

ELEMENTS OF GEOMETRY

A POINT

Definition Point

A **point** is a single location in space, represented by a dot.



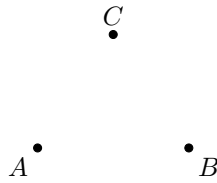
Definition Point Notation

A point is named using a capital letter, written as A .



Points have no size, shape, or dimension. They simply mark a position.

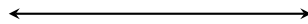
Ex: The diagram below shows three points labeled A , B , and C :



B LINES, SEGMENTS AND RAYS

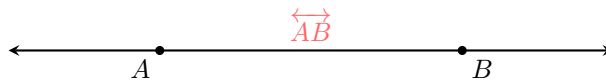
Definition Line

A **line** is a straight collection of points that extends infinitely in both directions.

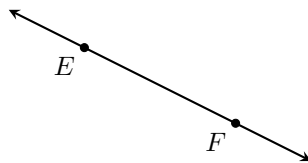


Definition Line Notation

A line is named using two points on it, written as \overleftrightarrow{AB} .



Ex: Name the line shown below:



Answer: The line is \overleftrightarrow{EF} .

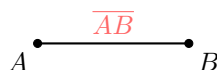
Definition Line Segment

A **line segment** is a part of a line with two endpoints. It has a definite length.



Definition Line Segment Notation

A line segment is named by its endpoints, written as \overline{AB} .



Ex: Name the segment shown below:



Answer: The segment is \overline{EF} .

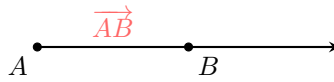
Definition Ray

A **ray** is a part of a line that starts at one endpoint and extends infinitely in one direction.

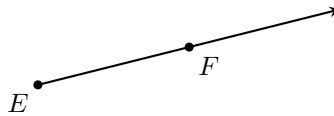


Definition Ray Notation

A ray is named by its endpoint and another point on it, written as \overrightarrow{AB} .



Ex: Name the ray shown below:

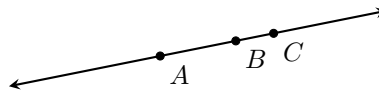


Answer: The ray is \overrightarrow{EF} .

Definition Collinear Points

Collinear points are points that all lie on the same straight line.

Ex: The points A , B and C are collinear points.

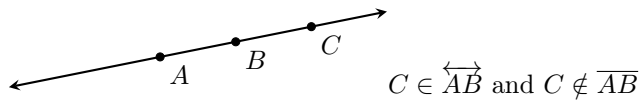


C ELEMENT RELATION

Definition Element Relation

The relation **is a point of** (or "is an element of") is used to show that a point lies on a geometric figure, such as a line or segment. It is denoted by the symbol \in .

Ex:



In this figure, point C lies on the line through points A and B , so $C \in \overleftrightarrow{AB}$. However, C does not lie on the segment between A and B , so $C \notin \overline{AB}$.

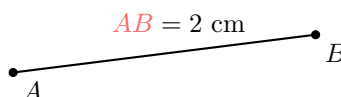
D LENGTH

Definition Length of a Line Segment

The **length** of a line segment is the distance between its two endpoints.

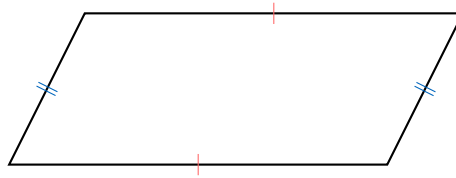
Definition Length Notation

The length of a line segment is denoted by its endpoints, written as AB .

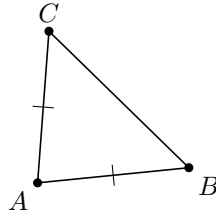


Definition Equal Lengths

Line segments are **equal in length** if they have the same length. We use **tick marks** to show they are equal.



Ex: Identify two segments that have the same length.

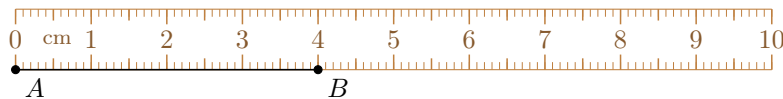


Answer: Segments \overline{AB} and \overline{AC} have the same length, as shown by their identical tick marks. Therefore, $AB = AC$.

Method Measuring Length

We measure the length of a segment using a ruler by aligning one endpoint with the zero mark and reading the measurement at the other endpoint.

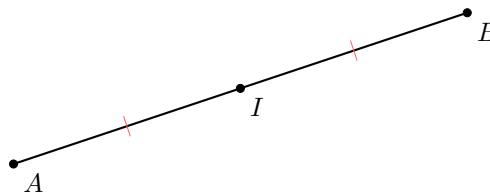
Ex: Measure the length of segment \overline{AB} .



Answer: By aligning a ruler with segment \overline{AB} , the length is measured as $AB = 4$ cm.

Definition Midpoint of a Line Segment

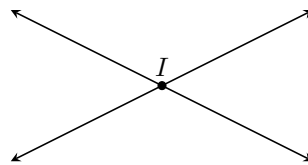
The **midpoint** of a line segment is a point that lies on the segment and divides it into two segments of equal length.



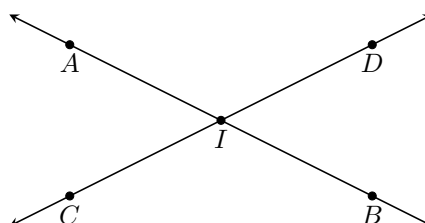
E INTERSECTION POINT

Definition Intersection Point

An **intersection point** is a point where two or more geometric objects, such as lines or segments, meet.



Ex: Find the intersection point of the lines \overleftrightarrow{AB} and \overleftrightarrow{CD} .

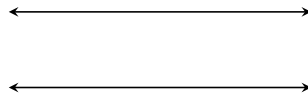


Answer: The intersection point is I .

F PARALLEL LINES

Definition Parallel Lines

Two **parallel lines** are lines that never intersect, no matter how far they extend.



Definition Parallel Line Notation

Parallel lines are indicated using matching arrowheads on each line.

