



# Introduction to Similarity

Unit 1B Day 1



# Basics of Geometry

Pre-Lesson

# Segment

**Definition:** Part of a line that consists of two points called the endpoints and all points between them.

**How to sketch:**  A blue line segment is drawn between two red dots. The dot on the left is labeled 'A' and the dot on the right is labeled 'B'.

**How to name:**  $\overline{AB}$  or  $\overline{BA}$

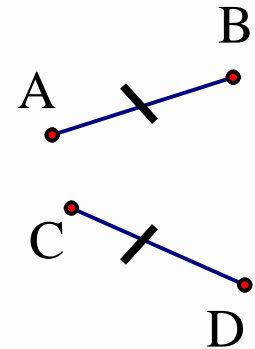
The symbol  $\overline{AB}$  is read as "segment AB".

$AB$  (without a symbol) means the *length* of the segment or the *distance* between points  $A$  and  $B$ .

# Congruent Segments

**Definition:** Segments with equal lengths. (congruent symbol:  $\cong$  )

Congruent segments can be marked with dashes.



If numbers are equal the objects are congruent.

$\overline{AB}$ : the segment AB ( an object )

AB: the distance from A to B ( a number )

**Correct notation:**  $AB = CD$

$\overline{AB} \cong \overline{CD}$

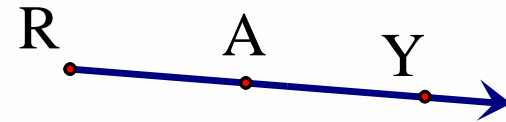
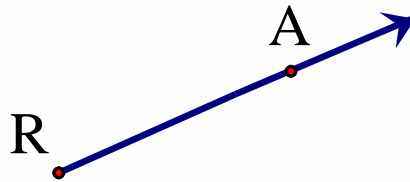
**Incorrect notation:**  ~~$AB \cong CD$~~

~~$\overline{AB} = \overline{CD}$~~

# Ray

**Definition:**  $\overrightarrow{RA}$  :  $\overline{RA}$  and all points Y such that A is between R and Y.

**How to sketch:**



**How to name:**

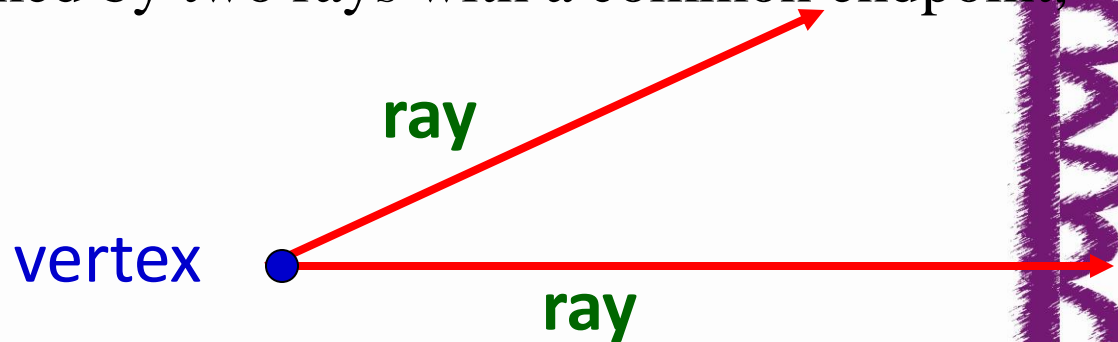
$\overrightarrow{RA}$  ( not  $\overrightarrow{AR}$  )

$\overrightarrow{RA}$  or  $\overrightarrow{RY}$  ( not  $\overrightarrow{RAY}$  )

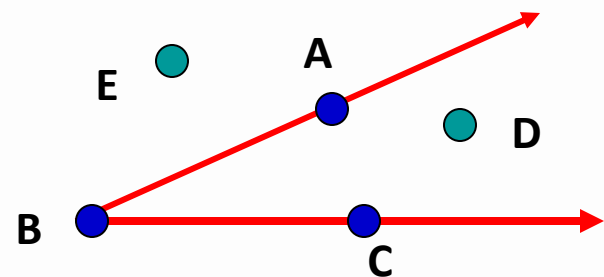
( the symbol  $\overrightarrow{RA}$  is read as “ray RA” )

# Angle and Points

- An Angle is a figure formed by two rays with a common endpoint, called the **vertex**.



- Angles can have points in the interior, in the exterior or on the angle.



Points A, B and C are on the angle. D is in the interior and E is in the exterior.  
B is the vertex.

