NAME:_____ Math _____, Period _____

Mr. Rogove Date:_____

Learning Objective: We will find positive solutions for equations involving square roots and cube roots. (G8M7L5)

Activating Prior Knowledge:

We can solve linear equations (solve for x)

$-2(5x-3)=x+28$	$27x-15=6x-78$
$-10x+6=x+28$ $-x \quad -x$ $-11x+6=28$ $-6 \quad -6$ $\frac{-11x}{-11}=\frac{22}{-11}$ $x=-2$	$-6x \quad -6x$ $21x-15=-78$ $+15 \quad +15$ $\frac{21x}{21}=\frac{-63}{21}$ $x=-3$

Concept Development:

Solving non-linear equations has some of the same elements…our goal remains the same in solving equations:

Solve for the variable

Find "x"

We can simplify the expressions until we have the form of $x^2=p$ *or* $x^3=p$ and then take the square root or cube root of both sides of the equation to solve for x.

Example:

$$x^3+9x=\frac{1}{2}(18x+54)$$

$x^3+9x=9x+27$

$\sqrt[3]{x^3}=\sqrt[3]{27}$

$x=3$

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Guided Practice:

Steps to Solving Equations Involving Square Roots and Cube Roots

1. Use the properties of equality to transform the equation to the form of $x^2 = p$ *or* $x^3 = p$.
2. Solve for x by taking the square root (or cube root) of both sides of the equation.
3. Check your work by substituting the positive solution for your unknown value into the exercise.

$x^2 + 4x = 4(x + 16)$ $x^2+4x = 24x+64$ $x^2 = 64$ $x = 8$	$x^2 - 14 = 5x + 67 - 5x$ $x^2 - 14 = 67$ $+14 \quad +14$ $x^2 = 81$ $\sqrt{x^2} = \sqrt{81}$ $x = 9$ "$x = \pm 9$" CHECK $9^2 - 14 \stackrel{?}{=} 5(9) + 67 - 5(9)$ $81 - 14 \stackrel{!}{=} 45 + 67 - 45$ $67 = 67$
* $x(x + 4) - 3 = 2(2x + 39)$ $x^2+4x-3 = 4x+78$ $+3 \quad +3$ $x^2+4x = 4x+81$ $-4x \quad -4x$ $x^2 = 81$ $\sqrt{x^2} = \sqrt{81}$ $x = 9$	* $x(x - 1) = 121 - x$ $x^2 - 1x = 121 - x$ $+1x \quad +1x$ $x^2 = 121$ $x = 11$

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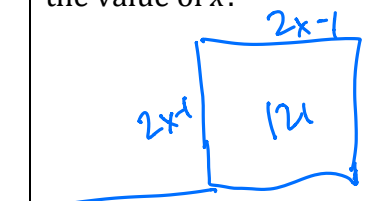
A square yard has a side length $2x - 1$ and an area of 121 square yards. What is the value of x?

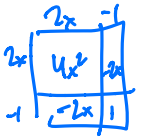


$\sqrt{(2x-1)^2} = \sqrt{121}$

$2x - 1 = 11$

$2x = 12$

$x = 6$



$4x^2 - 4x + 1 = 121$

$4x^2 - 4x - 120 = 0$

$x^2 - x - 30 = 0$

$(x-6)(x+5) = 0$

$x = 6$ or $x = -5$

A square has a side length of $3x$ and an area of 324 square inches. What is the value of x?

$\sqrt{(3x)^2} = \sqrt{324}$

$\frac{3x}{3} = \frac{18}{3}$

$x = 6$

$(3x)^2 = 324$

$\frac{9x^2}{9} = \frac{324}{9}$

$\sqrt{x^2} = \sqrt{36}$

$x = 6$

$(4x)^3 = 1{,}728$

$\sqrt[3]{(4x)^3} = \sqrt[3]{1728}$

$4x = 12$

$x = 3$

$\frac{64x^3}{64} = \frac{1728}{64}$

$x^3 = 27$

$x = 3$

$-3x^3 + 14 = -67$

$\frac{-3x^3}{-3} = \frac{-81}{-3}$

$\sqrt[3]{x^3} = \sqrt[3]{27}$

$x = 3$

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$x(2x^2 - 5) + 3x = -2x + 1024$

$2x^3 - 5x + 3x = -2x + 1024$

$2x^3 - 2x = -2x + 1024$

$\frac{2x^3}{2} = \frac{1024}{2}$

$\sqrt[3]{x^3} = \sqrt[3]{512}$

$x = 8$

$216 + x = x(x^2 - 5) + 6x$

$x = 6$

$(6\sqrt{2x})^2 - 2x = \frac{1}{2}(144 - 4x)$

$6^2 \cdot (\sqrt{2x})^2 - 2x = 72 - 2x$

$36 \cdot 2x - 2x = 72 - 2x$

$72x - 2x = 72 - 2x$

$+2x \quad +2x$

$x = 1$

$(6\sqrt{2x})^2$

$(6\sqrt{2x})(6\sqrt{2x})$

$(\sqrt{120} - 1)^2$

$(\sqrt{120} - 1)(\sqrt{120} - 1)$

$(2\sqrt{x})^2 - (6x + 2) = 3(3 - 2x) + 29$

$2^2(\sqrt{x})^2 - 6x - 2 = 9 - 6x + 29$

$4x - 6x - 2 = -6x + 38$

$-2x - 2 = -6x + 38$

$4x = 40$

$x = 10$

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Independent Practice:

No ind Prac. Can give out homework

Closure:

Solve for x:

$$\frac{1}{2}(2x^2 + 10) = 30$$

Notes:

Aligns to lesson 5 grade 8 module 7. Homework should be problem set from lesson 5.