LESSON MAKER PRO

Prove the Angle

Use a theorem and equality properties to test angle claims.

HIGH SCHOOL · G.RL.1.1

G.RL.1.1 "Use undefined terms, definitions, postulates, and theorems in logical arguments/proofs."

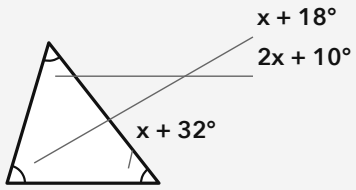
NAME _____ DATE _____

BUILD THE ARGUMENT

The triangle angle-sum theorem says a triangle's interior angles add to 180°. Write an equation from the angle measures, then use properties of equality to solve it.

WORKED EXAMPLE

Find x. Name the theorem used to write the equation and the property used to reach 4x = 120.



1. (x + 18) + (x + 32) + (2x + 10) = 180, by the triangle angle-sum theorem.
2. 4x + 60 = 180, by combining like terms.
3. 4x = 120, by the subtraction property of equality.
4. x = 30, by the division property of equality.

Answer: x = 30; triangle angle-sum theorem; subtraction property of equality.

PRACTICE 4 problems

1 For a triangle, a + b + c = 180°. If a = 46° and b = 69°, find c. Name the property used to replace a and b with their values.

ANSWER _____

2 A triangle's angles satisfy a + b + c = 180°. If a = x + 24°, b = 2x + 16°, and c = 71°, find x.

ANSWER _____

3 A proof changes 3x + 42 = 180 to 3x = 138. Name the property that justifies this step.

ANSWER _____

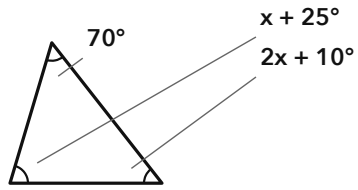
4 A student claims 35°, 65°, and 85° can be a triangle's angles. Is the claim valid? Give their sum and cite a theorem.

ANSWER _____

_____

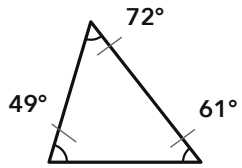
APPLY IT Show your work

1 A designer is making a triangular icon for a game. Find x, and name the theorem that supports your equation.



ANSWER _____

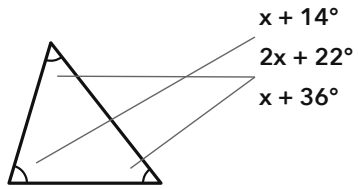
2 A skatepark sign uses this triangular design. A builder says the labeled angles are possible. Is the builder correct? Justify your answer with a theorem.



ANSWER _____

CHALLENGE One step up

A student finds x = 36 by combining x + 2x + x into 3x. Find the correct value of x and explain the error.



WORK SPACE AND ANSWER

Prove the Angle

PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	For a triangle, a + b + c = 180°. If a = 46° and b = 69°, find c. Name the property used to replace a and b with their values.	**c = 65°; substitution property of equality.**
2	A triangle's angles satisfy a + b + c = 180°. If a = x + 24°, b = 2x + 16°, and c = 71°, find x.	**x = 23.**
3	A proof changes 3x + 42 = 180 to 3x = 138. Name the property that justifies this step.	**Subtraction property of equality.**
4	A student claims 35°, 65°, and 85° can be a triangle's angles. Is the claim valid? Give their sum and cite a theorem.	**No. The sum is 185°, not 180° as required by the triangle angle-sum theorem.**

PART 2 · APPLY IT

1. **x = 25; triangle angle-sum theorem.** The angle-sum theorem gives (x + 25) + (2x + 10) + 70 = 180. Simplify to 3x + 105 = 180, then solve for x.
2. **No. The angles add to 182°, but the triangle angle-sum theorem requires 180°.** Add 49 + 61 + 72 to get 182. Since this is not 180, the labeled angles cannot all be correct.

CHALLENGE

x = 27. The student combined the x terms incorrectly: x + 2x + x = 4x. The angle-sum equation is 4x + 72 = 180, so 4x = 108 and x = 27.

Accept equivalent wording for properties of equality. In the challenge, the explanation must identify that the x terms total 4x, not 3x.