



# LITTERA PUBLIC SCHOOL

**CLASS VI**

**CHAPTER 13**

**MATHS**

## Parallel lines

Two or more lines that lie in the same plane and never intersect each other are known as **parallel lines**. They are equidistant from each other and have the same slope. Let us learn more about parallel lines in this article.

What are Parallel Lines?

Parallel lines are straight lines that never meet each other no matter how long we extend them. Observe the following figure that shows parallel lines. Line 'a' is parallel to line 'b', and line 'p' is parallel to line 'q'.

### Parallel Lines and Transversal

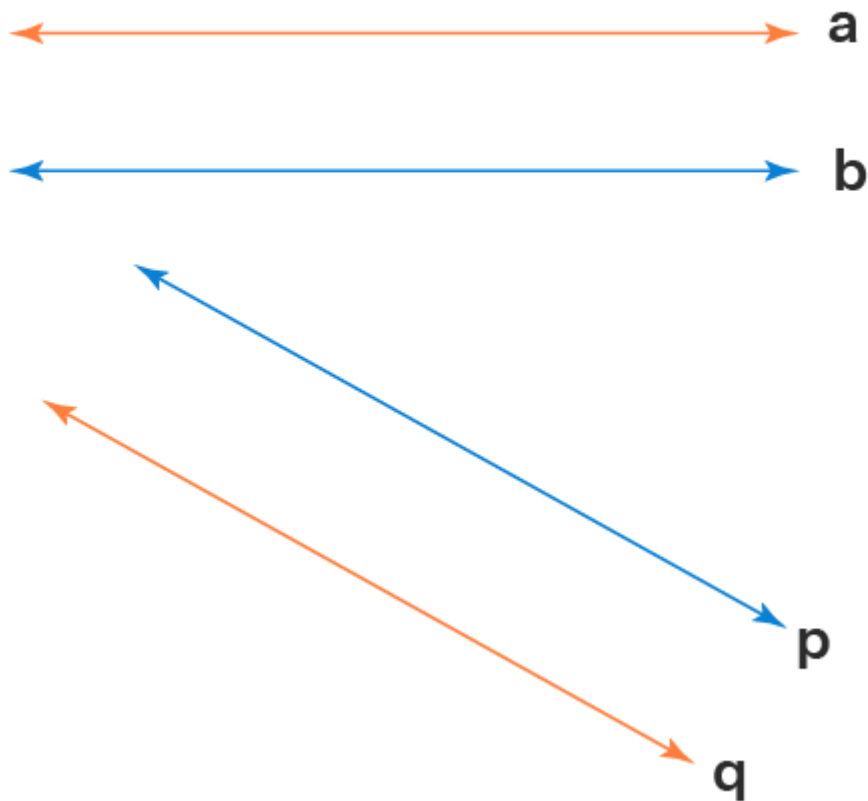
When any two parallel lines are intersected by another line called a transversal, many pairs of angles are formed. While some angles are congruent (equal), the others are supplementary. Observe the following figure to see the parallel lines labeled as L1 and L2 that are cut by a transversal. Eight separate angles have been formed by the two parallel lines and a transversal. Each angle has been labeled using an alphabet.

## Parallel lines

Two or more lines that lie in the same plane and never intersect each other are known as **parallel lines**. They are equidistant from each other and have the same slope. Let us learn more about parallel lines in this article.

What are Parallel Lines?

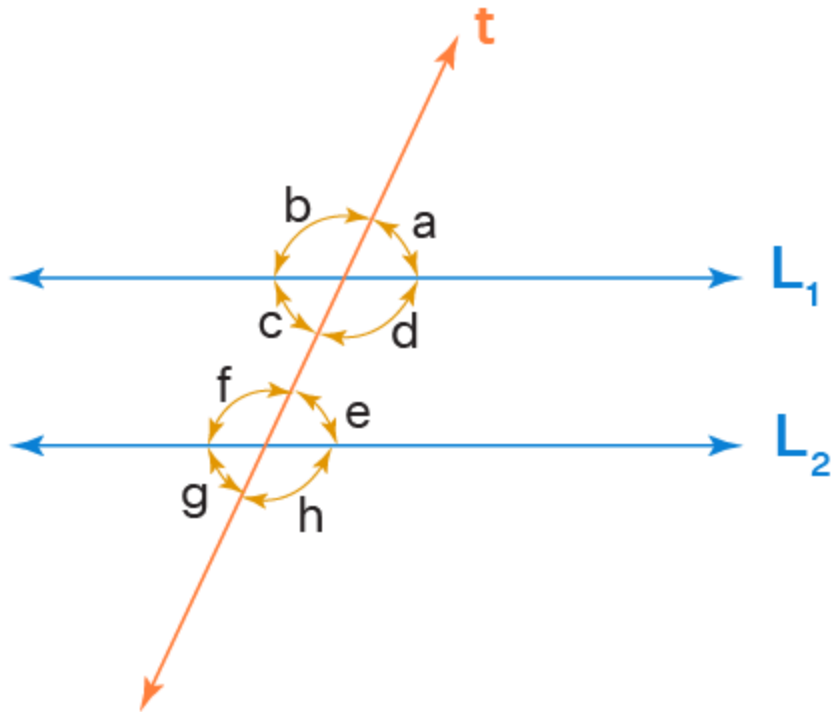
Parallel lines are straight lines that never meet each other no matter how long we extend them. Observe the following figure that shows parallel lines. Line 'a' is parallel to line 'b', and line 'p' is parallel to line 'q'.



