Class 9 Lines And Angles Notes

Basic Definitions and Terms

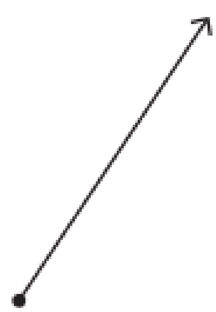
The ideal way to begin with the chapter is to understand and learning the important definitions and terms of the chapter. Mentioned below are some vital definitions of varied types of lines and angles.

Line Segment

If a line has two ends, then it is called a line segment.

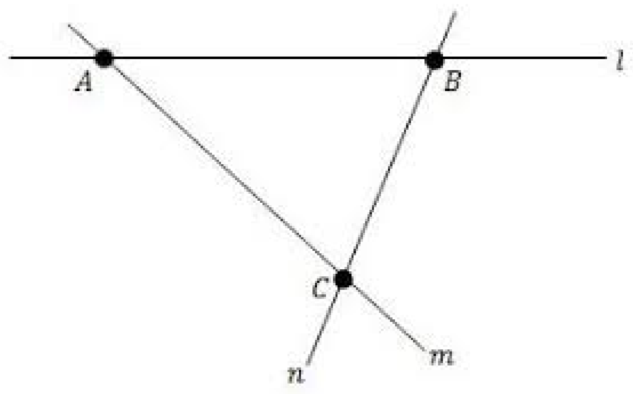
Ray

That part of the line with one endpoint is called a ray.



Non-Collinear Points

It is an essential concept of class 9 lines and angles, which says that collinear points are present in a line having three or more points. Else, they are called non-collinear points. In simpler terms, non- collinear points do not allow a single line to be formed through them.

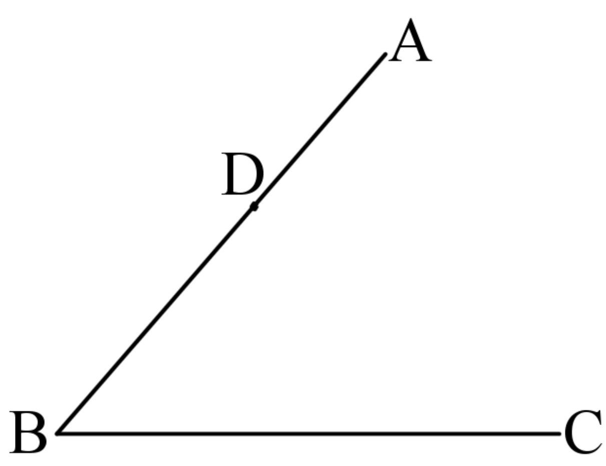


In the aforementioned picture, no single line through points A, B, C is formed because they are non-collinear, rather separate lines *l,m,n* can be seen.

Now let us have a look at the types of angles that we will be studying in this chapter.

Angle

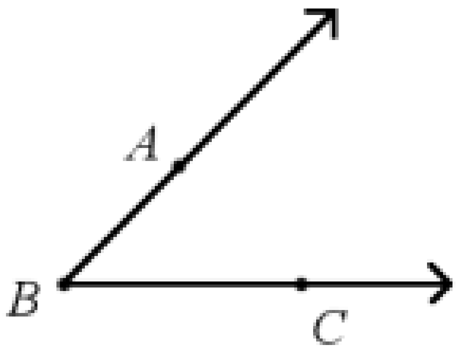
When two rays originate from the same endpoint, it is called an Angle. Arms are the two rays that make the base for an angle. The endpoints where the two rays meet is known as the Vertex.



There are various types of angles, explained below are the important ones according to the class 9 lines and angles chapter.

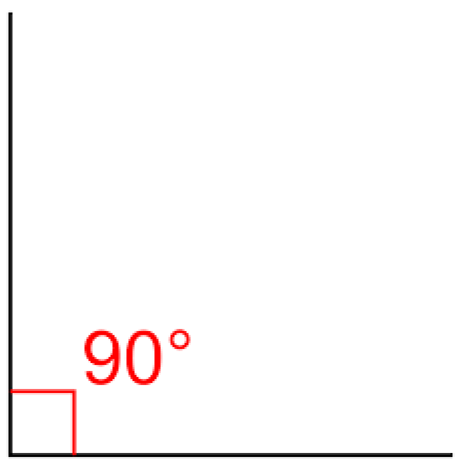
Acute Angle

All the angles that measure between the range of 0 to 90 degrees are called an acute angle.



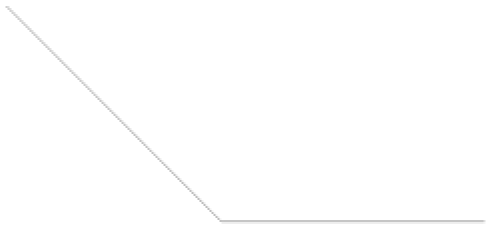
Right Angle

As per the class 9 lines and angles chapter, an angle which measures exactly 90 degrees is called a Right Angle.

