Unit 8: Solving Quadratic Equations

To solve a quadratic equation, use one of the following methods:

- Factoring
- Quadratic Formula

1. $x^2 + 8x = 0$

$x(x+8)=0$

$x=0$ | $x+8=0$

$-8 \quad -8$

$x=-8$

$x=\{-8,0\}$

2. $4x^2 = 10x$

$-10x \quad -10x$

$4x^2-10x=0$

$4x(x-10)=0$

$\frac{4x}{4}=\frac{0}{4}$ | $x-10=0$

$+10 \quad +10$

$x=10$

$x=0$

$x=\{0,10\}$

3. $x^2 + 5x = 6$

$-6 \quad -6$

$x^2 + 5x - 6 = 0$

A M

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

$x+6=0$	$x-1=0$
$-6 \quad -6$	$+1 \quad +1$
$x=-6$	$x=1$

$x = \{-6, 1\}$

4. $x^2 = 18x - 81$

$-18x \quad +81$

$x^2 - 18x + 81 = 0$

A M

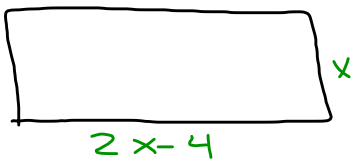
$(x-9)(x-9) = 0$

$x-9=0$	$x-9=0$
$+9 \quad +9$	$+9 \quad +9$
$x=9$	$x=9$

$x = \{9\}$

5. The length of a rectangle is 4 inches less than twice its width. If the area of the rectangle is 70 square inches, what are its dimensions?

x



let x = width
let 2x-4 = Length

$A = lw$

$70 = x(2x-4)$

$70 = 2x^2 - 4x$

$-70 \quad -70$

$0 = 2x^2 - 4x - 70$

$a \quad b \quad c$

use quadratic formula

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

$$x = \frac{-(-4) \pm \sqrt{(-4)^2-4(2)(-70)}}{2(2)}$$

$$x = \frac{4 \pm \sqrt{576}}{4}$$

$\sqrt{576} = 24$

$$x = \frac{4+24}{4} \text{ or } x = \frac{4-24}{4}$$

$x = 7$ $\quad$ $x = -5$ Reject

$2x-7$

$2(7)-4 = 10$

$w = 7$
$L = 10$

Completing the Square

Rewrite each expression by completing the square

1. $a^2 - 4a + 15$	2. $c^2 + 20c - 40$	3. $x^2 + x + 1$

① $a^2 - 4a + 15$

$a^2 - 4a \boxed{+4} + 15 \boxed{-4}$

$\left(\frac{-4}{2}\right)^2 = 4$

$\boxed{(a-2)^2 + 11}$

② $c^2 + 20c - 40$

$c^2 + 20c \boxed{+100} - 40 \boxed{-100}$

$\left(\frac{20}{2}\right)^2$

$\boxed{(c+10)^2 - 140}$

③ $x^2 + x + 1$

$x^2 + 1x \boxed{+\frac{1}{4}} + 1 \boxed{-\frac{1}{4}}$

$\left(\frac{1}{2}\right)^2$

$\boxed{(x - \frac{1}{2})^2 + \frac{3}{4}}$

Solve for x by completing the square.

1. $a^2 - 4a - 15 = 0$

$a^2 - 4a \boxed{+4} = +15 \boxed{-4}$

$\left(\frac{-4}{2}\right)^2$

$\sqrt{(a-2)^2} = \sqrt{11}$

$a - 2 = \pm\sqrt{11}$

$+2 \quad +2$

$a = 2 \pm \sqrt{11}$

2. $n^2 - 2n - 15 = 0$

$+15 \quad +15$

$n^2 - 2n \boxed{+1} = 15 \boxed{+1}$

$\left(\frac{-2}{2}\right)^2$

$\sqrt{(n-1)^2} = \sqrt{16}$

$n - 1 = \pm 4$

$+1 \quad +1$

$n = 1 \pm 4$

$n = \{-3, 5\}$

3. $r^2 + 4r + 3 = 0$

r^2+4r [+4] $= -3$ [+4]

$\left(\frac{4}{2}\right)^2$

$\sqrt{(r+2)^2} = \sqrt{1}$

$r+2 = \pm 1$

$-2 \quad -2$

$r = -2 \pm 1$

$r = \{-3, -1\}$

4. $c^2 + 20c - 40 = 0$

c^2+20c [+100] $= 40$ [+100]

$\left(\frac{20}{2}\right)^2$

$\sqrt{(c+10)^2} = \sqrt{140}$

$c+10 = \pm\sqrt{140}$

$-10 \quad -10$

$c = -10 \pm \sqrt{140}$

Unit 9: Rational Expressions and Equations

Simplify each expression or solve each equation for x.

1. $\dfrac{x^2 - 12x + 20}{x - 10}$

A M

$\dfrac{(x-10)(x-2)}{x-10}$ $= x-2$

2. gcf: 2n

$\dfrac{2n^2 - 10n}{n^2 - 9n + 20} \cdot \dfrac{n^2 - 8n + 16}{4n^2}$

a m

A M

$\dfrac{2n(n-5)}{(n-4)(n-5)} \cdot \dfrac{(n-4)(n-4)}{4n^2}$

$\dfrac{2n(n-4)}{4n^2} = \dfrac{n-4}{2n}$

3. $\frac{3y+9}{y+2} \div \frac{(y+3)}{1}$

K C F

gcf: 3

$\frac{3y+9}{y+2} \cdot \frac{1}{y+3}$

$\frac{3(y+3)}{y+2} \cdot \frac{1}{y+3} = \frac{3}{y+2}$

4. $\frac{x-7}{6} = \frac{4}{x+3}$

$(x-7)(x+3) = 24$

$x^2+3x-7x-21 = 24$

$x^2-4x-21 = 24$

$-24 \quad -24$

$x^2-4x-45 = 0$

$(x+5)(x-9) = 0$

$x+5=0 \quad | \quad x-9=0$

$-5 \quad -5 \quad | \quad +9 \quad +9$

$x=-5 \quad | \quad x=9$

$x=\{-5, 9\}$