### Parallel Lines and Transversal

When any two parallel lines are intersected by another line called a transversal, many pairs of angles are formed. While some angles are congruent (equal), the others are supplementary. Observe the following figure

to see the parallel lines labeled as L1 and L2 that are cut by a transversal. Eight separate angles have been formed by the two parallel lines and a transversal. Each angle has been labeled using an alphabet.



Given below are the pairs of angles formed by the two parallel lines L1 and L2.

- Corresponding Angles: It should be noted that the pair of **corresponding angles** are equal in measure. In the given figure, there are four pairs of corresponding angles, that is,  $\angle a = \angle e$ ,  $\angle b = \angle f$ ,  $\angle c = \angle g$ , and  $\angle d = \angle h$
- Alternate Interior Angles: **Alternate interior angles** are formed on the inside of two parallel lines that are intersected by a transversal. They are equal in measure. In this figure,  $\angle c = \angle e$ ,  $\angle d = \angle f$
- Alternate Exterior Angles: **Alternate exterior angles** are formed on either side of the transversal and they are equal in measure. In this figure,  $\angle a = \angle g$ ,  $\angle b = \angle h$

- **Consecutive Interior Angles:** **Consecutive interior angles** or co-interior angles are formed on the inside of the transversal and they are supplementary. Here,  $\angle c + \angle f = 180^\circ$ , and  $\angle d + \angle e = 180^\circ$
- **Vertically Opposite Angles:** **Vertically opposite angles** are formed when two straight lines intersect each other and they are equal in measure. Here,  $\angle a = \angle c$ ,  $\angle b = \angle d$ ,  $\angle e = \angle g$ ,  $\angle f = \angle h$

## Parallel Lines Properties

Parallel Lines can be easily identified with the basic properties given below.

- Parallel lines are those straight lines that are always the same distance apart from each other.
- Parallel lines never meet no matter how much they are extended in either direction.

How do you Know if Lines are Parallel?

Apart from the characteristics given above, when any two parallel lines are cut by a transversal, they can be identified by the following properties.

- Any two lines are said to be parallel if the Corresponding angles so formed are equal.
- Any two lines are said to be parallel if the Alternate interior angles so formed are equal.
- Any two lines are said to be parallel if the Alternate exterior angles so formed are equal.
- Any two lines are said to be parallel if the Consecutive interior angles on the same side of the transversal are supplementary.

## Parallel Lines Equation

The equation of a straight line is generally written in the slope-intercept form represented by the equation,  $y = mx + b$ , where 'm' is the slope and 'b' is the y-intercept. The value of 'm' determines the slope or gradient and tells us how steep the line is.

It should be noted that the slope of any two parallel lines is always the same. For example, if the slope of a line with the equation  $y = 4x + 3$  is 4. Therefore, any line that is parallel to  $y = 4x + 3$  will have the same slope, that is, 4.

Parallel lines have different y-intercepts and have no points in common.

## Parallel Lines Symbol

Parallel lines are the lines that never meet each other, no matter how long we extend them. The symbol used to denote parallel lines is  $\parallel$ . For example,  $AB \parallel PQ$  indicates that line  $AB$  is parallel to line  $PQ$ . The symbol that denotes non-parallel lines is  $\nparallel$ .

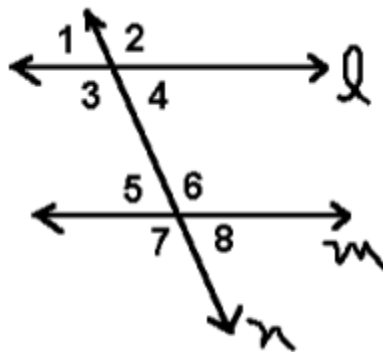
Parallel lines are defined as two or more lines that reside in the same plane but never intersect. They are exactly the same distance apart and have the same slope.

