



Why Pythagoras works

GRADE 8 MATH

Name _____

Date _____

Show your working. One skill: **why Pythagoras works**.**WORKED EXAMPLE**

In a right triangle with legs a and b and **hypotenuse** c — the side opposite the right angle, always the longest — $a^2 + b^2 = c^2$. The square proof: a big square of side $a + b$ holds four copies of the triangle, and the leftover area is the square on the hypotenuse. In numbers with $a = 3$, $b = 4$: $49 - 24 = 25$. In letters: $(a + b)^2 - 2ab = a^2 + b^2$, which mentions no number and so covers every right triangle at once. The **converse** is the other direction — if $a^2 + b^2 = c^2$ then the triangle is right-angled — and it is what lets you **test** a triangle.

1. A square of side $5 + 12$ holds four copies of a right triangle with legs 5 and 12. Work out the big square's area, the area of the four triangles, and what is left.

APPLICATION

Show your thinking

Answer

2. Show that your leftover area is the square on the hypotenuse of a 5-12-13 triangle.

APPLICATION

Show your thinking

Answer

3. Tom checks 3-4-5, 5-12-13 and 8-15-17, and says he has proved the theorem. Explain what is missing, and what would fix it.

REASONING

Show your thinking

Answer

4. A triangle has sides 6, 7 and 8. Is it right-angled? Which statement — the theorem or its converse — did you use?

REASONING

Show your thinking

Answer