Reading Strategy

8-8 Use Vocabulary

You can solve radical equations in a three-step process. For example, to solve the equation $\sqrt{x} - 4 = 0$, follow the steps below.



Isolate the radical in each equation.



Solve the following equations.

\sim	x -	+ 2	2 =	3
	\mathcal{N}	\sqrt{x}	$\sqrt{x+2}$	$\sqrt{x+2} =$

8-8 Solving Radical Equations and Inequalities (continued)	8-8 Multiple Radicals
	Equations may involve more than one radical. In that case, the solution process is repeated to eliminate multiple radicals. For example:
Solving equations with rational exponents is similar to solving radical equations.	$\sqrt{x} + \sqrt{x-5} = 5$
Solve: $x = (x + 20)^2$.	To solve, isolate one radical and square both sides as shown below.
Step 1 Haise both sides to the reciprocal power. Think: $(a^{\hat{\pi}}) = a$ $\mathbf{y}^2 = \left[(\mathbf{y} + 20)^{\frac{1}{2}} \right]^2$	$\sqrt{x} = 5 - \sqrt{x-5}$
Stan 2 Square both sides	$(\sqrt{x})^2 = (5 - \sqrt{x} - 5)^2$ $x = 25 - 10\sqrt{x - 5} + (x - 5)$
$x^2 = x + 20$	$x = 25 - 10 \sqrt{x} - 5 + (x - 5)$ Notice that now there is only one radical in the equation. Repeat the
Step 3 Write the quadratic equation in standard form.	process, isolate the radical, square, and solve.
$x^2 - x - 20 = 0$ Set one side of the	$x = 25 - 10\sqrt{x-5} + (x-5)$
Step 4 Factor. (x + 4)(x - 5) = 0 equation equal to zero.	$-20 = -10 \sqrt{x-5}$
Step 5 Solve	$2^2 = (\sqrt{x-5})^2$
(x + 4) = 0 or $(x - 5) = 0$	4 = x - 5
$x = -4 \qquad x = 5$	9 = <i>x</i>
Step 6 Check for extraneous solutions.	Solve each equation. Check each answer to ensure that it does not
$x = (x + 20)^{\overline{2}}$ This is the only solution.	include extraneous solutions. $1\sqrt{y-3} - \sqrt{y+15} = 2$ $2\sqrt{y+16} - y - \sqrt{y+7}$
x = -4 $x = 5$	15 25
$-4 \neq (16)^{\frac{1}{2}} \mathbf{X} \qquad 5 = (25)^{\frac{1}{2}} \mathbf{y}$	10.20 9
	3. $\sqrt{x-3} - \sqrt{x-2} = 1$ 4. $\sqrt{\sqrt{x-3}} = \sqrt{x-15}$
Solve each equation.	No solution 19
4. $(5x+6)^{\frac{1}{4}}=3$ 5. $(6x-8)^{\frac{1}{3}}=4$ 6. $x=(x+6)^{\frac{1}{2}}$	5. $\sqrt{x-3} = \frac{2}{\sqrt{x-3}}$ 6. $\sqrt{x^2-7x+12} - x = x-6$
$\left[(5x+6)^{\frac{1}{4}}\right]^4 = 3^4 \qquad \left[(6x-8)^{\frac{1}{3}}\right]^3 = 4^3 \qquad x^2 = \left[(x+6)^{\frac{1}{2}}\right]^2$	$\sqrt{x-3}$ 5 3
$\frac{5x+6=81}{5x-7} \qquad \frac{6x-8=64}{5x-7} \qquad \frac{x^2=x+6}{5x-7}$	7. $\sqrt[3]{3x+1} = \sqrt[3]{50x+6}$ 8. $\sqrt[3]{x-7} = \sqrt[3]{x-1}$
$5x = 75 \qquad 6x = 72 \qquad x^2 - x - 6 = 0$	5 or $-\frac{1}{9}$ 8 or -1
<u>x = 15</u> <u>x = 12</u> $(x-3)(x+2) = 0$	9. $\sqrt{x+2} = 1 + \sqrt{x-3}$ 10. $\sqrt[3]{x+2} = \sqrt[3]{\frac{x}{2}+5}$
X = 3	7 6
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LESSON Problem Solving	Reading Strategy
Problem Solving Bolving Radical Equations and Inequalities The formula $s = \sqrt{30/d}$ can be used to estimate the speed, s, in miles per hour that a car is traveling when it goes into a skid, where f is the coefficient of friction and d is the length of the skid marks in feet. 1. How does the speed vary as the length of the skid marks? Directly 2. Kody skids to a stop on a street with a speed limit of 35 mi/h. His skid marks measure 52 ft, and the coefficient of friction is 0.7. Kody says that he was driving only about 30 mi/h. Kody wants to prove that he was not speeding. a. Solve the equation for <i>d</i> in terms of <i>s</i> . $d = \frac{s^2}{30f}$ b. How long would the skid marks be if he had been driving at a speed of 35 mi/h? About 58 ft c. Was Kody speeding or not? Explain how you know. No; possible answer: his skid marks were only 52 ft, not 58 ft. d. Find his actual speed. About 33 mi/h. 3. Ashley skids to a stop on a street with a speed limit of 15 mi/h to avoid a dog who runs into the street about 20 ft ahead