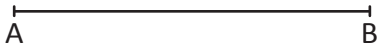
Investigation: Congruent and Similar Triangles Name: _____

Key terms

Two shapes are **congruent** (≡) if they are both the same _____ and _____.
Two shapes are **similar** (|||) if they are the same _____ but not the same _____.

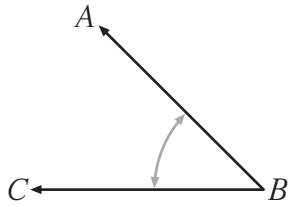
Naming lines, angles and triangles

- Name **lines** using the letters of the two points (or vertices) the line is between:

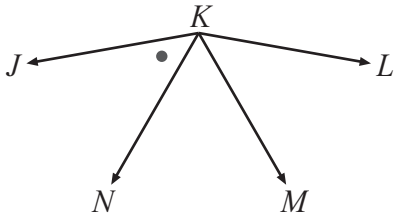


is line AB

- Name **angles** using the letters involved, with the letter at the vertex in the middle.

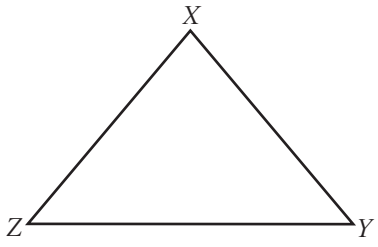


∠ABC or ∠CBA or ∠B



∠JKN or ∠NKJ but not ∠K

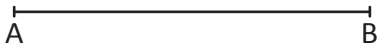
- Name **triangles** using the letters of the three points involved:



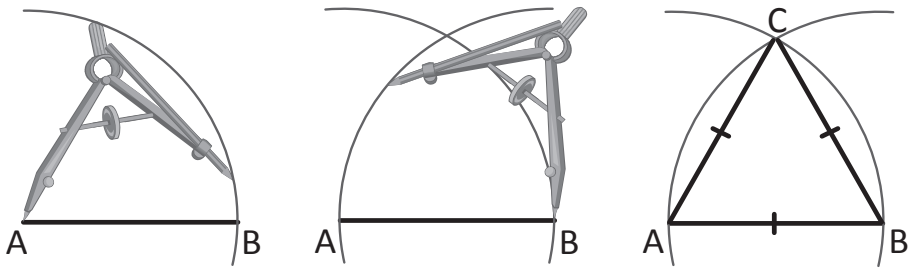
is ΔXYZ

Drawing triangles

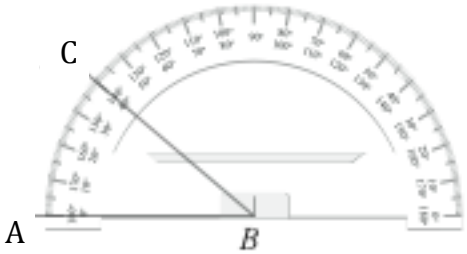
- Most triangles will start with drawing a line of a known length. Use a ruler:



- To draw lines of a known length but at an unknown angle, use a compass:



- To draw lines at a known angle, use a protractor to mark the angle before ruling:



If **one side** of a triangle is known, how many different triangles can be drawn?

1. Draw ΔABC using the following measurements:
   AB = 8cm

2. Now try to draw a different triangle ΔDEF using the following measurements:
   DE = 8cm

3. Was it possible to draw a different shape or size of triangle while keeping one side the same? Why or why not?

If **two sides** of a triangle are known, how many different triangles can be drawn?

1. Draw ΔGHI using the following measurements:
   GH = 9cm
   HI = 5cm

2. Now try to draw a different triangle ΔJKL using the following measurements:
   JK = 9cm
   KL = 5cm

3. Was it possible to draw a different shape or size of triangle while keeping two sides the same? Why or why not?

If **three sides** of a triangle are known, how many different triangles can be drawn?

1. Draw ΔMNO using the following measurements:
   MN = 10cm
   NO = 8cm
   MO = 6cm

2. Is it possible to draw this triangle any other way? Why or why not?

3. Now try to draw a different triangle ΔPQR using the following measurements:
   PQ = 5cm
   QR = 4cm
   PR = 3cm

4. What do you notice about ΔMNO and ΔPQR?

If **one angle** of a triangle is known, how many different triangles can be drawn?

1. Draw ΔSTU using the following measurements:
   ST = 5cm
   ∠STU = 60°
   TU = 4cm

2. Is it possible to draw this triangle any other way? Why or why not?

3. Would the triangle be different if the two side lengths were not given?

4. Now try to draw a different triangle ΔVWX using the following measurements:
   VW = 10cm
   ∠VWX = 60°
   WX = 8cm

5. What do you notice about ΔSTU and ΔVWX? Why does the angle need to be the same?

If **two sides** of a **right-angled triangle** are known, how many different triangles can be drawn?

The longest side of a right-angled triangle is called the **hypotenuse** and is always opposite the right angle. This situation is different to the last where the known angle was between the two known sides.

1. Draw the right-angled triangle, ΔYZA, using the following measurements:
   YZ = 10cm (hypotenuse)
   ZA = 6cm

2. Is it possible to draw this triangle any other way? Why or why not?

If **two angles** of a triangle are known, how many different triangles can be drawn?

1. Draw ΔBCD using the following measurements:
   BC = 8cm
   ∠CBD = 60°
   ∠BCD = 30°

2. Is it possible to draw this triangle any other way? Why or why not?

3. Now try to draw a different triangle ΔEFG using the following measurements:
   EF = 10cm
   ∠FEG = 60°
   ∠EFG = 30°

4. What do you notice about ΔBCD and ΔEFG?

5. Why is knowing two angles in a triangle the same as knowing three angles?

Summary

Two triangles are **congruent** if all matching (or corresponding) sides and angles are _____.

If triangles can only be drawn one way based on the measurements given, then all those triangles will be _____.

Two triangles are **similar** if all matching angles are _____ and all matching sides are the same _____.

If all the triangles drawn, based on the measurements given, are the same shape but different sizes, then all those triangles are _____.

Once you have completed the investigation, complete the summary table below. In each case, decide whether the number of corresponding sides or angles given is enough to prove that the triangles are congruent or similar.

Corresponding sides or angles that are equal or same ratio	**Congruent**	**Similar**
One side (S)	☐	☐
Two sides (SS)	☐	☐
Three sides (SSS)	☐	☐
One angle (A)	☐	☐
One angle and one side (AS)	☐	☐
One angle between two sides (SAS)	☐	☐
One right angle, hypotenuse and one other side (RHS)	☐	☐
Two angles (AA)	☐	☐
Two angles and one side (ASA)	☐	☐