two points
- c) Never meet
- d) Form right angles

7. A line intersecting two other lines is called:

- a) Ray
- b) Segment
- c) Transversal
- d) Curve

8. Corresponding angles formed by a transversal on parallel lines are:

- a) Equal
- b) 90°
- c) Unequal
- d) Complementary

9. Alternate angles formed by a transversal on parallel lines are:

- a) Equal
- b) 180°
- c) 90°
- d) Unequal

10. Interior angles on the same side of a transversal add up to:

- a) 90°
- b) 120°
- c) 180°
- d) 360°

MCQs (PART-2) ($10 \times 1 = 10$ marks)

11. Two roads cross each other forming four angles. One of the angles measures 68° . What is the measure of the angle vertically opposite to it?

- a) 68°
- b) 112°
- c) 90°
- d) 136°

12. Two straight lines intersect. One angle is 125° . Which angle forms a linear pair with it?

- a) 125°
- b) 55°
- c) 65°
- d) 90°

13. A carpenter joins two wooden strips so that they meet at a right angle. The strips are:

- a) Parallel b) Perpendicular c) Intersecting but not perpendicular d) Skew

14. Two railway tracks remain at the same distance from each other and never meet even if extended. They are an example of:

- a) Intersecting lines b) Perpendicular lines c) Parallel lines d) Transversal lines

15. A transversal cuts two parallel lines. If one corresponding angle is 78° , another corresponding angle will be:

- a) 102° b) 78° c) 156° d) 90°

16. In a figure, two lines are cut by a transversal. One pair of corresponding angles is equal. What can you conclude?

- a) The lines intersect at right angles. b) The lines are parallel.
c) The lines are perpendicular. d) The transversal is parallel to both lines.

17. A transversal cuts two parallel lines. If one alternate angle measures 135° , the other alternate angle is:

- a) 45° b) 90° c) 135° d) 180°

18. When a transversal cuts two parallel lines, the interior angles on the same side of the transversal always add up to:

- a) 90° b) 180° c) 270° d) 360°

19. Which of the following statements is always true?

- a) Every intersecting pair of lines is perpendicular.
b) Every pair of parallel lines has equal corresponding angles when cut by a transversal.
c) Parallel lines meet at infinity on a plane.
d) Vertically opposite angles are supplementary.

20. A student draws two lines that appear parallel, but the corresponding angles formed by a transversal are 82° and 84° . What is the correct conclusion?

- a) The lines are parallel because they look parallel.
b) The lines are perpendicular.
c) The lines are not parallel because corresponding angles are unequal.
d) More information is needed.

WORKSHEET-2

Section B: Short Answer Questions ($10 \times 2 = 20$ Marks)

1. Two straight lines intersect. One of the angles formed is 72° . Find all the remaining three angles.

2. Explain why the opposite sides of a rectangular window are parallel and the adjacent sides are perpendicular.

3. A transversal cuts two parallel lines. One corresponding angle measures 115° . Find the alternate angle and justify your answer.

4. State any two differences between intersecting lines and parallel lines.

5. A student says, "If two lines never meet, they are always parallel." Is the statement always correct? Explain.

6. Two lines intersect to form four angles. If one angle is 135° , find the vertically opposite angle and one adjacent angle.

7. A transversal cuts two parallel lines. One alternate angle is 68° . Find the corresponding angle and the interior angle on the same side.

8. Why are corresponding angles useful in deciding whether two lines are parallel?

9. Draw two perpendicular lines and state two properties of perpendicular lines.

10. What happens to corresponding angles when a transversal intersects parallel lines?

Section C: Short Answer Questions ($6 \times 3 = 18$ Marks)

11. Two lines intersect and one angle measures 120° . Find the other three angles.

12.If two lines intersect and one angle is 75° , find its vertically opposite angle and adjacent angle.

13.Explain why all four angles formed by perpendicular lines are equal.

14.Draw and label: A pair of parallel lines , A pair of perpendicular lines

15.State any three properties of parallel lines.

16.Explain the relationship between corresponding angles and parallel lines.

Section D: Long Answer Questions ($4 \times 5 = 20$ Marks)

17. A transversal intersects two parallel lines. One corresponding angle is 65° . Find:

- (i) its corresponding angle
- (ii) its alternate angle
- (iii) the adjacent angle.

18. Explain with a diagram:

- (a) Linear Pair
- (b) Vertically Opposite Angles

19. Describe the paper-folding activity used to obtain parallel and perpendicular lines.

20. Draw two parallel lines and a transversal. Mark all corresponding angle pairs and alternate angle pairs.

Section E: Case Study Based Questions ($2 \times 4 = 8$ Marks)

21. Railway Track

Rohan observes railway tracks while travelling.

- (i) Why are the rails considered parallel lines?
- (ii) Will they ever meet if extended indefinitely?

22. Road Crossing

Two roads cross each other making an angle of 110° .

- (i) What is the measure of the vertically opposite angle?
- (ii) What is the measure of each adjacent angle?

Self Assessment:

I understood all the concepts:

☐ Yes

☐ No

I need more practice:

☐ Yes

☐ No

Name of Concepts having doubts/Not Cleared: _____

Parent's Assessment:

My ward understood all the concepts:

☐ Yes

☐ No

He/She needs more practice:

☐ Yes

☐ No

Name of Concepts having doubts/Not Cleared: _____

Signature of Parent:

Teacher's Assessment:

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Answers of Worksheet-1

Q.No.	1	2	3	4	5	6	7	8	9	10
Ans	b	c	b	b	c	c	c	a	a	c
Q.No.	11	12	13	14	15	16	17	18	19	20
Ans	a	b	b	c	b	b	c	b	b	c

Answers of Worksheet-2

Q.No.	1	2	3	4	5	6
Ans	2°, 108°, 72°, 108°	Explanation	115°	Explanation	No.	135° 45°
	7	8	9	10	11	12
	68° 112°	Explanation	They intersect at exactly one point. They form four right angles of 90° each	Equal	60°, 120°, 60°	75°, 105°
Q.No.	13	14	15	16	17	18
Ans	Explanation	Drawing	Statement	Explanation	(i)65° (ii)65° (iii) 115°	Explanation
Q.No.	19	20	21	22		
Ans	Description	Drawing	Explanation	(i)110° (ii) 110 (iii)70°		