Bellwork: Solve the equation below:

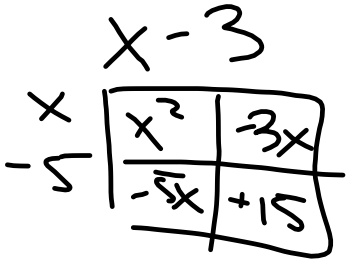
$x^2+15=8x$

$-8x \quad -8x$

$x^2-8x+15=0$

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

$x=3, 5$



Homework 4.1 Solutions

1. $\{-3\}$
2. $\{-11,-1\}$
3. $\{2,6\}$
4. $\{0,4\}$
5. $\{-7,4\}$
6. $\left\{-\frac{1}{2},\frac{5}{3}\right\}$
7. $\{-5\}$
8. $\{-4,4\}$
9. $\left\{-\frac{2}{3},\frac{1}{5}\right\}$
10. $\{0,6\}$
11. $\left\{-\frac{5}{2},-\frac{1}{6}\right\}$
12. $\{-8,8\}$
13. $\left\{-\frac{1}{4},\frac{1}{4}\right\}$
14. $\{5,6\}$
15. $\left\{-\frac{3}{5},6\right\}$
16. $\{-8,15\}$
17. $\left\{-1,\frac{7}{12}\right\}$
18. $\left\{-\frac{2}{3},6\right\}$
19. $x = 6$
    Dimensions: 14cm x 9cm
20. $t = 1.5$ seconds
21. x-intercepts: $(6,0),(7,0)$

★ 22. $\{-3, 24\}$

18) $4(x^2-4x)=x^2+12$

$4x^2-16x=x^2+12$

$-x^2 \quad -12 \quad -x^2 \quad -12$

$\frac{-6}{1} \quad \frac{2}{3}$

$(x-6)(3x+2)=0$

$x-6=0$

$+6 \quad +6$

$x=6$

$3x+2=0$

$-2 \quad -2$

$\frac{3x}{3}=\frac{-2}{3}$

$x=-\frac{2}{3}$

$3x^2-16x-12=0$

-36

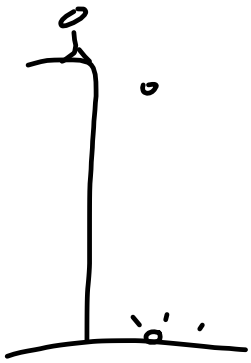
$-18 \quad +2$

-16

$\frac{-18}{3} \quad \frac{+2}{3}$

$x=6, -\frac{2}{3}$

20)



$H(t)=-16t^2+36$

$0=-16t^2+36$

$0=-4(4t^2-9)$

$0=-4(2t+3)(2t-3)$

$2t+3=0$ $\qquad$ $2t-3=0$

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Lesson 4.2 Objectives:

I can solve quadratic equations using the square root method

NG A SQUARE ROOT TO SOLVE QUADRATIC EQUATIONS

Given:

Step 1: Isolate the perfect square containing the variable: { Add the 1 to both sides / Divide by 2 both sides

Step 2: Square root both sides to cancel the square.

Step 3: Square & square root cancel; plus-or-minus on the other side.

Step 4: Isolate the variable if necessary & simplify your answers if possible

EXAMPLE

$2(x+3)^2 - 1 = 49$

$+1 \quad +1$

$\frac{2(x+3)^2}{2} = \frac{50}{2}$

$\sqrt{(x+3)^2} = \sqrt{25}$

$x+3 = \pm 5$

$x+3=5 \qquad x+3=-5$

$-3 \quad -3 \qquad -3 \quad -3$

$x=2 \qquad x=-8$

REMEMBER THE PLUS-OR-MINUS: When you use a square root on both sides of an equation to cancel the square on a variable, the side of the equation without the variable gets a plus-or-minus (±). This will often create two solutions.

WHEN TO USE: This method can be used to solve ANY quadratic equation. However, there are some forms that are **more convenient** to solve with a square root. Recommended use is for equations where the variable only appears once as a quadratic – that is, there's no linear term.

RECOMMENDED: $3x^2 = 18$ or $(x+3)^2 - 9 = 0$ **NOT RECOMMENDED:** $x^2 + 7x + 6 = 0$

$(x+6)(x+1) = 0$

$x = -6, -1$

1. $3x^2 + 7 = 55$

$-7 \quad -7$

$\frac{3x^2}{3} = \frac{48}{3}$

$\sqrt{x^2} = \pm\sqrt{16}$

$x = \pm 4$

$x = 4 \quad x = -4$

2. $\sqrt{x^2} = \sqrt{18}$

$x = \pm\sqrt{18}$

$18 = 2 \cdot 3 \cdot 3$

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

$x = 3\sqrt{2}$

$x = -3\sqrt{2}$

3. $3(x+1)^2+2=302$

$-2 \quad -2$

$\sqrt{(x+1)^2} = \pm\sqrt{100}$

$x+1 = \pm 10$

$-1 \quad -1$

$x = -1 \pm 10$

$\frac{3(x+1)^2}{3} = \frac{300}{3}$

$x+1 = 10$ $\quad -1 \quad -1$

$x = 9$

$x+1 = -10$ $\quad -1 \quad -1$

$x = -11$

$x = 9, -11$

4. $\sqrt{(x-6)^2} = \sqrt{12}$

$x-6 = \pm\sqrt{12}$

$12 = 6 \cdot 2$

$12 = 3 \cdot 2 \cdot 2$

$x-6 = \pm 2\sqrt{3}$

$+6 \quad +6$

$x = 6 \pm 2\sqrt{3}$

IRRATIONAL AND COMPLEX SOLUTIONS: In the Example above, what if the 25 were not a perfect square? What if it were a negative number? These situations will produce irrational or complex (imaginary) solutions for the variable.

5. $3x^2 = 2x^2 - 49$

$-2x^2 \quad -2x^2$

$\sqrt{x^2} = \sqrt{-49}$

$x = \pm 7i$

$7^2 = 49$

$(-7)^2 = 49$

$i^2 = -1$

6. $4(x+1)^2 + 36 = 0$

-36

$\frac{4(x+1)^2}{4} = \frac{-36}{4}$

$\sqrt{(x+1)^2} = \sqrt{-9}$

$x+1 = \pm 3i$

$-1 \quad -1$

$x = -1 \pm 3i$