LESSON MAKER PRO

Triangle Possibilities

Sketch triangles and test which measurements work.

GRADE 7 · 7A.GM.A.34

7A.GM.A.34 "Construct geometric shapes (freehand, using a ruler and a protractor, and using technology) given measurement constraints with an emphasis on constructing triangles from three measures of angles or sides..."

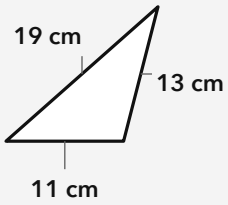
NAME _____ DATE _____

CHECK, THEN SKETCH

For three side lengths to form a triangle, the two shorter lengths must add to more than the longest length. Three valid side lengths determine one triangle, but three angles that add to 180° can make triangles of different sizes. Sketch freehand and label the given measures. Your sketch does not need to be to scale.

WORKED EXAMPLE

Sketch a triangle using the side lengths shown. Can you make it, and do the lengths determine one triangle or more than one?

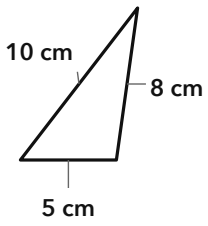


1. Check the two shorter sides: 11 + 13 = 24, and 24 > 19.
2. Sketch a triangle freehand and label its sides 11 cm, 13 cm, and 19 cm.
3. Three fixed side lengths determine one triangle. Flipping it does not make a new triangle.

Answer: Yes. The lengths determine one triangle.

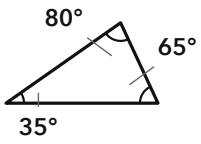
PRACTICE 6 problems

1 Sketch the triangle shown and label its sides. Do these lengths determine one triangle, more than one triangle, or no triangle?



ANSWER _____

2 Sketch a triangle with the angles shown and label them. Do these angles determine one triangle, more than one triangle, or no triangle?

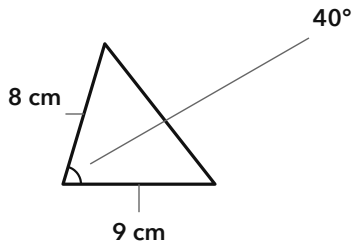


ANSWER _____

3 Can you sketch a triangle with sides 3 cm, 4 cm, and 9 cm? Write one triangle, more than one triangle, or no triangle.

ANSWER _____

4 Sketch a triangle using the two marked sides and the angle between them. Label the given measures. Do they determine one triangle, more than one triangle, or no triangle?

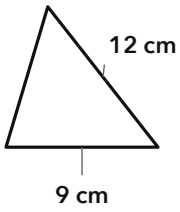


ANSWER _____

5 Can you sketch a triangle with angles 35°, 60°, and 90°? Write one triangle, more than one triangle, or no triangle.

ANSWER _____

6 Sketch two different triangles that each have the two labeled side lengths. Label a different whole-number third side on each sketch. Do the two given lengths determine one triangle, more than one triangle, or no triangle?



ANSWER _____

APPLY IT Show your work

1 A game club wants a triangular sticker with sides 8 cm, 9 cm, and 16 cm. Sketch it freehand and label the sides. Do these measurements determine one triangle, more than one triangle, or no triangle?

WORK SPACE

ANSWER _____

2 A video creator wants a triangular logo with angles 45°, 55°, and 80°. Sketch two different-sized versions and label the angles on each. Do these measurements determine one triangle, more than one triangle, or no triangle?

WORK SPACE

ANSWER _____

CHALLENGE One step up

A triangular frame has sides 5 cm, 8 cm, and x cm, where x is a whole number. Find the smallest and largest possible values of x. Sketch one possible frame freehand and label all three sides. Explain why your two values are the limits.

WORK SPACE AND ANSWER

ANSWER KEY

Triangle Possibilities

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PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	Sketch the triangle shown and label its sides. Do these lengths determine one triangle, more than one triangle, or no triangle?	**One triangle. A freehand sketch has sides labeled 5 cm, 8 cm, and 10 cm.**
2	Sketch a triangle with the angles shown and label them. Do these angles determine one triangle, more than one triangle, or no triangle?	**More than one triangle. A freehand sketch has angles labeled 35°, 65°, and 80°.**
3	Can you sketch a triangle with sides 3 cm, 4 cm, and 9 cm? Write one triangle, more than one triangle, or no triangle.	**No triangle.**
4	Sketch a triangle using the two marked sides and the angle between them. Label the given measures. Do they determine one triangle, more than one triangle, or no triangle?	**One triangle. A freehand sketch has sides labeled 9 cm and 8 cm with a 40° angle between them.**
5	Can you sketch a triangle with angles 35°, 60°, and 90°? Write one triangle, more than one triangle, or no triangle.	**No triangle.**
6	Sketch two different triangles that each have the two labeled side lengths. Label a different whole-number third side on each sketch. Do the two given lengths determine one triangle, more than one triangle, or no triangle?	**More than one triangle. For example, sketches with side lengths 9 cm, 12 cm, 10 cm and 9 cm, 12 cm, 15 cm both work.**

PART 2 · APPLY IT

1. **One triangle. The sketch has sides labeled 8 cm, 9 cm, and 16 cm.** The shorter sides add to 17 cm, which is greater than 16 cm. Three valid side lengths determine one triangle.
2. **More than one triangle. Both sketches have angles labeled 45°, 55°, and 80°, but they are different sizes.** The angles add to 180°, so the triangle is possible. Its size can change while its angles stay the same.

CHALLENGE

The smallest value is 4 cm, and the largest is 12 cm. One possible sketch has sides 5 cm, 8 cm, and 9 cm. The third side must be greater than 8 - 5 = 3 cm and less than 8 + 5 = 13 cm.

Accept freehand sketches that show the requested labels, even if they are not to scale. Count flipped or rotated copies as the same triangle.