BYJU'S
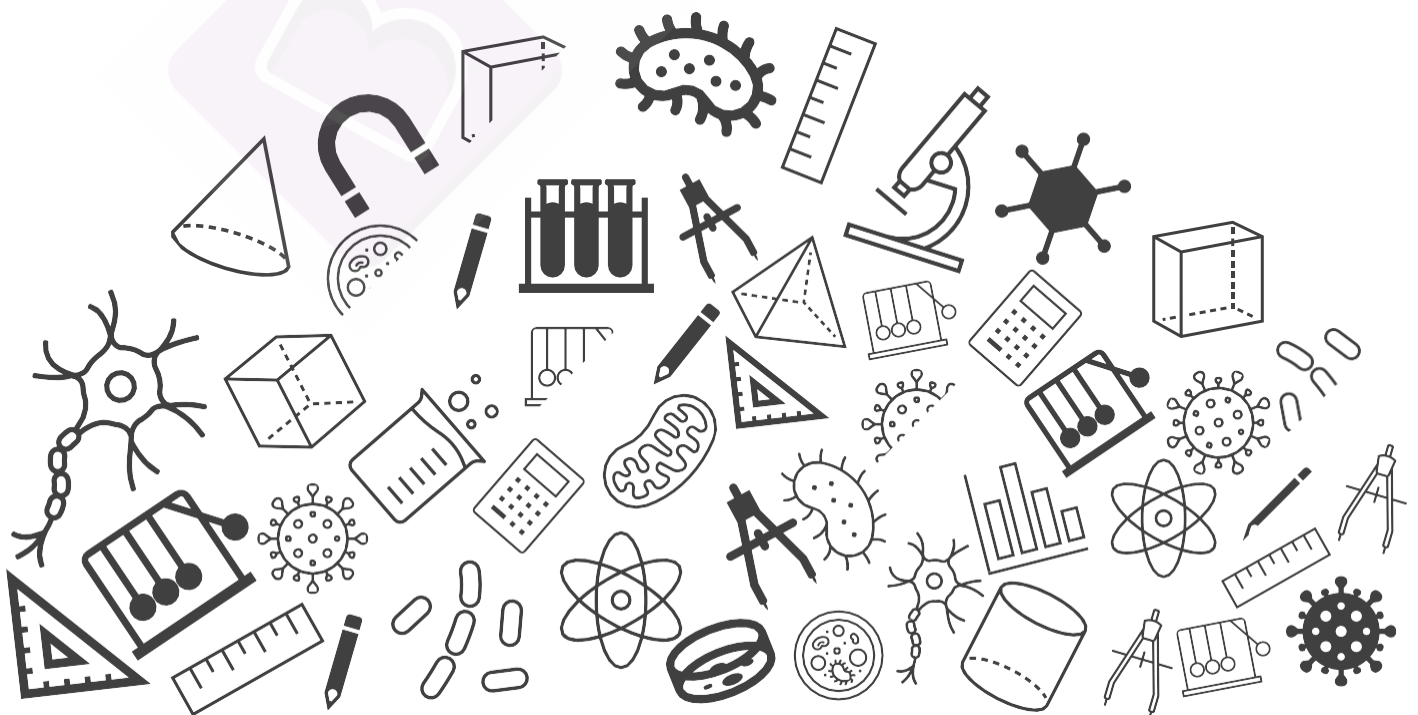
Grade 07: Maths
Chapter Notes

BYJU'S Classes

Chapter Notes

Lines and Angles

Grade 07

Topics to be Covered

1. Basics of Geometry

2. Related Angles

2.1. Complementary Angles
2.2. Supplementary Angles
2.3. Adjacent Angles
2.4. Linear Pair
2.5. Vertically Opposite Angles

