

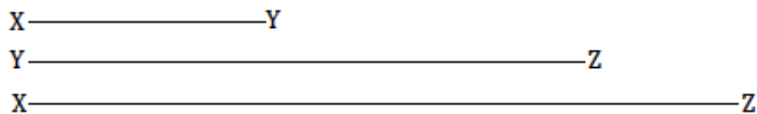
Lesson 9: Conditions for a Unique Triangle—Three Sides and Two Sides and the Included Angle

Classwork

Exploratory Challenge

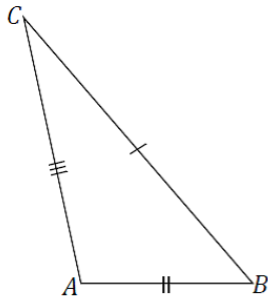
1. A triangle $\triangle ABC$ exists with side lengths of the segments below. Draw a triangle $\triangle DEF$ with the same side lengths as $\triangle ABC$. Use your compass to determine the sides of $\triangle DEF$. Use your ruler to measure side lengths. Leave all construction marks as evidence of your work, and label all side and angle measurements.

Under what condition is $\triangle DEF$ drawn? Compare the triangle you drew to two of your peers' triangles. Are the triangles identical? Did the condition determine a unique triangle? Use your construction to explain why. Do the results differ from your predictions?



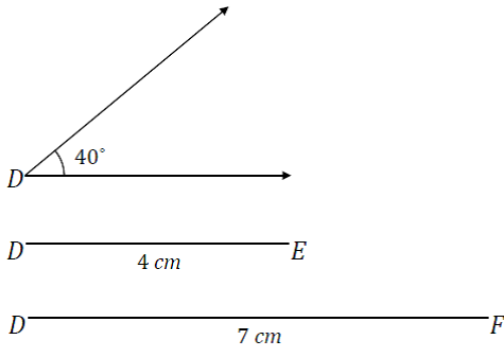
2. _____ is located below. Copy the sides of the triangle to create _____. Use your compass to determine the sides of _____. Use your ruler to measure side lengths. Leave all construction marks as evidence of your work, and label all side and angle measurements.

Under what condition is _____ drawn? Compare the triangle you drew to two of your peers' triangles. Are the triangles identical? Did the condition determine a unique triangle? Use your construction to explain why.



3. A triangle has an angle of 40° adjacent to side lengths of 4 cm and 7 cm. Construct the triangle with side lengths of 4 cm, 7 cm, and included angle 40° . Use your compass to draw the sides of the triangle. Use your ruler to measure side lengths. Leave all construction marks as evidence of your work, and label all side and angle measurements.

Under what condition is the triangle drawn? Compare the triangle you drew to two of your peers' triangles. Did the condition determine a unique triangle? Use your construction to explain why.



4. _____ has side lengths _____ cm, _____ cm, and _____. Draw _____ under the same conditions. Use your compass and protractor to draw the sides of _____. Use your ruler to measure side lengths. Leave all construction marks as evidence of your work, and label all side and angle measurements.

Under what condition is _____ drawn? Compare the triangle you drew to two of your peers' triangles. Are the triangles identical? Did the condition determine a unique triangle? Use your construction to explain why.

Problem Set

- A triangle with side lengths a cm, b cm, and c cm exists. Use your compass and ruler to draw a triangle with the same side lengths. Leave all construction marks as evidence of your work, and label all side and angle measurements.

Under what condition is the triangle drawn? Compare the triangle you drew to two of your peers' triangles. Are the triangles identical? Did the condition determine a unique triangle? Use your construction to explain why.
- Draw triangles under the conditions described below.

 - A triangle has side lengths a cm and b cm. Draw two non-identical triangles that satisfy these conditions. Explain why your triangles are not identical.
 - A triangle has a side length of a cm opposite a θ angle. Draw two non-identical triangles that satisfy these conditions. Explain why your triangles are not identical.
- Diagonal d_1 is drawn in square $ABCD$. Describe what condition(s) can be used to justify that d_1 is identical to d_2 . What can you say about the measures of $\angle A$ and $\angle C$? Support your answers with a diagram and explanation of the correspondence(s) that exists.
- Diagonals d_1 and d_2 are drawn in square $ABCD$. Show that d_1 is identical to d_2 , and then use this information to show that the diagonals are equal in length.
- Diagonal d_1 is drawn in rhombus $ABCD$. Describe the condition(s) that can be used to justify that d_1 is identical to d_2 . Can you conclude that the measures of $\angle A$ and $\angle C$ are the same? Support your answer with a diagram and explanation of the correspondence(s) that exists.
- Diagonals d_1 and d_2 are drawn in rhombus $ABCD$ and meet at point E . Describe the condition(s) that can be used to justify that d_1 is identical to d_2 . Can you conclude that the line segments AE and CE are perpendicular to each other? Support your answers with a diagram and explanation of the correspondence(s) that exists.