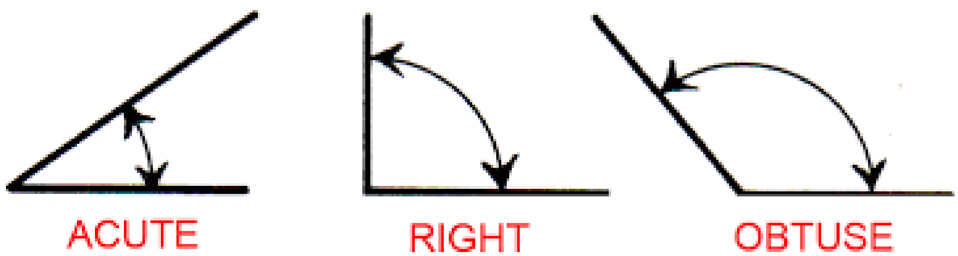


Obtuse Angle

This is an angle greater than 90 degrees but smaller than 180 degrees.

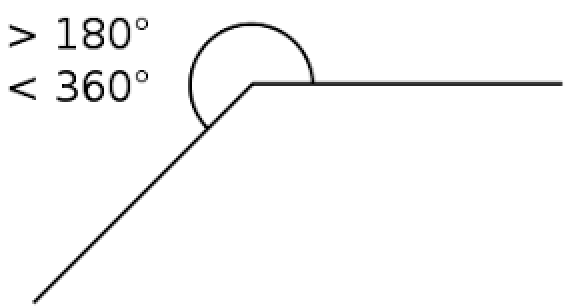


The picture given below depicts a comparison between the 3 main types of angles.



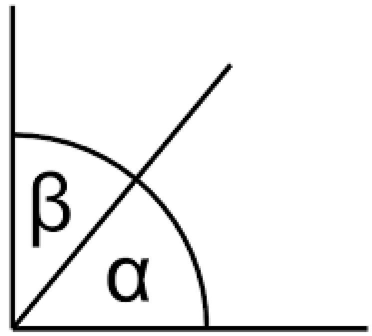
Reflex Angle

A reflex angle is greater than 180 degrees but less than 360 degrees.



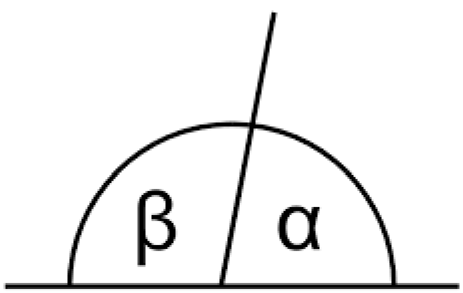
Complementary Angles

Two angles having a sum of 90 degrees are called complementary angles.



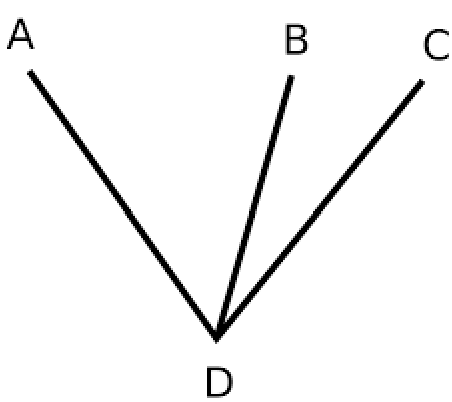
Supplementary Angles

It happens to be an important concept of class 9 lines and angles. Supplementary angles are those angles which have some of 180 degrees.



Adjacent Angles

Two or more angles that have a common vertex are called adjacent angles.

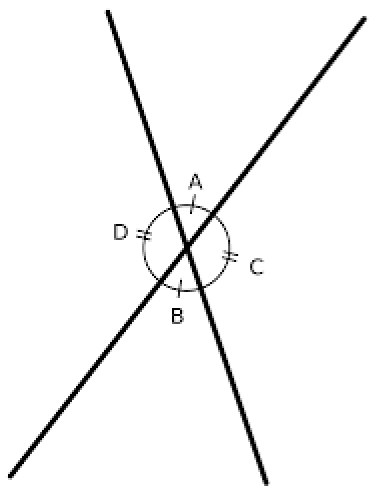


Linear Pair Angles

It is a fundamental concept of this chapter and it says that if two non-common arms say, *a* and *b* can form a line, they will be called line pair angles.

Vertically Opposite Angles

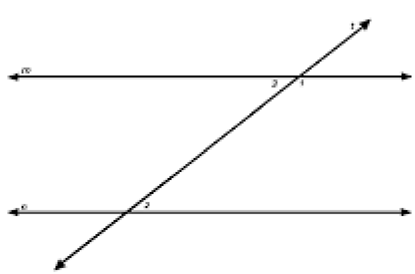
When two lines, say, AB and CD intersect one another, they are called vertically opposite angles.



If there are two lines parallel to one another and have the same length of perpendicular on the surface of the line, it is called the distance between two parallel lines. The vertically opposite angle is an elementary concept of lines and angles.

