ALGEBRA DL-Zoom Meeting 2 - Solving Quadratic Equations

Review the following information and then solve the quadratic equations.

Taking the Square Root $\sqrt{\ }$ $(x^2 = d)$

- Isolate x^2
- Take the square root of both sides of the equation (*remember: there are two roots + and -*)

Factoring $(x^2 + bx + c = 0)$

- Set the equation equal to zero by bringing all terms to one side
- Factor
- Set each factor equal to zero
- Solve each equation
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Quadratic Formula $ax^2 + bx + c = 0$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$a = 1 \quad b = 7 \quad c = 12$

3) $x^2 + 7x + 12 = 0$

$x = \frac{-7 \pm \sqrt{(7)^2 - 4(1)(12)}}{2(1)}$

$\frac{-7 \pm \sqrt{49-48}}{2}$

$\frac{-7 \pm \sqrt{1}}{2}$ $\quad \frac{-7 \pm 1}{2}$

$\frac{-7+1}{2}$ $\quad \frac{-7-1}{2}$

A M

1. $\sqrt{x^2} = \pm\sqrt{121}$

$x = \pm 11$

$x = \{-11, 11\}$

$x^2 = 121$

$(-11)^2 = 121$

$(11)^2 = 121$ ✓

2. $4y^2 - 15 = 85$

$-85 \quad -85$

$\frac{4y^2}{4} - \frac{100}{4} = 0$

$4(y^2 - 25) = 0$

$4(y-5)(y+5) = 0$

$(y-5)(y+5)$

$y-5=0 \quad y+5=0$

$+5 \quad +5 \quad -5 \quad -5$

DOTS

$y = \{-5, 5\}$

3. $a^2 + 7a + 12 = 0$

$(a+3)(a+4) = 0$

$a+3=0 \quad a+4=0$

$-3 \quad -3 \quad -4 \quad -4$

$a = -3 \quad a = -4$

$a = \{-4, -3\}$

4. $3x^2 - 24x = -45$

$+45 \quad +45$

$3x^2 - 24x + 45 = 0$

$3(x^2 - 8x + 15) = 0$

$3(x-3)(x-5) = 0$

$x-3=0 \quad x-5=0$

$x = 3 \quad x = 5$

$x = \{3, 5\}$

5. $y^2 + 6y = 0$

$y(y+6) = 0$

$y = 0 \quad y+6=0$

$-6 \quad -6$

$y = -6$

$y = \{-6, 0\}$

6. $\sqrt{(y-5)^2} = \pm\sqrt{49}$

$y - 5 = \pm 7$

$+5 \quad +5$

$y = 5 \pm 7$

$5+7 \quad 5-7$

$y = 12 \quad y = -2$

7. $\frac{4(x-3)^2}{4} = \frac{32}{4}$

$\sqrt{(x-3)^2} = \sqrt{8}$

$x - 3 = \pm\sqrt{8}$

$x - 3 = \pm 2\sqrt{2}$

$+3 \quad +3$

$x = 3 \pm 2\sqrt{2}$

$* \sqrt{8}$

$\sqrt{4} \cdot \sqrt{2}$

$2\sqrt{2}$

8. $\frac{1}{x} = \frac{x}{4x+5}$

$x = \{-1, 5\}$

$x^2 = 4x + 5$

$-4x-5 \quad -4x-5$

$x^2 - 4x - 5 = 0$

$(x-5)(x+1) = 0$

$x-5=0 \quad x+1=0$

$x=5 \quad x=-1$

9. $\sqrt{(x+1)^2} = \pm\sqrt{81}$

$x + 1 = \pm 9$

$-1 \quad -1$

$x = -1 \pm 9$

$-1+9 \quad -1-9$

$8 \quad -10$

$x = \{8, -10\}$

Review the following information and then solve each word problem.

When solving word problems...

1) **Read the problem twice, maybe three times. Think about what is being asked. Draw a diagram to help you make sense of the situation.**
2) **Choose a variable or variables to represent the unknown(s).**
3) **Write an equation relating all unknowns.**
4) **Solve your equation and find all unknowns.**
5) **Check your answer for reasonableness.**

10. The length of a rectangle is 5 cm more than the width. The area is 84 cm². Find the length and width of the rectangle.

$x+5=12$

$7=x$ $\boxed{A=84\text{cm}^2}$

let x = width
let $x+5$ = length

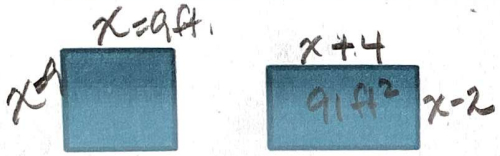
$x(x+5)=84$
$x^2+5x=84$
$-84 \quad -84$
$x^2+5x-84=0$
$(x+12)(x-7)=0$

$x+12=0$	$x-7=0$
reject $x=-12$	$\boxed{x=7}$

The width is 7cm and the length is 12cm.

11. A square banner had 4 ft. added to its width and 2 ft. subtracted from its height. The banner then had an area of 91 ft². How long was a side of the original square banner?

$x=9$ft.

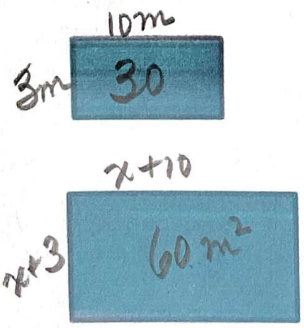


$(x+4)(x-2)=91$
$x^2-2x+4x-8=91$
$x^2+2x-8=91$
$-91 \quad -91$
$x^2+2x-99=0$
$(x-9)(x+11)=0$

$x-9=0$	$x+11=0$
$x=9$	$x=-11$ reject

The original side of the square is 9ft.

12. The dimensions of a rectangular garden were 3 m by 10 m. When both dimensions were increased by the same amount, the area of the garden doubled. Find the dimensions of the new garden.



$(x+3)(x+10)=60$
$x^2+10x+3x+30=60$
$x^2+13x+30=60$
$-60 \quad -60$
$x^2+13x-30=0$
$(x+15)(x-2)=0$

$x+15=0$	$x-2=0$
$x=-15$ reject	$x=2$
	$2+3=5$

$2+10=12$

The new dimensions are 5m + 12m.