3. Types of Lines

3.1 Intersecting Lines
3.2 Transversal
3.3 Parallel Lines

Mind Map

Intersecting Lines

Transversal

Parallel Lines

Types of Lines

Lines and Angles

Basics of Geometry

Related Angles

Complementary Angles

Vertically Opposite Angles

Supplementary Angles
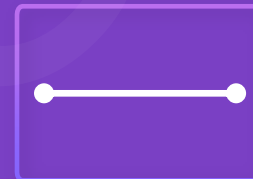
Adjacent Angles

Linear Pair
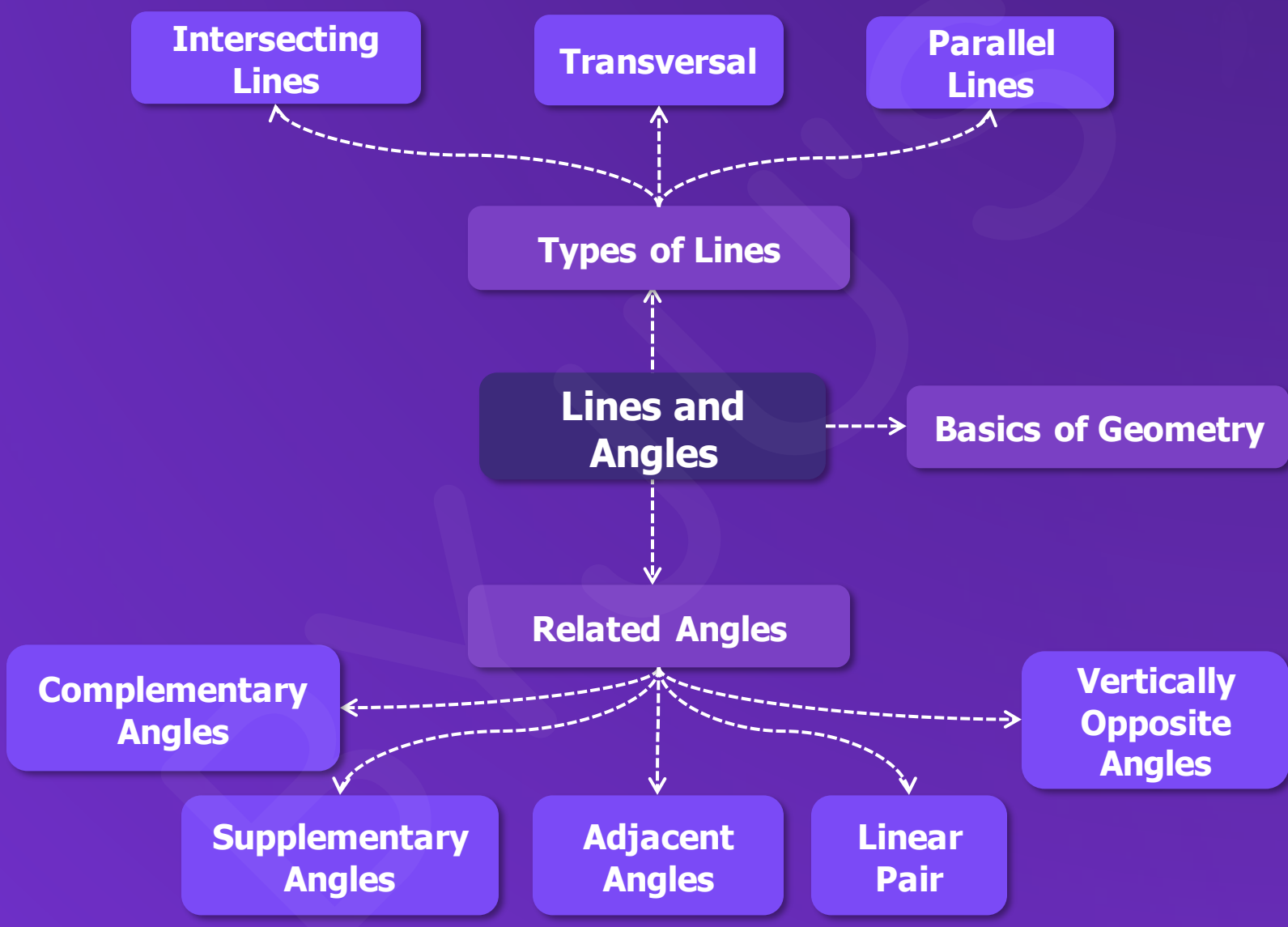
Line

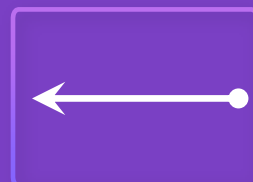- A line extends infinitely in both the directions.

Line Segment

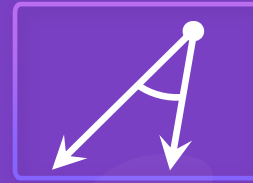- A line segment doesn't extend infinitely and has two endpoints.

Ray

- A ray has an endpoint on one end and extends infinitely on another end.

1. Basics of Geometry

Angle

- Two rays having the common endpoint form an angle.

Types of Angles

- An angle which is less than 90° is known as an acute angle.

- An angle which is of L shape or exact measure of 90° is known as the right angle.

- An angle which is greater than 90° but less than 180° is known as the obtuse angle.

- An angle which is a straight line or having the exact measure of 180° is known as the straight angle.

- An angle which is greater than 180° but less than 360° is known as the reflex angle.