- Naming an angle:** (1) Using 3 points  
(2) Using 1 point  
(3) Using a number – *next slide*

**Using 3 points:** vertex must be the middle letter

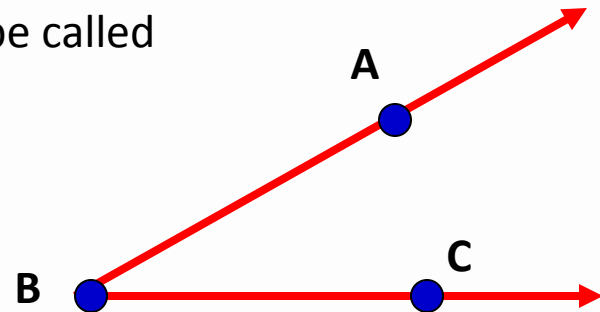
This angle can be named as  $\angle ABC$  or  $\angle CBA$

**Using 1 point:** using only vertex letter

\* Use this method is permitted when the vertex point is the vertex of one and only one angle.

Since **B** is the vertex of only this angle, this can also be called

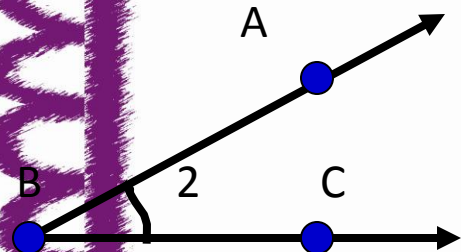
$\angle B$



# Naming an Angle - *continued*

## Using a number:

A number (without a degree symbol) may be used as the label or name of the angle. This number is placed in the interior of the angle near its vertex. The angle to the left can be named as \_\_\_\_\_.



$\angle 2$

## \* The “1 letter” name is unacceptable when ...

more than one angle has the same vertex point. In this case, use the three letter name or a number if it is present.



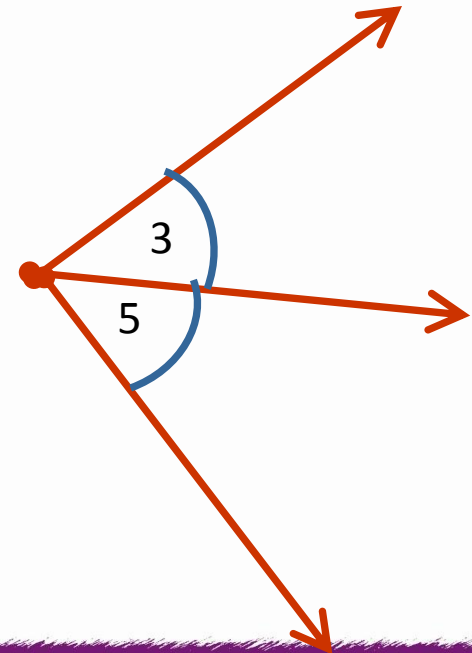
# Congruent Angles

**Definition:** If two angles have the same measure, then they are **congruent**.

Congruent angles are marked with the same number of “arcs”.

