Algebra 1 Unit 9 - Quadratic Equations Notes

Day 5 – Solving by Finding Square Roots (More Complicated)

Steps for Solving Quadratics by Finding Square Roots with Parentheses

1. Add or Subtract any constants outside of any parenthesis.
2. Multiply or Divide any constants around parenthesis/squared term. "Get ( )² by itself"
3. Take square root of both sides and set your expression equal to BOTH the positive and negative root (±). Ex: $(x+4)^2 = 25$
   $\sqrt{(x+4)^2} = \sqrt{25}$
   $(x+4) = \pm 5$
   $x+4 = +5$ and $x+4 = -5$
   $x = 1$ and $x = -9$
4. Add, subtract, multiply, or divide any remaining numbers to isolate x.

REMEMBER WHEN SOLVING FOR X YOU GET A POSITIVE AND NEGATIVE ANSWER!

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PEMDAS

Solve the following for x:

1) $(x-4)^2 = 81$

$\sqrt{(x-4)^2} = \sqrt{81}$

$x-4 = +9$

$+4 \quad +4$

$x = 13$

$x-4 = -9$

$+4 \quad +4$

$x = -5$

2) $(p-4)^2 = 16$

$\sqrt{(p-4)^2} = \sqrt{16}$

$p-4 = 4$

$+4 \quad +4$

$p = 8$

$p-4 = -4$

$+4 \quad +4$

$p = 0$

3) [redacted]

$(p-4)^2 = 16$

$\sqrt{(p-4)^2} = \sqrt{4}$

$p-4 = 4$

PEMDAS

4) $\frac{1}{2}(x+8)^2 = 14$

$\cdot 2 \quad \cdot 2$

$\sqrt{(x+8)^2} = \sqrt{28}$

$x+8 = +\sqrt{28}$

$x+8 = +2\sqrt{7}$

$-8 \quad -8$

$x = -8+2\sqrt{7}$

$x+8 = -\sqrt{28}$

$x+8 = -2\sqrt{7}$

$-8 \quad -8$

$x = -8-2\sqrt{7}$

5) $-2(x+3)^2 - 16 = -48$

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5 4

13 2 2

6) $3(x-4)^2 + 7 = 67$

$-7 \quad -7$

$3(x-4)^2 = 60$

$\div 3 \quad \div 3$

$\sqrt{(x-4)^2} = \sqrt{20}$

$x-4 = +\sqrt{20}$

$x-4 = 2\sqrt{5}$

$+4 \quad +4$

$x = 4+2\sqrt{5}$

$x-4 = -\sqrt{20}$

$x-4 = -2\sqrt{5}$

$+4 \quad +4$

$x = 4-2\sqrt{5}$

PEMDAS

$-3(x+2)^2 = 18$

$-3 \quad -3$

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

$x+2 = \pm\sqrt{6}$

x^2+3x+2

$-2^1+6^{1/2}$

$x+2 = \sqrt{6}$

$-2 \quad -2$

$x = -2+\sqrt{6}$

$x+2 = -\sqrt{6}$

$-2 \quad -2$

$x = -2-\sqrt{6}$

Algebra 1 Unit 9 - Quadratic Equations Notes

Solving Literal Equations with Quadratic Equations

A literal equation is an equation with more than one variable. When solving literal equations, you would use the properties of equality to isolate the variable you are solving for and treat the other variables like constants.

PEMDAS

1. Solve for s: $A = 6s^2$

$\sqrt{\frac{A}{6}} = \sqrt{s^2}$

$\pm\sqrt{\frac{A}{6}} = s$

2. Solve for r: $A = \pi r^2$

$\sqrt{\frac{A}{\pi}} = \sqrt{r^2}$

$\pm\sqrt{\frac{A}{\pi}} = r$

3. Solve for r: $A = \frac{\pi r^2 s}{360}$

$360A = \pi r^2 s$

$\sqrt{\frac{360A}{\pi s}} = \sqrt{r^2}$

$\pm\sqrt{\frac{360A}{\pi s}} = r$

4. Solve for b: $a^2 + b^2 = c^2$.

$\sqrt{b^2} = \sqrt{c^2 - a^2}$

$b = \pm\sqrt{c^2 - a^2}$

5. Solve for c: $E = mc^2$

$\sqrt{\frac{E}{m}} = \sqrt{c^2}$

$\pm\sqrt{\frac{E}{m}} = c$

PEMDAS

6. Solve for s: $V = \frac{1}{3}s^2 h$

$\frac{3}{1}\cdot\frac{V}{h} = \frac{1}{3}s^2\cdot\frac{3}{1}$

$\sqrt{\frac{3V}{h}} = \sqrt{s^2}$

$s = \pm\sqrt{\frac{3V}{h}}$

7. The formula for finding the volume of a square pyramid is $V = 1/3s^2h$, where s represents the side length of the square base and h represents the height. What equation could be used to find the height of the square pyramid?

$\frac{3}{1}\cdot V = \frac{1}{3}s^2 h\cdot\frac{3}{1}$

$\frac{3V}{s^2} = \frac{s^2 h}{s^2}$

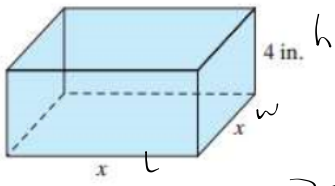
$h = \frac{3V}{s^2}$

8. The volume of a box with a square bottom and a height of 4 in is given by $V(x) = 4x^2$, where x is the length (in inches) of the sides of the bottom of the box.

$V = lwh$

$V = x\cdot x\cdot 4$

$V = 4x^2$



a. If the volume of the box is 289 in³, find the dimensions of the box.

PEMDAS

$\frac{289}{4} = \frac{4x^2}{4}$

$\sqrt{72.25} = \sqrt{x^2}$

$8.5 = x$

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