- An angle which is an exact measure of 360° or one complete revolution is known as the complete angle.
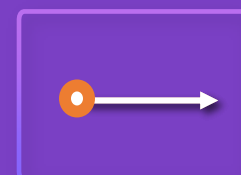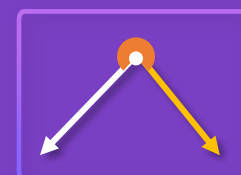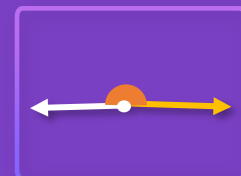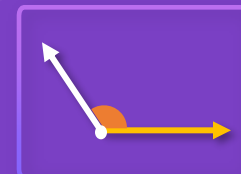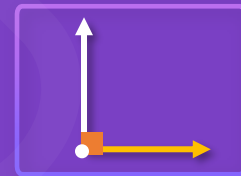
2. Related Angles

2.1. Complementary Angles

- The pair of angles whose sum is 90° are called complementary angles.

- From the yoga pose, we can conclude that ∠AOB and ∠BOC are complementary angles as ∠AOB + ∠BOC = 90°.
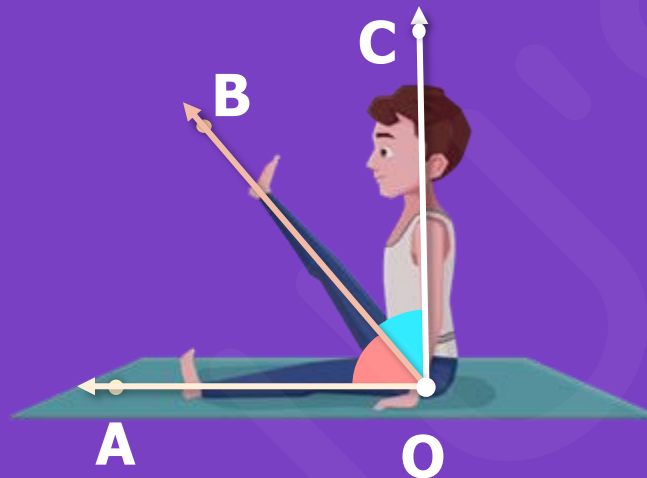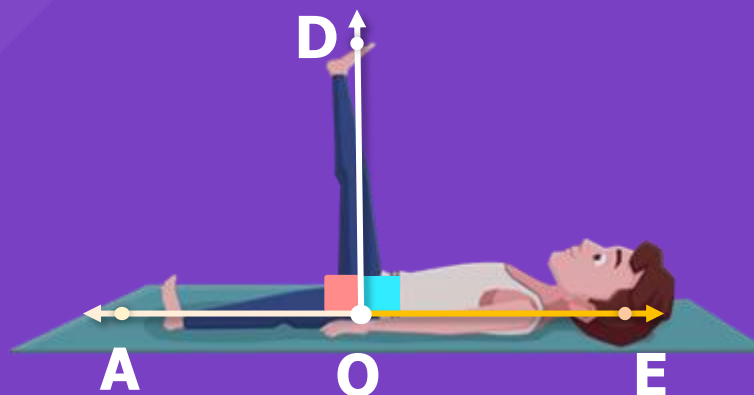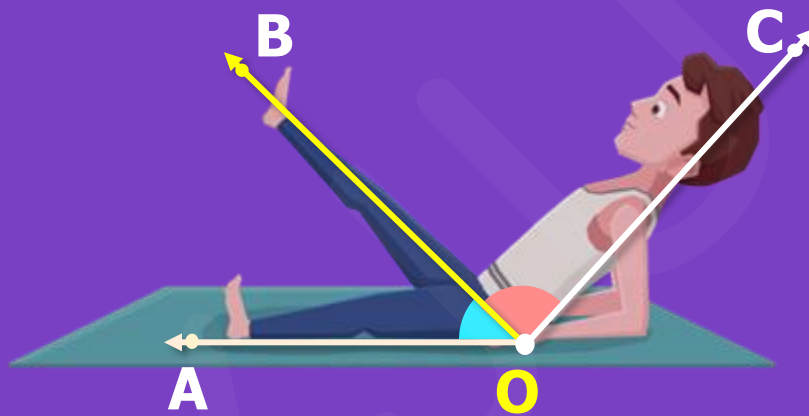

2.2. Supplementary Angles

- The pair of angles whose sum is 180° are called supplementary angles.

- From the yoga pose, we can conclude that ∠AOD and ∠DOE are supplementary angles as ∠AOD + ∠DOE = 180°

2. Related Angles

2.3. Adjacent Angles

- The two angles are said to be adjacent angles when they share the common vertex and a common arm.

