

Section 10.6: Radical Equations and Problem Solving

Objectives:

1. Solve equations that contain radical expressions.
2. Use the Pythagorean theorem to model problems.

Objective 1: Solve equations that contain radical expressions

Power Rule

If both sides of an equation are raised to the same power, all solutions of the original equation are among the solutions of the new equation. In other words, “if we raise one side of an equation to a power, you must also raise the other side of the equation by the same power.”

Examples:

Solve: $\sqrt{3x-2} = 5$ $\sqrt{9x-2} - 2x = 0$

Solving a Radical Equation

- Step 1: Isolate one radical on one side of the equation.
- Step 2: Raise each side of the equation to a power equal to the index of the radical and simplify.
- Step 3: If the equation still contains a radical term, repeat Steps 1 and 2. If not, solve the equation.
- Step 4: Check all proposed solutions in the original equation.

Examples:

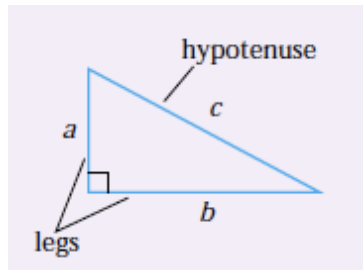
Solve: $\sqrt[3]{x-5} + 2 = 1$ $\sqrt{9+x} = x+3$ $\sqrt{3x+1} + \sqrt{3x} = 2$

Objective 2: Use the Pythagorean theorem to model problems

Pythagorean Theorem

If a and b are the lengths of the legs of a right triangle and c is the length of the hypotenuse, then

$$a^2 + b^2 = c^2$$



Examples:

Find the length of a leg, if one of the legs is 6 cm and the hypotenuse is 9cm.

A furniture upholsterer wishes to cut a strip from a piece of fabric that is 45 inches by 45 inches. The strip must be cut on the bias of the fabric. What is the longest strip that can be cut? Give an exact answer and a two-decimal-place approximation.