Congruence
Teacher Answers

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TI-Nspire CAS


Investigation


Student


30 min

Aim

The aim of this investigation is to confirm the congruence rules for triangles.

Equipment

For this activity you will need:

- TI-Nspire CAS (or TI-Nspire)
- TI-Nspire file – Congruence

Introduction

The concept of 'congruence' is similar to the concept of 'equality'. It is used in geometry to indicate when shapes are the same. A good way to think of congruence is to visualise one shape fitting exact on top of another.

In algebra, we use the equal sign $(=)$ to indicate equality. In geometry, we use the congruent sign $(\equiv)$ to indicate congruence. If line segments $\overline{AB}$ and $\overline{CD}$ are congruent, we write $\overline{AB} \equiv \overline{CD}$. If two triangles ΔABC and ΔDEF are congruent, we write $\Delta ABC \equiv \Delta DEF$.

In this activity, we will be investigating tests for determining congruence in triangles. The four congruency tests we will be investigating are:

- **Side, Side, Side (SSS)**
- **Side, Angle, Side (SAS)**
- **Side, Side, Angle (SSA)**
- **Angle, Side, Angle (ASA)**

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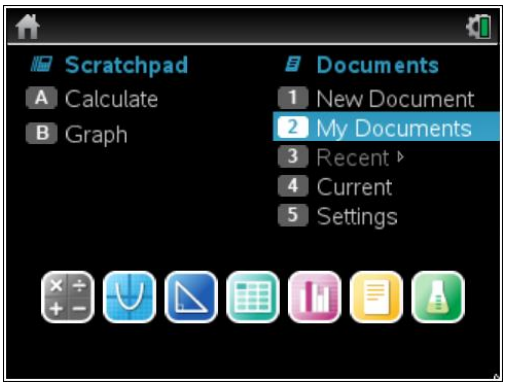
Setting up the activity

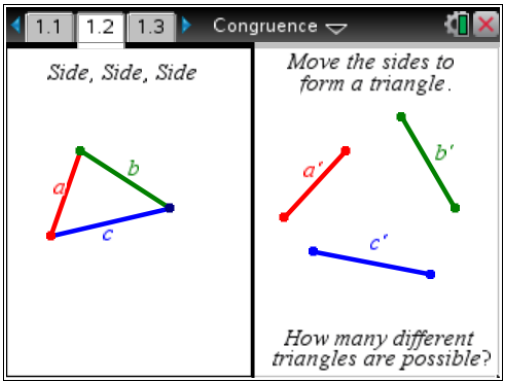
This activity requires access to the "Congruence" TI-Nspire file. This file should be loaded on your device before proceeding.

Once the file is on your handheld, press **home** and select **My Documents**. Locate the "Congruence" file and press **enter** to open.



Side, Side, Side (SSS)

Navigate to page 1.2. On the right hand side of the screen, grab and move the line segments to form a triangle.

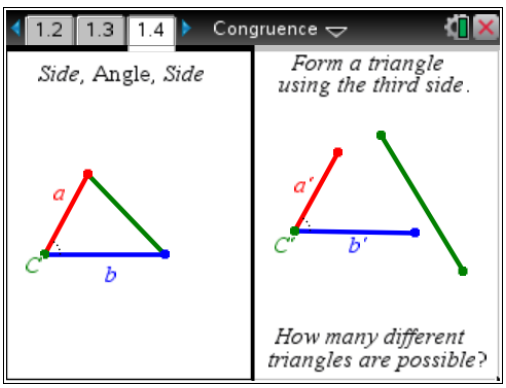


1. How many different triangles can be formed using three congruent sides? 1
2. Do you believe that the Side, Side, Side (SSS) test shows congruence? Why or why not?

   Yes. No matter how you fit the sides together, the triangle on the right will always be congruent to the one on the left.

Side, Angle, Side (SAS)

Navigate to page 1.4. On the right hand side of the screen, grab and move the third line segment to form a triangle.



3. How many different triangles can be formed using a congruent side, a congruent angle and another congruent side? 1
4. Do you believe that the Side, Angle, Side (SAS) test demonstrates congruence? Why or why not?
   Yes. When you move the line segment into place, only one congruent triangle is possible.

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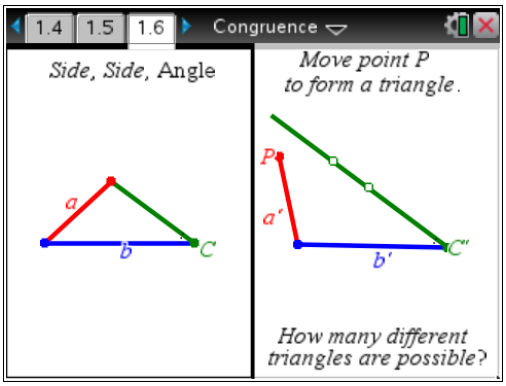
Side, Side, Angle (SSA)

Navigate to page 1.6. On the right hand side of the screen, grab and move the point P to form a triangle.

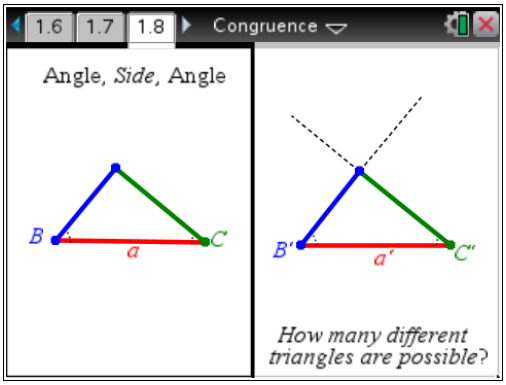


5. How many different triangles can be formed using two congruent sides followed by a congruent angle? 2
6. Do you believe that the Side, Side, Angle (SSA) test demonstrates congruence? Why or why not?

   No. Two different triangles are possible.

Angle, Side, Angle (ASA)

Navigate to page 1.8. Observe the triangle on the right hand side of the screen.



7. How many different triangles can be formed using a congruent angle, a congruent side followed by another congruent angle? 1
8. Do you believe that the Angle, Side, Angle (ASA) test demonstrates congruence? Why or why not?

   Yes. The two congruent angles at the end of the line segment result in only one possible congruent triangle.

9. Would an Angle, Angle, Side (AAS) test demonstrate congruence? Why or why not?

   Yes. The three angles of a triangle add to 180°. If you are given two angles of a triangle then you can determine the third angle. Consequently, the ASA test will confirm congruence.

10. Would an Angle, Angle, Angle (AAA) test demonstrate congruence? Why or why not?

    No. The two triangles will be similar as they will have the same shape. However, without at least one congruent side, the triangles will not be congruent.

11. Copy and complete the following table to summarise your results. Write 'Yes' if you believe the congruency test is valid. Write 'No' if you believe it is not valid.

Congruency Test	**Yes/No**
Side, Side, Side (SSS)	Yes
Side, Angle, Side (SAS)	Yes
Side, Side, Angle (SSA)	No
Angle, Side, Angle (ASA)	Yes
Angle, Angle, Side (AAS)	Yes
Angle, Angle, Angle (AAA)	No

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