- From the yoga pose, we can conclude that ∠AOB and ∠BOC are adjacent angles with the common vertex as O, the common arm as OB, and the non-common arms as OA and OC on either side of OB.
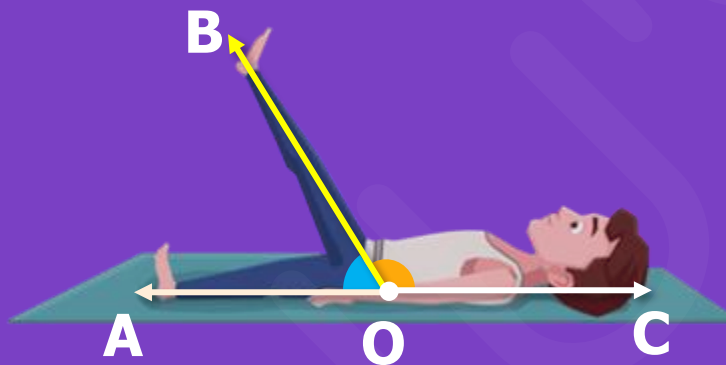

It is not necessary for two complementary angles or two supplementary angles to be adjacent angles.

2.4. Linear Pair

- A linear pair is a pair of adjacent angles whose non-common arms are opposite rays, which implies their sum is 180°.

- From the yoga pose, we can conclude that ∠AOB and ∠BOC form a linear pair.
  ⇒ ∠AOB + ∠BOC = 180°

## 2.5. Vertically Opposite Angles

- If two lines intersect each other, then the pair of opposite angles formed at the vertex are called vertical angles or vertically opposite angles.

- A pair of vertically opposite angles are always equal.

- From the yoga pose, we can conclude that
  ∠1 = ∠3 and ∠2 = ∠4
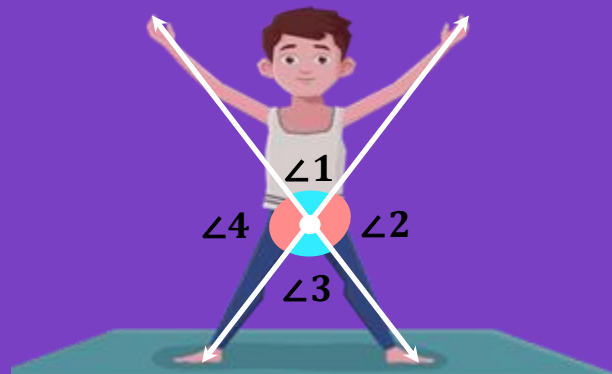
3. Types of Lines

3.1. Intersecting Lines

- Intersecting lines are two lines that share exactly one common point.
- This common point is called the point of intersection.

Point of intersection
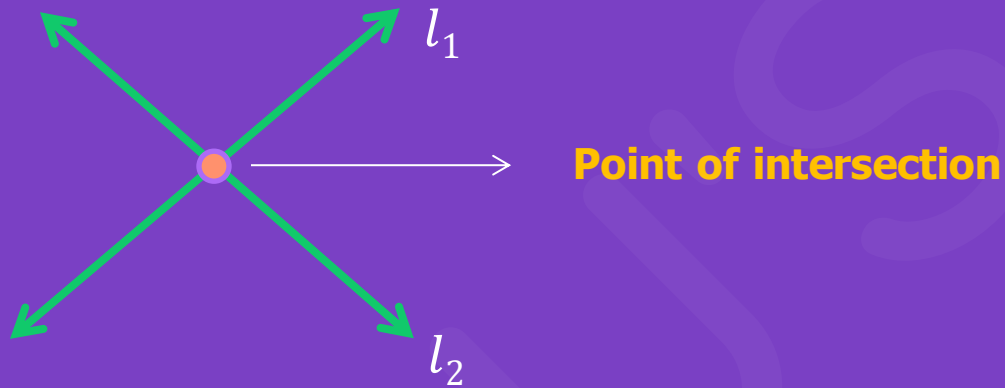
3.2. Transversal

- A line that intersects two or more lines at distinct points is called a transversal.

- In the first figure, l_1, l_2 and l_3 are 3 lines, l_4 will behave as a transversal.

- In the second figure, l_1 and l_2 are two lines, l_3 will behave as a transversal.

