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UNIT 10 LESSON 5

**AIM**: SWBAT define the conditions needed to construct a triangle

**THINK ABOUT IT!**

Measure and label the angles and side lengths of the two triangles below.

Step A: Explain what you notice about the sum of the angles for both triangles.

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Step B: Explain what you notice about the sum of the shorter sides of the triangles compared to the longer side. Why does this relationship make sense?

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Test the Conjecture 1) Which set of measurements could be used to create a triangle?

* Triangle ABC with angle A = 45°, angle B = 80°, and angle C = 70°
* Triangle XYZ with angle X = 45° , angle Y = 45°, and angle Z = 90°

Test the Conjecture 2) Which set of measurements could be used to create a triangle?

* Triangle ABC with side lengths AB = 2”, BC = 3”, and CA = 4”
* Triangle XYZ with side lengths XY = 4”, YZ = 2”, and ZX = 1”
* Triangle QRS with side lengths QR = 3”, RS = 6”, and SQ = 3”

Conjecture:

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**PARTNER PRACTICE**

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| *Bachelor Level* |

1. Measure the angles of the triangle below and verify that it satisfies the condition that the sum of the angles must be 180 degrees.
2. Measure the side lengths of the triangle below and verify that it satisfies the condition that the sum of the shorter sides must be longer than the longest side.

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| *Master Level* |

1. Verify that the obtuse triangle below meets the conditions of constructing a triangle. Explain why this triangle does or does not meet these conditions.

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**INDEPENDENT PRACTICE**

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| *Bachelor Level* |

1. Which of the following measurements could be used to construct a triangle? Explain.
   1. 30°, 60°, 80°
   2. 30°, 140°, 20°
   3. 30°, 149°, 1°
   4. 45°, 55°, 65°

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1. Which measurement(s) could not be used to construct a triangle? **Select all that apply**. Explain.
   1. 1”, 2”, 3”
   2. 9”, 6”, 4”
   3. 25”, 100”, 76”
   4. 18”, 20”, 39”

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| *Master Level* |

1. Use the conditions for constructing angles to determine the maximum number of right angles that a triangle can have. Explain and prove by attempting to construct triangles with different numbers of right angles.

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1. An equilateral triangle has three angles that are the same and three sides that are the same. If one side is 2 inches, what are all the other measurements of the triangle? Use your ruler and protractor to construct this triangle.
2. A triangle’s longest side is three times the length of the shortest side. The middle side is twice as long as the shortest side. Will these conditions sometimes, always, or never result in the conditions needed to create a triangle? Explain and provide examples.

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1. Two sides of a triangle measure 15cm and 20cm. Write an inequality that describes all the possible lengths of the third side that would meet the conditions for constructing a triangle. Explain your answer.

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| *PhD Level* |

1. Prove that a triangle has 180 degrees by slicing a rectangle and explaining how that relates to the sum of the angles of triangles.

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1. Can two different triangles have the exact same angles but be different sizes? Explain and attempt to prove by drawing two different triangles with the same angles.

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**Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**EXIT TICKET**

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| Self-assessment | I mastered the learning objective today. | I am almost there. | Need more practice and feedback. |
| Teacher feedback | You mastered the learning objective today. | You are almost there. | You need more practice and feedback. |

1. Which set of measurements below could be used to create a triangle?
   1. 30°, 75°, 95°
   2. 40°, 90°, 40°
   3. 30°, 70°, 80°
   4. 150°, 10°, 40°
2. Marcia says that she can create a triangle with angles of 30°, 60°, and 90° with side lengths of 3in, 4in, and 7in because the angles add up to 180 degrees and the sum of the shorter side is at least as long as the longest side. Do you agree or disagree? Explain your reasoning.

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