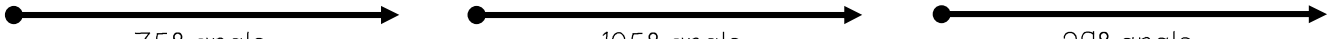
Unit: Angles & Triangles
Student Handout 5

Name _____

Date _____Pd_____

CONSTRUCTING TRIANGLES

Demarcus is sketching different angles in his math notebook. Use a protractor and ruler to help him complete the angles shown below.



75° angle

105° angle

29° angle

A triangle can be constructed using similar steps as constructing an angle. Use the steps shown in the box below to construct the triangle described in the example above.

CONSTRUCTING A TRIANGLE

1. Draw and label a _____ _____, measure if necessary.
2. Use a protractor to draw an _____ at one of the endpoints of the line segment.
3. Label the _____ _____ in the triangle.
4. Draw and label a second angle at the other _____ of the original line segment.
5. Mark the third point on the triangle where the sketched lines _____.
6. Erase any extra markings and check all angle measures.

1 Construct triangle ABC, where the $m\angle A = 90°$, the $m\angle B = 30°$, and the length of $\overline{AB}$ is 5 cm.

Construct the triangle given the conditions below, then answer questions a-b.

2 Triangle RST has angle measures of $m\angle R = 55°$, $m\angle S = 70°$, and $m\angle T = 55°$.

a. Measure the sides of triangle RST and then compare your measurements with a partner. Are the measures of the sides of your triangles the same or different?

b. What can you conclude about the number of triangles that can be formed given 3 angle measures?

3 Construct triangle XYZ, where the $m\angle YXZ = 40°$, the $m\angle XYZ = 60°$, and the length of $\overline{XY}$ is 5 cm.

Find the length of each side in centimeters.

$\overline{XZ}$ = _____

$\overline{YZ}$ = _____

4 Construct a triangle with angle measures of 65°, 35°, and 80°.

How many triangles can be constructed given this information? Explain.

5 Construct triangle MNO, where the $m\angle N = 35°$, the $m\angle O = 45°$, and the length of $\overline{MN}$ is 4 cm. (Hint: Find the missing angle before constructing.)

How many triangles can be constructed given this information? Explain.

6 Construct triangle ABC, where the $m\angle A = 90°$, $m\angle B = 45°$, and $m\angle C = 45°$.

Measure and label the length of each side of the triangle. What can you conclude about the measure of sides $\overline{AB}$ and $\overline{AC}$?

7 Determine the number of triangles that can be constructed given the conditions in a-d.

a. $m\angle A = 110°$, $m\angle B = 20°$, and $m\angle C = 50°$ → _____

b. Three line segments measure 21 inches, 7 inches, and 4 inches → _____

c. $\overline{RS}$ = 14 cm, $m\angle R = 27°$, and $m\angle S = 98°$ → _____

d. $m\angle E = 95°$, $m\angle F = 62°$, and $m\angle G = 18°$ → _____

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CONSTRUCTING TRIANGLES

Answer each of the questions below. Be sure to show your thinking.

1. Marissa is constructing triangles given different conditions. Which of the following conditions will NOT produce a triangle?

a. angle measures of 47°, 58°, 75°

b. $m\angle T = 61°$, $m\angle U = 61°$, $m\angle V = 58°$

c. side lengths of 5 ft, 11 ft, and 4 ft

d. $\overline{XZ} = 11$ cm, $\angle X = 42°$, and $\angle Z = 80°$

2. Mrs. Taylor asked her class to construct a triangle with angle measures of 78°, 15°, and 87°. Which of the following statements must be true?

a. One unique triangle can be constructed.

b. More than one triangle can be constructed.

c. No triangle can be constructed.

For 3-6, construct a triangle with the given conditions.

3. Triangle ABC with $\overline{AB} = 3$ cm, $\angle ABC = 40°$, and $\angle BAC = 70°$.

4. Triangle MNO has angle measures of $m\angle M = 40°$, $m\angle N = 65°$, and $m\angle O = 75°$.

5. Triangle RST has angle measures of $m\angle R = 90°$, $m\angle S = 20°$, and $m\angle T = 70°$.

6. Triangle XYZ with $\overline{XZ} = 2$ in, $\angle X = 25°$, and $\angle Y = 45°$.