45
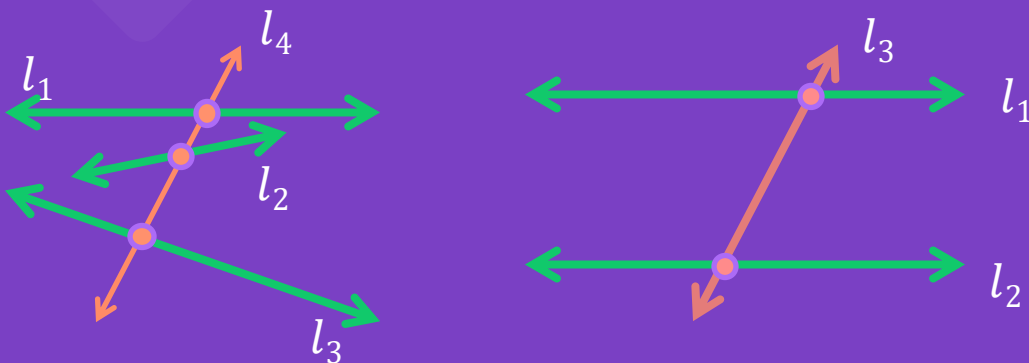
Angles Made by a Transversal

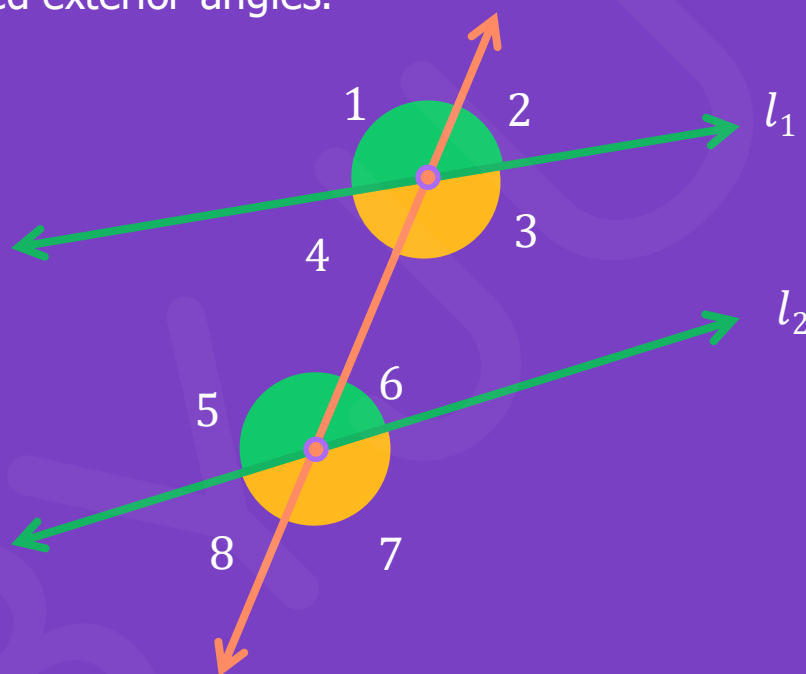When two or more lines are cut by a transversal, different angles are formed.

Interior and Exterior Angles

- The angles that comes within or inside the two lines are called interior angles.

- Angles that lie outside or in the exterior of two lines are called exterior angles.

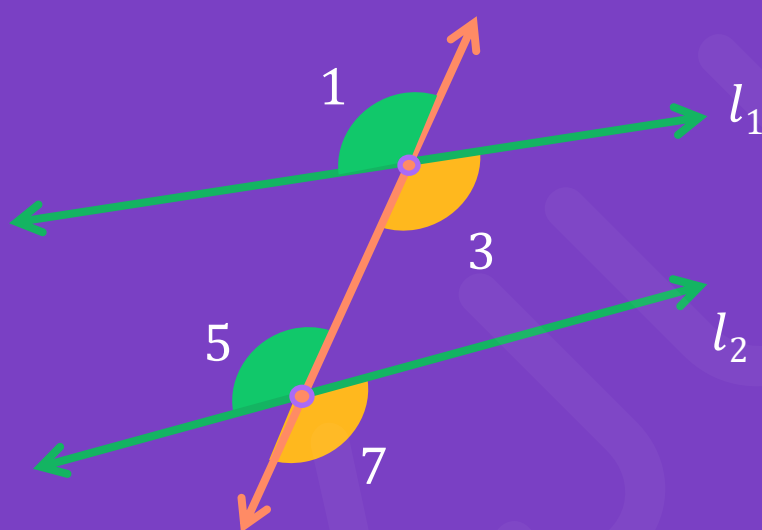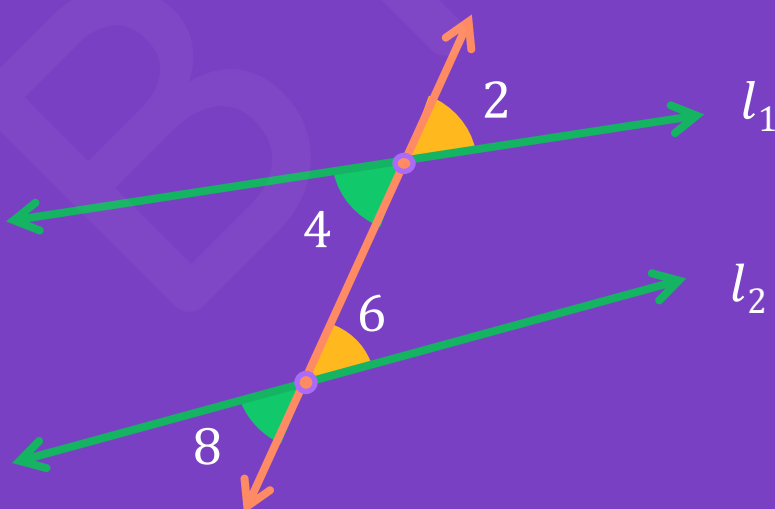| Interior angles	Exterior angles
$\angle 3, \angle 4, \angle 5, \angle 6$	$\angle 1, \angle 2, \angle 7, \angle 8$

