LESSON MAKER PRO

Triangle Possibilities

Decide what three measurements can make.

GRADE 8 · 8.GR.A.2

8.GR.A.2 "Draw or build triangles using tools (ruler, protractor, technology, or physical manipulatives) given three measures of angles or sides. Determine whether the given conditions result in a unique triangle, more than one triangle..."

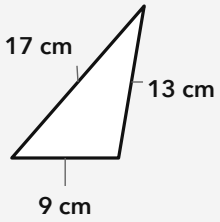
NAME _____ DATE _____

THE BIG IDEA

For three side lengths, add the two shorter lengths. If their sum is greater than the longest length, they make one unique triangle. Three angles must add to 180°; if they do, they can make more than one triangle because the side lengths can change.

WORKED EXAMPLE

Can the side lengths shown make a triangle? If so, how many different triangles?



1. 9 + 13 = 22.
2. 22 > 17, so the sides can make a triangle.
3. Three fixed side lengths make one unique triangle.

Answer: One unique triangle.

PRACTICE 4 problems

1 Side lengths: 5 cm, 8 cm, 12 cm. No triangle, one unique triangle, or more than one?

ANSWER _____

2 Side lengths: 4 cm, 7 cm, 11 cm. No triangle, one unique triangle, or more than one?

ANSWER _____

3 Angles: 40°, 60°, 80°. No triangle, one unique triangle, or more than one?

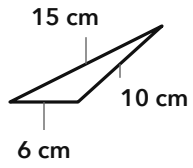
ANSWER _____

4 Angles: 65°, 55°, 70°. No triangle, one unique triangle, or more than one?

ANSWER _____

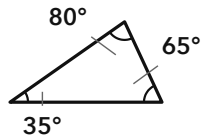
APPLY IT Show your work

1 A maker space cuts the three rods shown for a drone stand. Will they make no triangle, one unique triangle, or more than one?



ANSWER _____

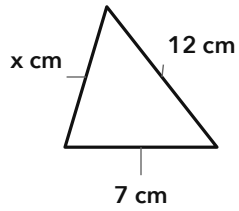
2 A game designer sets the angles of a triangular tile as shown. Can tiles with different side lengths have these angles? Classify the result.



ANSWER _____

CHALLENGE One step up

Two rods have the lengths shown. A third rod is x cm long. Which whole-number values of x from 1 to 20 make a triangle? Explain.



WORK SPACE AND ANSWER

ANSWER KEY

Triangle Possibilities

GRADE 8 · 8.GR.A.2

PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	Side lengths: 5 cm, 8 cm, 12 cm. No triangle, one unique triangle, or more than one?	**One unique triangle.**
2	Side lengths: 4 cm, 7 cm, 11 cm. No triangle, one unique triangle, or more than one?	**No triangle.**
3	Angles: 40°, 60°, 80°. No triangle, one unique triangle, or more than one?	**More than one triangle.**
4	Angles: 65°, 55°, 70°. No triangle, one unique triangle, or more than one?	**No triangle.**

PART 2 · APPLY IT

1. **One unique triangle.** 6 + 10 = 16, which is greater than 15. Three fixed side lengths make one unique triangle.
2. **Yes, more than one triangle.** 35° + 65° + 80° = 180°. Tiles of different sizes can have the same three angles.

CHALLENGE

x can be any whole number from 6 through 18. The third side must satisfy 12 - 7 < x < 12 + 7, so 5 < x < 19.

Accept "unique" for one unique triangle and "multiple" for more than one. Triangles that differ only by turning or flipping count as the same triangle.