Parallel lines in geometry are the lines which do not cross at any point or intersect each other. Curves that do not touch or intersect and maintain a predetermined minimum distance are known as parallel curves. A line and a plane that does not share a point in three-dimensional Euclidean space are also said to be parallel. Skew lines, on the other hand, are two non-coplanar lines.

Euclid's parallel postulate deals with parallel lines. Parallelism is largely a feature of affine geometries, of which Euclidean geometry is a specific example. Lines can have equivalent features in other geometries, such as hyperbolic geometry, which is referred to as parallelism.

## Parallel Lines and Transversal

Many pairs of angles are created when any two parallel lines are intersected by a transversal. Some angles are complementary, whereas others are congruent (equal). Look at the parallel lines labelled  $l$  and  $m$  that are cut by a transversal line  $n$  in the diagram below. The two parallel lines and a transversal have created eight different angles. An alphabet has been used to mark each angle.



The angles created by the two parallel lines  $l$  and  $m$  are listed below.

- Corresponding Angles: It's worth noting that the corresponding angles are of identical magnitude. There are four pairs of corresponding angles in the above figure:  $\angle 1 = \angle 5$ ,  $\angle 2 = \angle 6$ ,  $\angle 3 = \angle 7$ , and  $\angle 4 = \angle 8$ .
- Alternate Interior Angles: On the inside of two parallel lines intersected by a transversal, alternate interior angles are generated. They are of equal size.  $\angle 3 = \angle 6$ ,  $\angle 4 = \angle 5$  in this diagram.
- Alternate Exterior Angles: On either side of the transversal, alternate exterior angles are generated in equal quantity. In this  $\angle 1 = \angle 8$  and  $\angle 2 = \angle 7$ .
- Consecutive Interior Angles, also known as co-interior angles, are supplementary angles created on the inside of the transversal.  $\angle 3 + \angle 5 = 180^\circ$ , and  $\angle 4 + \angle 6 = 180^\circ$  in this case.
- Vertically Opposite Angles: When two straight lines connect and are of equal length, vertically opposite angles are generated. In this case,  $\angle 1 = \angle 4$ ,  $\angle 2 = \angle 3$ ,  $\angle 5 = \angle 8$ , and  $\angle 6 = \angle 7$ .

## Parallel Line Properties

The basic qualities listed below can help you identify parallel lines.

- Straight lines that are always the same distance apart are known as parallel lines.
- No matter how far parallel lines are extended in any direction, they never intersect.

Apart from the qualities listed above, the following properties can be used to identify any two parallel lines that are cut by a transversal.

- If the angles formed by any two lines are equal, they are said to be parallel.
- If the Alternate interior angles formed by two lines are equal, they are said to be parallel.
- If the Alternate Exterior Angles formed by two lines are equal, they are said to be parallel.
- If the interior angles on the same side of the transversal are additional, two lines are said to be parallel.

## Parallel Lines Equation

A straight line's equation is usually stated in the slope-intercept form, which is represented by the equation  $y = mx + b$ , where 'm' is the slope and 'b' is the y-intercept. The slope or gradient is determined by the value of 'm,' which informs us how steep the line is.

It's worth noting that the slope of any two parallel lines is the same. If the slope of a line with the equation  $y = 4x + 3$  is 4, for example. As a result, any line parallel to  $y = 4x + 3$  has the same slope, which is 4. Parallel lines share no points and have different y-intercepts.

# Conclusion

Parallel lines are two lines in the same plane that are at the same distance from each other but never meet in geometry. Parallel lines are defined as two or more lines that reside in the same plane but never intersect. They are exactly the same distance apart and have the same slope. Parallel lines in geometry are the lines which do not cross at any point or intersect each other.

A line and a plane that does not share a point in three-dimensional Euclidean space are also said to be parallel. Skew lines, on the other hand, are two non-coplanar lines.

Many pairs of angles are created when any two parallel lines are intersected by a transversal. Some angles are complementary, whereas others are congruent (equal).

Straight lines that are always the same distance apart are known as parallel lines.

No matter how far parallel lines are extended in any direction, they never intersect.

A straight line's equation is usually stated in the slope-intercept form, which is represented by the equation  $y = mx + b$ , where 'm' is the slope and 'b' is the y-intercept.