Angles Made by a Transversal

Corresponding Angles

Corresponding angles are the angles which are formed in matching corners or corresponding corners with the transversal when two lines are intersected by the transversal.

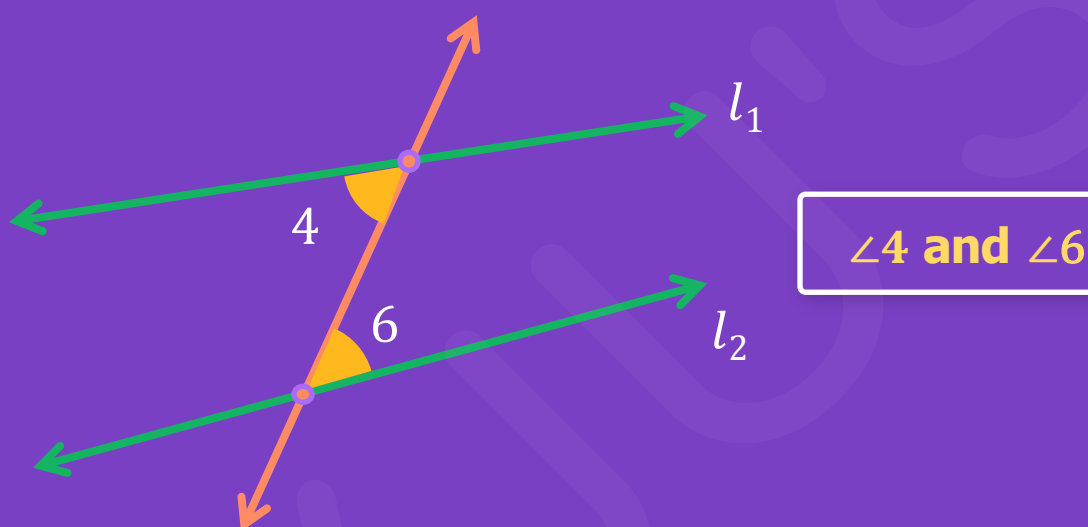$\angle 1$ and $\angle 5$
$\angle 3$ and $\angle 7$

$\angle 2$ and $\angle 6$
$\angle 4$ and $\angle 8$

Angles Made by a Transversal

Alternate Interior Angles

When a transversal cuts 2 or more lines, alternate interior angles lie on the inner side of the lines but on the opposite sides of the transversal.
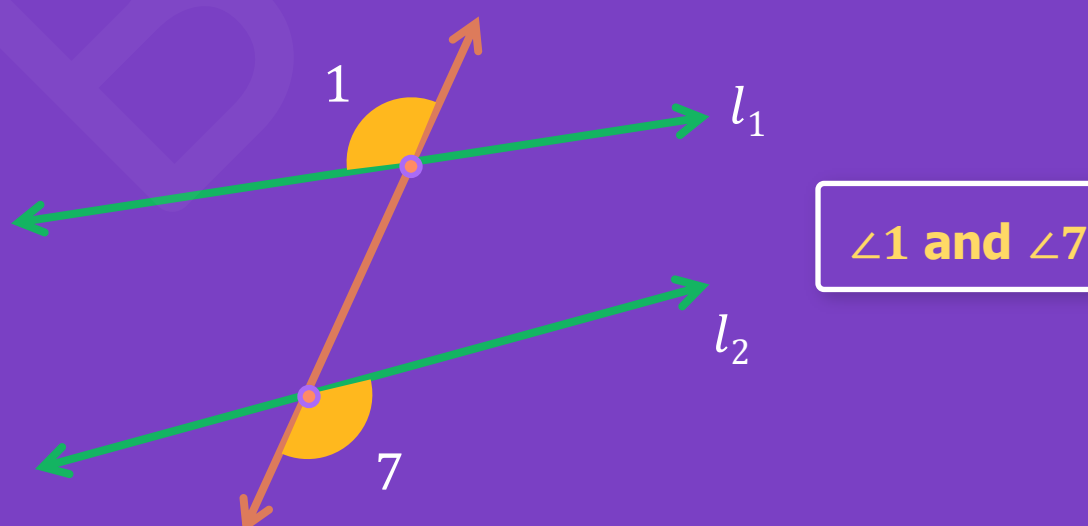
l_1

