LESSON MAKER PRO

Roots, Graphs, Contexts

Model, solve, graph, and interpret radical relationships.

HIGH SCHOOL · MA.912.AR.7.4

MA.912.AR.7.4 "Solve and graph mathematical and real-world problems that are modeled with radical functions. Interpret key features and determine constraints in terms of the context."

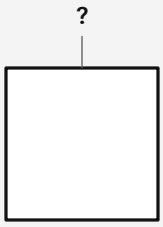
NAME _____ DATE _____

RADICAL FUNCTION CLUES

A radical function such as y = sqrt(x - h) + k begins at (h, k). The expression inside a square root must be greater than or equal to 0, so use that rule to find the domain and any context limits.

WORKED EXAMPLE

The square shown has an area of 45 cm². Find its exact side length.



1. Let s be the side length. $s^2 = 45$.
2. s = sqrt(45) = sqrt(9 * 5).
3. s = 3sqrt(5).

Answer: 3sqrt(5) cm

PRACTICE 6 problems

1 Solve: sqrt(x + 8) = 6

ANSWER _____

2 Solve: sqrt(7x - 4) = 10

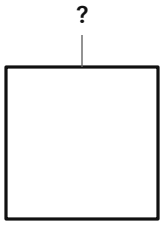
ANSWER _____

3 For y = sqrt(x - 6) + 4, state the domain and the starting point of the graph.

ANSWER _____

_____

4 The square shown has an area of 98 in^2. Find its exact side length.



ANSWER _____

5 Solve: sqrt(x + 8) = x - 6

ANSWER _____

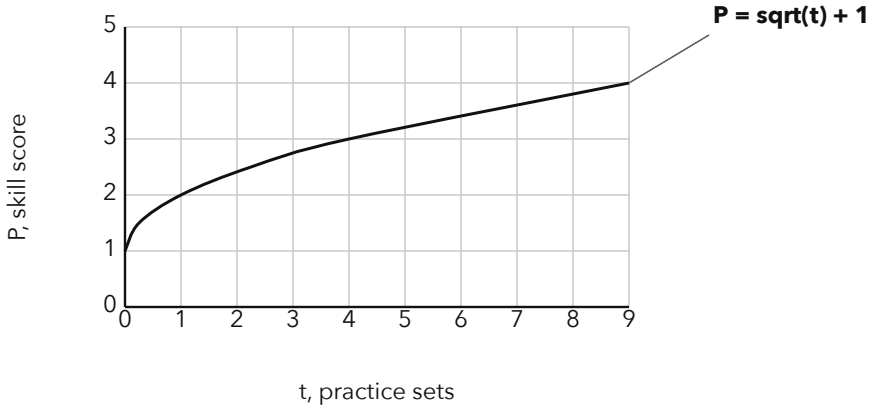
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6 Let f(x) = sqrt(x + 2) - 4. Find f(11).

ANSWER _____

APPLY IT Show your work

1 A study app models a user's skill score, P, after t completed practice sets with P = sqrt(t) + 1. Use the graph to find the score after 9 practice sets. State the possible values of t in this context.



ANSWER _____

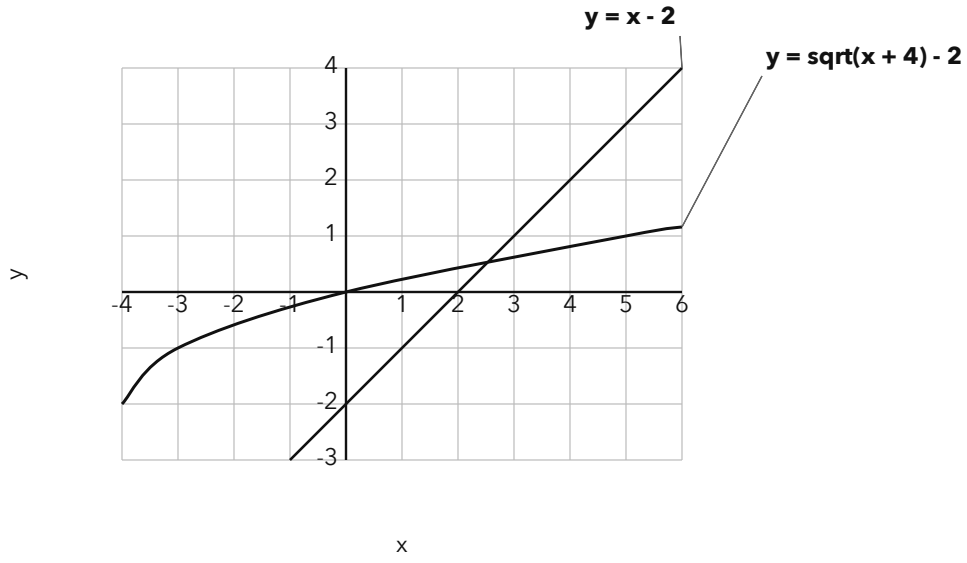
2 A skate park designer models the height h, in feet, of a ramp by h = sqrt(x + 4) - 2, where x is the horizontal distance in feet. The model is used only for 0 <= x <= 77. Find x when h = 6, then give the range of possible ramp heights.

WORK SPACE

ANSWER _____

CHALLENGE One step up

The graph shows y = sqrt(x + 4) - 2 and y = x - 2. Solve sqrt(x + 4) - 2 = x - 2. Explain why the other result from squaring is not a solution.



WORK SPACE AND ANSWER

ANSWER KEY # Roots, Graphs, Contexts

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PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	Solve: sqrt(x + 8) = 6	**x = 28**
2	Solve: sqrt(7x - 4) = 10	**x = 104/7**
3	For y = sqrt(x - 6) + 4, state the domain and the starting point of the graph.	**Domain: x >= 6; starting point: (6, 4)**
4	The square shown has an area of 98 in^2. Find its exact side length.	**7sqrt(2) in**
5	Solve: sqrt(x + 8) = x - 6	**x = (13 + sqrt(57))/2. Since x - 6 must be nonnegative, x >= 6. Squaring gives x^2 - 13x + 28 = 0; reject (13 - sqrt(57))/2 because it is below 6. The retained root satisfies the original equation.**
6	Let f(x) = sqrt(x + 2) - 4. Find f(11).	**sqrt(13) - 4**

PART 2 · APPLY IT

1. **P = 4; t is a nonnegative whole number.** Substitute t = 9, so P = sqrt(9) + 1 = 4. Because t counts completed practice sets, it cannot be negative or fractional.
2. **x = 60 ft; 0 <= h <= 7 ft** Set 6 = sqrt(x + 4) - 2, giving sqrt(x + 4) = 8 and x = 60. On the stated interval, the increasing function has height 0 at x = 0 and height 7 at x = 77.

CHALLENGE

x = (1 + sqrt(17))/2. The other result, (1 - sqrt(17))/2, is negative, but rearranging gives sqrt(x + 4) = x, so x must be nonnegative.

Accept equivalent exact radical forms and equivalent interval notation for domains and ranges. For equations formed by squaring, accept only solutions that check in the original equation.