Name: _____ Date: _____

Learning Goal 4.2	Given a quadratic equation, find the values of solution(s) by factoring, completing the square or using the quadratic formula.

When factoring fails you … there are 2 other methods.

Example Solve the following equations by completing the square.

a. $x^2 - 4x = 11$

$-11 \quad -11$

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

$(x^2 - 4x + 4 - 4) - 11 = 0$

$(x^2 - 4x + 4) - 4 - 11 = 0$

$(x-2)^2 - 15 = 0 \Rightarrow$ 

$+15 \quad +15$

$\sqrt{(x-2)^2} = \sqrt{15}$

$x - 2 = \pm\sqrt{15}$

$+2 \quad +2$

$x = 2 \pm \sqrt{15}$

b. $x^2 - 21 = -10x$

$+10x \quad +10x$

$\left(\frac{10}{2}\right)^2 = (5)^2 = 25$

$x^2 + 10x - 21 = 0$

$(x^2 + 10x + 25 - 25) - 21 = 0$

$(x^2 + 10x + 25) - 25 - 21 = 0$

$(x+5)^2 - 46 = 0 \Rightarrow$ 

$+46 \quad +46$

$\sqrt{(x+5)^2} = \sqrt{46}$

$x + 5 = \pm\sqrt{46}$

$-5 \quad -5$

$x = -5 \pm \sqrt{46}$

46
2 23

c. $2x^2 + 7x = -6$

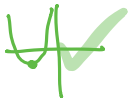
$+6 \quad +6$

$2x^2 + 7x + 6 = 0$ ← is factorable

$2\left(x^2 + \frac{7}{2}x\right) + 6 = 0 \qquad \left(\frac{7}{4}\right)^2 = \frac{49}{16}$

$2\left(x^2 + \frac{7}{2}x + \frac{49}{16} - \frac{49}{16}\right) + 6 = 0$

$2\left(x^2 + \frac{7}{2}x + \frac{49}{16}\right) - \frac{49}{8} + \frac{48}{8} = 0$

$2\left(x + \frac{7}{4}\right)^2 - \frac{1}{8} = 0 \Rightarrow$ 

$+\frac{1}{8} \quad +\frac{1}{8}$

$\frac{2\left(x+\frac{7}{4}\right)^2}{2} = \frac{1}{8} \div 2$

$\sqrt{\left(x+\frac{7}{4}\right)^2} = \sqrt{\frac{1}{16}}$

$x + \frac{7}{4} = \pm\frac{1}{4}$

$x = -\frac{7}{4} \pm \frac{1}{4}$

d. $2x^2 + 3x = 7$

$-7 \quad -7$

$2x^2 + 3x - 7 = 0$

$2\left(x^2 + \frac{3}{2}x\right) - 7 = 0 \qquad \left(\frac{3}{4}\right)^2 = \frac{9}{16}$

$2\left(x^2 + \frac{3}{2}x + \frac{9}{16} - \frac{9}{16}\right) - 7 = 0$

$2\left(x^2 + \frac{3}{2}x + \frac{9}{16}\right) - \frac{9}{8} - \frac{56}{8} = 0$

$2\left(x + \frac{3}{4}\right)^2 - \frac{65}{8} = 0 \Rightarrow$ 

$2\left(x+\frac{3}{4}\right)^2 = \frac{65}{8}$

$\left(x+\frac{3}{4}\right)^2 = \frac{65}{16}$

$x + \frac{3}{4} = \pm\frac{\sqrt{65}}{4}$

$x = -\frac{3 \pm \sqrt{65}}{4}$

BEDMAS

BEDMAS

Assignment p.240 #1 – 10, 13, 16, 18, 21 Quiz Next Day!

$x = \frac{-6}{4} = \frac{3}{2}$ $x = \frac{-8}{4} = -2$

Example The circular Toonie coin consists of an aluminum and bronze core and a nickel outer ring. If the radius of the inner core is 0.84 cm and the area of the circular face of the coin is 1.96π cm^2, what is the width of the outer ring?

↳ diameter of the coin?

$A = 1.96\pi$

$d = 2r$
$= 2\left(\frac{7}{5}\right)$
$= \frac{14}{5}$ cm
$= 2.8$ cm

$2.8 - 0.84 = 1.96$

$A = \pi r^2 = \frac{1.96\pi}{\pi}$

$\sqrt{r^2} = \sqrt{1.96}$

$r = \pm\sqrt{1.96}$
$= \pm\sqrt{\frac{196}{100}}$
$= \pm\frac{14}{10}$
$= \pm\frac{7}{5}$

The width of the outer ring is 1.96 cm.

Example A defender kicks a soccer ball away from her own goal. The path of the kicked soccer ball can be approximated by the quadratic function

$$h(x) = -0.06x^2 + 3.168x - 35.34$$

where *x* is the horizontal distance travelled in metres, from the goal line and *h* is the height.

a. How far is the soccer ball from the goal line when it is kicked?

$\left(\frac{52.8}{2}\right)^2 = 696.96$

$h(x) = -0.06(x^2 - 52.8x) - 35.34$
$= -0.06(x^2 - 52.8x + 696.96 - 696.96) - 35.34$
$= -0.06(x^2 - 52.8x + 696.96) + 41.8176 - 35.34$
$= -0.06(x - 26.4)^2 + 6.4776 = 0$
$-0.06(x - 26.4)^2 = -6.4776$
$(x - 26.4)^2 = 107.96$

b. How far does the soccer ball travel before it hits the ground?

$x - 26.4 \doteq \pm 10.39$
$x = 26.4 \pm 10.39$
$x_1 = 16.01$
$x_2 = 36.79$

a. The ball is ~16 m from the goal line when it is kicked

b. The ball travels ~20.8 m before it hits the ground.