Transversal Lines

A transversal line is one that intersects two or more lines at distinct points.



Axioms of Lines and Angles

For all of us to solve the questions of the lines and angles class 9, there are some axioms that have been laid down. All the steps that are involved in the solution of a question must be in accordance with these axioms.

Line Pair Axiom

The non-common arms of the angle will always form a line whenever the sum of two adjacent angles is more than 180 degree.

Corresponding Angles Axiom

When two lines are intersected by a transversal forming two corresponding angles in pairs, they will be parallel to one another.

Consecutive Interiors

They are the angles that lie on the same transversal’s side. They are also called allied or co-interior angles.

Theorems of Lines and Angles

Just as the axioms of the lines and angles are important while solving a question, similarly, one must keep in mind these theorems.

Theorem 1

When two lines that have a pair of alternate interior angles that are equal are intersected by a transversal, then the two lines are always parallel.

Theorem 2

A pair of interior angles on the same transversal’s side on two parallel lines will be supplementary whenever a transversal intersects.

Theorem 3

If two interior angles are formed on the same side of a transversal and are supplementary to each other and have a transversal interesting the two parallel lines, then those two lines are parallel.

Theorem 4

Sum of all the angles of the triangle is 180 degrees.

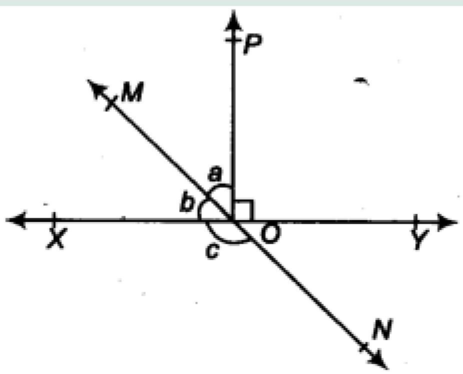
Theorem 5

The sum of two interior opposite angles of a triangle is always equal to the exterior angle of the triangle.

Class 9 Lines and Angles Solved Examples NCERT

Listed below are some of the solved examples from NCERT that will help you in getting a better hold over this topic-

Example 1: In figure, lines XY and MN intersect at 0. If ∠POY = 90° , and a : b = 2 : 3. find c.



Solution:

Since XOY is a straight line.

∴ b+a+∠POY= 180°

But ∠POY = 90° [Given]

∴ b + a = 180° – 90° = 90° …(i)

Also a : b = 2 : 3 ⇒ b = 3a/2 …(ii)

Now from (i) and (ii), we get

3a/2 + A = 90°

⇒ 5a/2 = 90°

⇒ a = (90/5)x 2= 36 = 36°

From (ii), we get

b = (3/2) x 36° = 54°

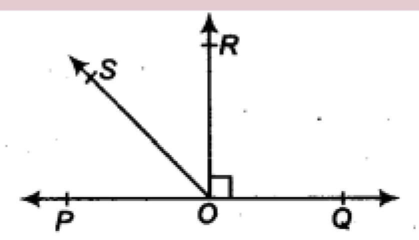
Since XY and MN interstect at O,

∴ c = [a + ∠POY] [Vertically opposite angles]

or c = 36° + 90° = 126°

Thus, the required measure of c = 126°.

Example 2: In figure, POQ is a line. Ray OR is perpendicular to line PQ. OS is another ray lying between rays OP and OR. Prove that: ∠ROS= 1/2 (∠QOS- ∠POS)



Solution 2:

POQ is a straight line. [Given]

∴ ∠POS + ∠ROS + ∠ROQ = 180°

But OR ⊥ PQ

∴ $\angle ROQ = 90°$

⇒ $\angle POS + \angle ROS + 90° = 180°$

⇒ $\angle POS + \angle ROS = 90°$

⇒ $\angle ROS = 90° - \angle POS$ … (1)

Now, we have $\angle ROS + \angle ROQ = \angle QOS$

⇒ $\angle ROS + 90° = \angle QOS$

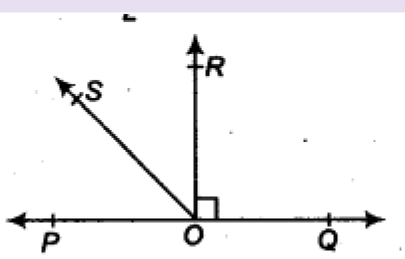
⇒ $\angle ROS = \angle QOS - 90°$ ……(2)

Adding (1) and (2), we have

$2\angle ROS = (\angle QOS - \angle POS)$

∴ $\angle ROS = 1/2(\angle QOS - \angle POS$

Example 3: In figure, find the values of x and y and then show that AB || CD.



Solution: $y = 130°$ …(1)

[Vertically opposite angles]

Again, PQ is a straight line and EA stands on it.

$\angle AEP + \angle AEQ = 180°$ [Linear pair]

or $50° + x = 180°$

$\Rightarrow x = 180° – 50° = 130°$ …(2)

From (1) and (2), $x = y$

As they are pair of alternate interior angles.

$\therefore AB \parallel CD$