LESSON MAKER PRO

Root Check

Solve root equations and test every candidate.

HIGH SCHOOL · A2.A.1.5

A2.A.1.5 "Solve square and cube root equations with one variable and check for extraneous solutions."

NAME _____ DATE _____

ISOLATE, POWER, CHECK

Isolate the radical, then square both sides of a square root equation or cube both sides of a cube root equation. A square root cannot be negative, and squaring can create an extraneous candidate, so check every candidate in the original equation.

WORKED EXAMPLE

Solve sqrt(x + 28) = x - 2.

1. Square both sides: $x + 28 = (x - 2)^2$.
2. Simplify and factor: $x^2 - 5x - 24 = (x - 8)(x + 3) = 0$. The candidates are 8 and -3.
3. Check 8: sqrt(8 + 28) = 6 and 8 - 2 = 6.
4. Check -3: sqrt(-3 + 28) = 5, but -3 - 2 = -5.

Answer: x = 8. The candidate -3 is extraneous.

PRACTICE 6 problems

1 Solve sqrt(x + 7) = 4.

ANSWER _____

2 Solve sqrt(3x + 4) = x. Identify any extraneous candidate.

ANSWER _____

3 Solve sqrt(x + 39) = x - 3. Identify any extraneous candidate.

ANSWER _____

4 Solve cbrt(x - 14) = 3.

ANSWER _____

5 Solve cbrt(3x + 10) = -5.

ANSWER _____

6 Solve cbrt((x + 9)/4) = -3.

ANSWER _____

APPLY IT Show your work

1 For an art post, you start with a square photo that has an area of x cm^2. You crop 7 cm from each side length, leaving a square photo with a side length of 13 cm. Solve sqrt(x) - 7 = 13 to find the original area.

WORK SPACE

ANSWER _____

2 In a building game, you need a solid cube with 6 blocks along each edge. You already have 40 blocks and need x more. Solve cbrt(x + 40) = 6 to find how many more blocks you need.

WORK SPACE

ANSWER _____

CHALLENGE One step up

Solve sqrt(4x + 21) = x + 4. Show why one candidate is extraneous.

WORK SPACE AND ANSWER

Root Check

PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	Solve sqrt(x + 7) = 4.	**x = 9**
2	Solve sqrt(3x + 4) = x. Identify any extraneous candidate.	**x = 4; -1 is extraneous.**
3	Solve sqrt(x + 39) = x - 3. Identify any extraneous candidate.	**x = 10; -3 is extraneous.**
4	Solve cbrt(x - 14) = 3.	**x = 41**
5	Solve cbrt(3x + 10) = -5.	**x = -45**
6	Solve cbrt((x + 9)/4) = -3.	**x = -117**

PART 2 · APPLY IT

1. **400 cm^2** Add 7 to get sqrt(x) = 20, then square to get x = 400. Check: sqrt(400) - 7 = 13.
2. **176 blocks** Cube both sides to get x + 40 = 216, so x = 176. Check: cbrt(176 + 40) = 6.

CHALLENGE

Squaring gives $4x + 21 = (x + 4)^2$, so $(x + 5)(x - 1) = 0$. For x = 1, both sides of the original equation equal 5. For x = -5, the left side is 1 and the right side is -1, so -5 is extraneous. The solution is x = 1.

Accept equivalent notation for square roots and cube roots. For problems 2 and 3, students should name the rejected candidate as well as the solution.