LESSON MAKER PRO

Triangle Truth Track

Use angle and side relationships to solve triangle problems.

HIGH SCHOOL · MA.912.GR.1.3

MA.912.GR.1.3 "Prove relationships and theorems about triangles. Solve mathematical and real-world problems involving postulates, relationships and theorems of triangles."

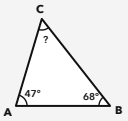
NAME _____ DATE _____

TRIANGLE RELATIONSHIPS

The interior angles of any triangle have a total measure of 180°. An exterior angle equals the sum of the two remote interior angles. In an isosceles triangle, angles opposite congruent sides have equal measures.

WORKED EXAMPLE

Use the triangle shown. Find m∠C.

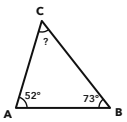


1. Let m∠C = x.
2. Write the angle-sum equation: 47 + 68 + x = 180.
3. Combine known angles: 115 + x = 180.
4. Subtract 115: x = 65.

Answer: m∠C = 65°

PRACTICE 6 problems

1 Use the triangle shown. Find m∠C.

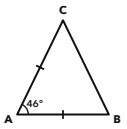


ANSWER _____

2 The angle measures of a triangle are x + 12, 2x - 9, and 3x + 3. Find x and all three angle measures.

ANSWER _____

3 Use the isosceles triangle shown. Find m∠B and m∠C.



ANSWER _____

4 In a triangle, an exterior angle measures 134°. One remote interior angle measures 58°. Find the other remote interior angle.

ANSWER _____

5 A triangle has side lengths 9, 14, and x. If x is an integer, state the possible range of x.

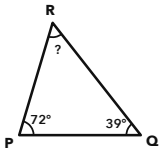
ANSWER _____

6 Two angles of a triangle are in the ratio 2:3. The third angle measures 45°. Find the two angles in the ratio.

ANSWER _____

APPLY IT Show your work

1 A concert club is building the triangular light-frame shown. Find the missing interior angle of the frame.



ANSWER _____

2 An esports club makes a triangular banner with side lengths 11 inches, 26 inches, and x inches. The third side must be a whole number. What are all possible values of x?

WORK SPACE

ANSWER _____

CHALLENGE One step up

Triangle ABC is isosceles with AB = AC. An exterior angle at B measures 121°. Find all three interior angle measures. Explain how the isosceles relationship and the exterior-angle relationship determine your answer.

WORK SPACE AND ANSWER

ANSWER KEY

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PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	Use the triangle shown. Find m∠C.	**m∠C = 55°**
2	The angle measures of a triangle are x + 12, 2x - 9, and 3x + 3. Find x and all three angle measures.	**x = 29; the angles are 41°, 49°, and 90°.**
3	Use the isosceles triangle shown. Find m∠B and m∠C.	**m∠B = 67° and m∠C = 67°.**
4	In a triangle, an exterior angle measures 134°. One remote interior angle measures 58°. Find the other remote interior angle.	**76°**
5	A triangle has side lengths 9, 14, and x. If x is an integer, state the possible range of x.	**6 ≤ x ≤ 22, where x is an integer.**
6	Two angles of a triangle are in the ratio 2:3. The third angle measures 45°. Find the two angles in the ratio.	**54° and 81°**

PART 2 · APPLY IT

1. **69°** The interior angles of a triangle total 180°. Subtract 72° and 39° from 180°.
2. **x can be any whole number from 16 through 36.** Use the triangle inequality: 26 - 11 < x < 26 + 11. Thus, 15 < x < 37, so the whole-number values run from 16 through 36.

CHALLENGE

m∠A = 62°, m∠B = 59°, and m∠C = 59°. The exterior angle equals the two remote interior angles, so 121 = m∠A + m∠C. Since AB = AC, m∠B = m∠C, and the interior angle at B is 180 - 121 = 59°.

Accept equivalent algebraic work and correctly stated strict triangle-inequality bounds. For the integer side-length problems, accept either the listed integers or the equivalent integer range.