of her. Ashley claims to be the decent price of the formula for the formed the formula for the street about 20 ft ahead of her. Ashley claims to be the street about 20 ft ahead of the r. Ashley claims to be the street about 20 ft ahead of her. Ashley claims to be the decent price of the formula for the street about 20 ft ahead of her. Ashley claims to be the street about 20 ft ahead of her. Ashley claims to be the street about 20 ft ahead of her. Ashley claims to be the street about 20 ft ahead of her. Ashley claims to be therefore there of the formula ft for there acon	Reading Strategy Beading Strategy Use Vocabulary You can solve radical equations in a three-step process. For example, to solve the equation $\sqrt{x} - 4 = 0$, follow the steps below. STEP 1: Isolate the radical equation $\sqrt{x} - 4 = 0$, follow the steps below. STEP 2: Raise both sides to the appropriate power. $(\sqrt{x})^2 = (4)^2$ To isolate the radical means to have only the radical on one side of the equation and all other variables and constants on the other side of the equation. To understand what it means to raise a
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Problem Solving Solving Radical Equations and Inequalities The formula $s = \sqrt{30/d}$ can be used to estimate the speed, s, in miles per hour that a car is traveling when it goes into a skid, where f is the coefficient of friction and d is the length of the skid marks in feet. 1. How does the speed vary as the length of the skid marks? Directly 2. Kody skids to a stop on a street with a speed limit of 35 mi/h. His skid marks measure 52 ft, and the coefficient of friction is 0.7. Kody says that he was driving only about 30 mi/h. Kody wants to prove that he was not speeding. a. Solve the equation for d in terms of s. $d = \frac{s^2}{30f}$ b. How long would the skid marks be if he had been driving at a speed of 35 mi/h? About 58 ft c. Was Kody speeding or not? Explain how you know. No; possible answer: his skid marks were only 52 ft, not 58 ft. d. Find his actual speed. About 33 mi/h 3. Ashley skids to a stop on a street with a speed limit of 15 mi/h to avoid a dog who runs into the street about 20 ft ahead of her. Ashley claims to have been going less than 15 mi/h. The coefficient of friction is 0.7. a. If Ashley were driving he speed limit, by what distance would she have missed the dog? <u>By at least 15 ft</u> Choose the letter for the best answer. 4. Barney was driving at 25 mi/h. A car pulls out 30 ft ahead of him. Which statement is true? 5. On a busy highway with a speed limit of 70 mi/h, a truck ahead of Verna jack-krifes across the	Reading Strategy Use Vocabulary You can solve radical equations in a three-step process. For example, to solve the equation $\sqrt{x} - 4 = 0$, follow the steps below. STEP 1: Isolate View of the radical $\sqrt{x} - 4 = 0$, follow the steps below. STEP 2: Raise both sides to the appropriate power. View of the radical means to have only the radical means to have only the radical on one side of the equation and all other variables and constants on the other side of the equation. To understand what it means to raise a number to a power, think about how the exponent is located slightly higher than the base. Isolate the radical in each equation. $1 \cdot \sqrt{x} + 3 = 0$ $\sqrt{x} = -3$ $2 \cdot \sqrt{x+2} - 6 = 0$ $\sqrt{x} = -3$ $2 \cdot \sqrt{x+2} - 6 = 0$ $\sqrt{x} = -3$ $2 \cdot \sqrt{x+2} - 6 = 0$ $\sqrt{x} = -3$ $2 \cdot \sqrt{x+2} - 6 = 0$ $\sqrt{x} = -2$ $4 \cdot \frac{1}{2} \sqrt{x} - 9 = 0$ $\sqrt{x} = -18$ $5 \cdot -2\sqrt{x+6} = -4$ $\sqrt{x+6} = 2$ To what power should both sides of each equation be raised? $6 \cdot \sqrt{x} = 2$ Third power $7 \cdot \sqrt{x+2} = 1$
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