The symbol for congruence is  $\cong$

**Example:**  $\angle 3 \cong \angle 5$ .



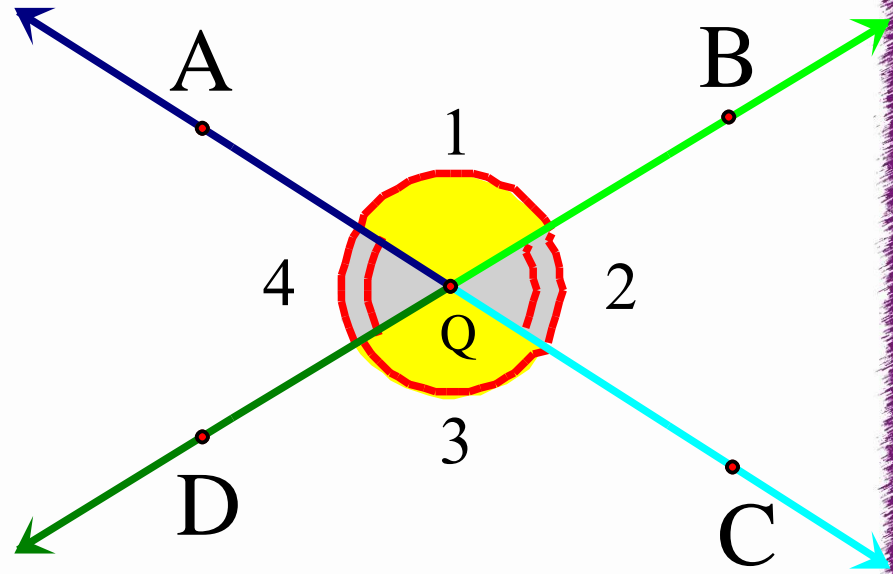
# Vertical Angles

**Definition:** A pair of angles whose sides form opposite rays.

**Examples:**

$\angle 1$  and  $\angle 3$

$\angle 2$  and  $\angle 4$



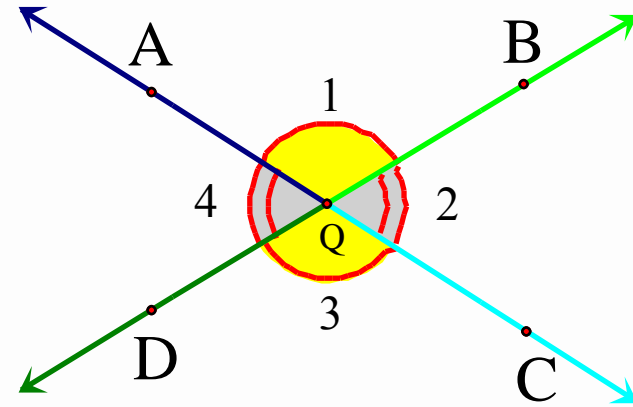
**Vertical angles are non-adjacent angles formed by intersecting lines.**

# Theorem: Vertical Angles are

= ~

**Given:** The diagram

**Prove:**  $\angle 1 \cong \angle 3$



**Statements**

**Reasons**

- $m\angle 1 + m\angle 2 = 180^\circ$   
 $m\angle 2 + m\angle 3 = 180^\circ$
- $m\angle 1 + m\angle 2 = m\angle 2 + m\angle 3$
- $m\angle 1 = m\angle 3$
- $m\angle 1 \cong m\angle 3$

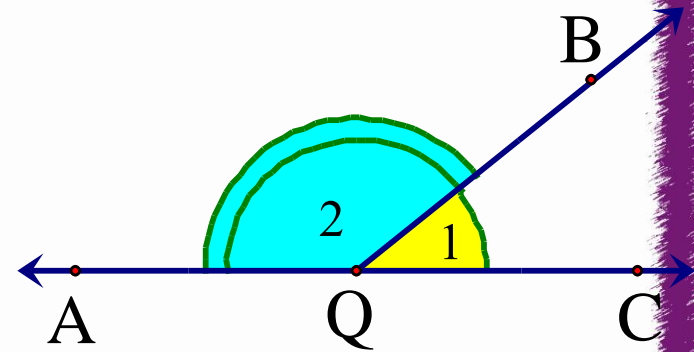
- Definition: Linear Pair
- Property: Substitution
- Property: Subtraction
- Definition: Congruence

# Supplementary Angles

**Definition:** A pair of angles whose sum is  $180^\circ$

**Examples:**

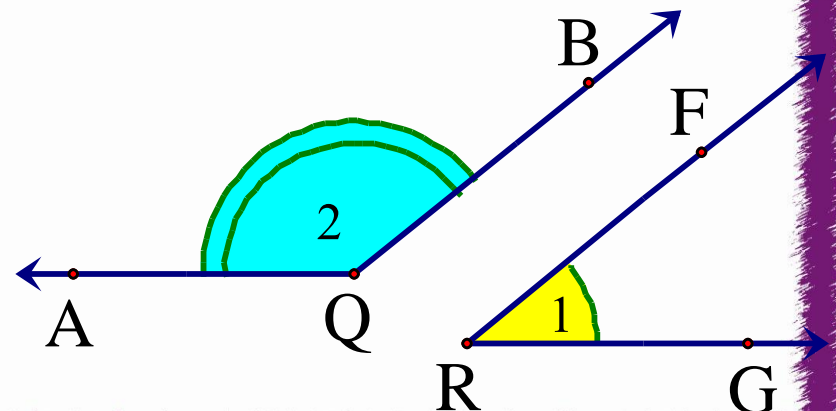
Adjacent supplementary angles are also called “Linear Pair.”



**Non-Adjacent Angles**

$$m\angle 1 = 40^\circ$$

$$m\angle 2 = 140^\circ$$





# Similar Figures

# Similar Figures

- **Similar Figures** are figures that have been transformed using at least one non-rigid transformation (dilation).
- Similar figures have the following properties:
  - All angles are congruent
  - All sides of the figure are proportional to the sides of the similar figure
  - The ratio of the sides of the two similar figures is determined by the **scale factor**