4

l_2

6

$\angle 4$ **and** $\angle 6$

Alternate Exterior Angles

When a transversal cuts 2 or more lines, alternate exterior angles lie on the outer side of the lines but on the opposite sides of the transversal.

1

l_1

l_2

$\angle 1$ **and** $\angle 7$

7

3. Types of Lines

3.3. Parallel Lines
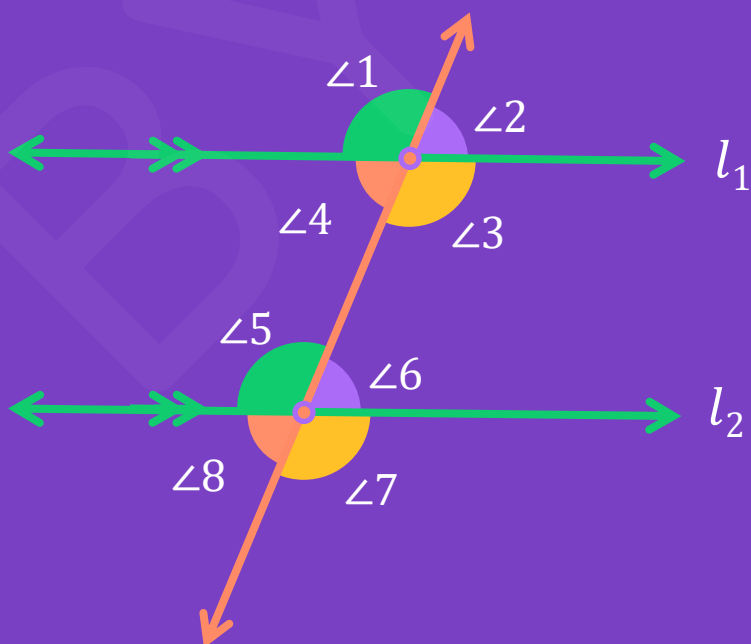
- Parallel lines are the lines that do not intersect or meet each other at any point in a plane.

- They are always equidistant from each other.

$$l_1$$

$$l_2$$

Transversal of Parallel Lines

Corresponding Angles

Corresponding angles formed by a transversal of two parallel lines are equal.

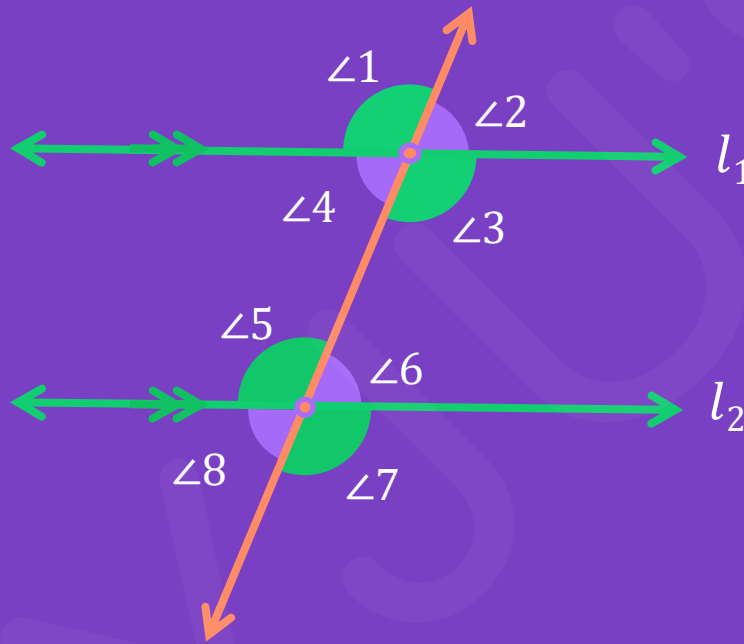$\angle 1$ $\angle 2$ $\angle 4$ $\angle 3$ l_1

$\angle 5$ $\angle 6$ $\angle 8$ $\angle 7$ l_2

$$\angle 1 = \angle 5,$$
$$\angle 3 = \angle 7$$
$$\angle 2 = \angle 6$$
$$\angle 4 = \angle 8$$

Transversal of Parallel Lines

Alternate Angles

- When a transversal cuts two parallel lines, pair of alternate interior and exterior angles formed will be equal in measure.

