

Section 6.9 Solving Quadratic Equations

To create a trinomial you multiply two binomials.

$$\begin{array}{l} (x+4)(x+7) \\ x^2 + 7x + 4x + 28 \\ x^2 + 11x + 28 \end{array}$$

General form of a trinomial

$$ax^2 + bx + c$$

To factor a trinomial you work backwards when $a=1$

Factor Section 6.9 Solving Quadratic Equations

$x^2 + 5x + 6$ 6 6
 $(x+2)(x+3)$ $2+3=5$ $x^2 - 6x - 16$
 $(x-8)(x+2)$

Factoring when $a \neq 0$

$3x^2 + 17x + 10$ $3 \cdot 10$
 $(3x^2 + 15x)(2x + 10)$ 30
 $3x(x+5) + 2(x+5)$ $15 + 2 = 17$
 $(x+5)(3x+2)$

$2x^2 - 5x + 3$ -16
 $2x^2 + 5x - 3 = 0$ $-8 + 2 = -6$
 $(2x^2 + 6x)(x-3) = 0$ -6
 $2x(x+3) - 1(x+3) = 0$ $6 + -1 = 5$
 $(x+3)(2x-1) = 0$
 $x+3=0$ $2x-1=0$
 $x=-3$ $x=\frac{1}{2}$

Factor

$$12x^2 - 10x - 28$$

$$2(6x^2 - 5x - 14)$$

$$2(6x^2 - 12x + 7x - 14)$$

$$6x(x-2) + 7(x-2)$$

$$2(x-2)(6x+7)$$

$$\begin{array}{r} -84 \\ \wedge \\ -12 + 7 = -5 \end{array}$$

To solve an equation, set it equal to zero. After factoring, set each factor equal to zero and solve for x.

Solve

$$3x^2 - 5x = 2 \quad 3x^2 - 5x - 2 = 0$$

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

$$3x(x-2) + 1(x-2) = 0$$

$$(x-2)(3x+1) = 0$$

$$x - 2 = 0 \quad 3x + 1 = 0$$

$$x = 2 \quad x = -\frac{1}{3}$$

$$\begin{array}{r} -6 \\ \wedge \\ -6 + 1 \end{array}$$

Solve.

$$20x^2 - 29x - 36 = 0$$

$$(20x^2 + 16x)(-45x - 36) = 0$$

$$4x(5x+4) - 9(5x+4) = 0 \quad \begin{matrix} -720 \\ \wedge \\ -45 = -29 \end{matrix}$$

$$(5x+4)(4x-9) = 0$$

$$5x+4=0 \quad 4x-9=0$$

$$x = -\frac{4}{5} \quad x = \frac{9}{4}$$

$$720/2$$

$$720/4$$

$$720/5$$

$$720/6$$

$$720/16 = 45$$

$$6x^2 - 11x + 4 = 0$$

$$(6x^2 - 3x)(-8x + 4) = 0$$

$$\begin{matrix} 24 \\ \wedge \\ -8-3 = -11 \end{matrix}$$

$$3x(2x-1) - 4(2x-1)$$

$$2x-1=0 \quad 3x-4=0$$

$$x = \frac{1}{2} \quad x = \frac{4}{3}$$

~~Homework~~

~~Pg 389 #49-55~~

Solve by using the *quadratic formula*

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} \quad ax^2 + bx + c$$

$$\begin{array}{ccc} a & b & c \\ 8x^2 - 10x - 3 = 0 & x = \frac{-(-10) \pm \sqrt{-10^2 - 4(8)(-3)}}{2(8)} \end{array}$$

$$x = \frac{10 \pm \sqrt{196}}{16}$$

$$x = \frac{10 \pm 14}{16}$$

$$x = \frac{10+14}{16} = \frac{24}{16} = \frac{3}{2}$$

$$x = \frac{10-14}{16} = \frac{-4}{16} = -\frac{1}{4}$$

Solve using the quadratic formula

$$18x^2 - 39x - 24 = 0$$

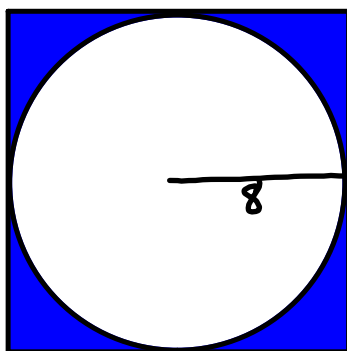
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$4x^2 - 8x = -1$$

Find the area of the shaded region.

$$A_{\text{square}} - A_{\text{circle}} = \text{shade}$$

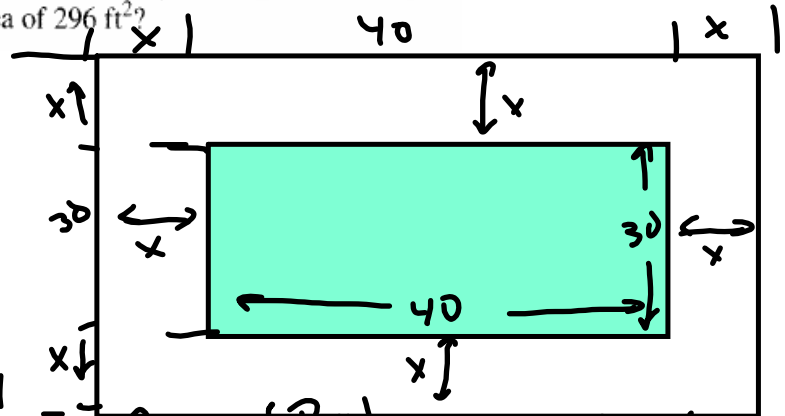
$$16^2 - 8^2(3.14) = 55.04$$



16 in.

EXAMPLE 12 *Brick Border*

Diane Cecero and her husband recently installed an inground rectangular swimming pool measuring 40 ft by 30 ft. They want to add a brick border of uniform width around all sides of the pool. How wide can they make the brick border if purchased enough brick to cover an area of 296 ft²?



Area of Brick and Pool

Area of Pool = Area of Brick

$$(30 + 2x)(40 + 2x) - (40)(30) = 296$$

$$(1200 + 60x + 80x + 4x^2) - 1200 = 296$$

$$140x + 4x^2 = 296$$

$$4x^2 + 140x - 296 = 0$$

Solve $4(x^2 + 35x - 74) = 0$

$$4(x + 37)(x - 2) = 0$$

$$4 \neq 0 \quad x + 37 = 0 \quad x - 2 = 0$$

$$x = -37$$

$$x = 2$$

-74
/ 4
37 + -2 = 35

Karen and Kurt's backyard has a width of 20 meters and a length of 30 meters. Karen and Kurt want to put a rectangular flower garden in the middle of the backyard leaving a strip of grass of uniform width around all sides of the flower garden. If they want to have 336 square meters of grass, what will be the width and length of the garden?

