



Why Pythagoras works

GRADE 8 MATH

Name _____

Date _____

Show every step. Where a question asks why, the reasoning is the answer.

WORKED EXAMPLE

$a^2 + b^2 = c^2$, with c the hypotenuse. The square proof: $(a + b)^2 - 2ab = a^2 + b^2 = c^2$. Letters, not numbers, are what make it a proof. The converse — $a^2 + b^2 = c^2 \Rightarrow$ right-angled — is a separate statement and it is the one that tests a triangle.

1. State the Pythagorean theorem, saying clearly which side c is.

FLUENCY

Show your thinking

Answer

2. Do the square count for legs 8 and 15: big square, four triangles, leftover. Check against the hypotenuse.

APPLICATION

Show your thinking

Answer

3. Do the square count for legs 5 and 5. What is the hypotenuse squared? What does that tell you about the hypotenuse itself?

REASONING

Show your thinking

Answer

4. Write the square proof in letters, showing each step of the algebra.

REASONING

Show your thinking

Answer

5. Explain why the version in letters proves the theorem and the version in numbers does not.

REASONING

Show your thinking

Answer

6. Write down the converse of the theorem, and say what it is useful for.

REASONING

Show your thinking

Answer

7. Give an everyday statement that is true but whose converse is false.

REASONING

Show your thinking

Answer

8. Ana writes $3^2 + 5^2 = 4^2$ for a 3-4-5 triangle. Show that this is false and say what went wrong.

REASONING

Show your thinking

Answer

9. Are 2, 3 and 4 the sides of a right triangle? Show the test.

APPLICATION

Show your thinking

Answer