$\angle 1$ $\angle 2$ $\angle 4$ $\angle 3$ l_1

$\angle 5$ $\angle 6$ $\angle 8$ $\angle 7$ l_2

Alternate Interior Angles
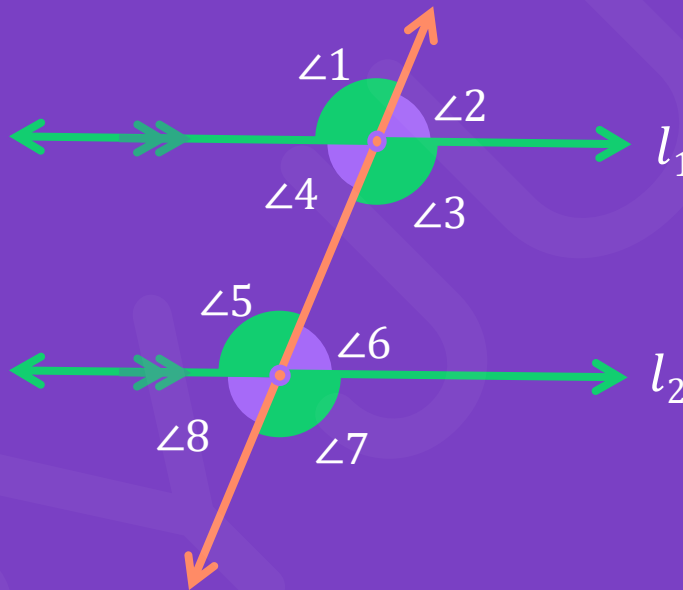
$\angle 3 = \angle 5, \angle 4 = \angle 6$

Alternate Exterior Angles

$\angle 2 = \angle 8, \angle 1 = \angle 7$

Transversal of Parallel Lines

Co-interior Angles

- Co-interior angles or consecutive interior angles are those angles which are on same side of the transversal.

- If two parallel lines are cut by a transversal, then each pair of co-interior angles are supplementary.

$$\angle 4 + \angle 5 = \mathbf{180°}$$
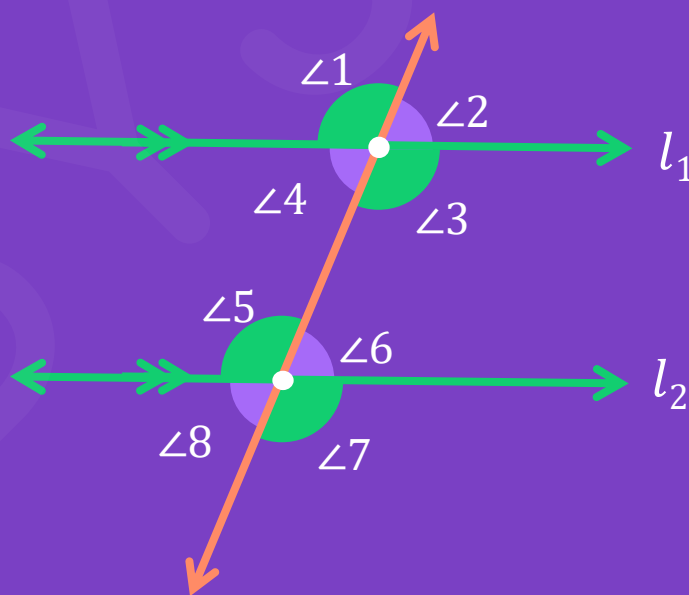$$\angle 3 + \angle 6 = \mathbf{180°}$$

Transversal of Parallel Lines

If two parallel lines are cut by a transversal

Corresponding angles are equal

Each pair of alternate angles are equal

Co-interior angles are supplementary

$\angle 1$ $\angle 2$ $\angle 4$ $\angle 3$ l_1

$\angle 5$ $\angle 6$ $\angle 8$ $\angle 7$ l_2

Checking for Parallel Lines

If a transversal intersects two lines such that:

Corresponding angles
are equal

OR

Each pair of alternate
angles are equal

OR

Co-interior angles are
supplementary

Lines are parallel