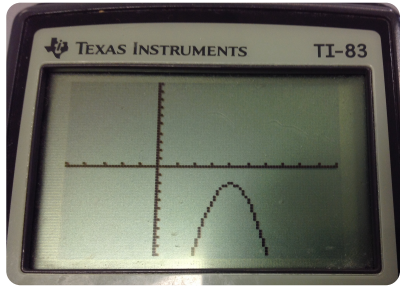


Solve by factoring.	Solve by graphing.
<p>1. $x^2 + 23x - 138 = 8x - 4x^2 + 2$</p> <p>$5x^2 + 15x - 140 = 0$</p> <p>$5(x^2 + 3x - 28) = 0$</p> <p>$5(x+7)(x-4) = 0$</p> <p>$5 \neq 0 \left\{ \begin{array}{l} x+7=0 \\ x=-7 \end{array} \right. \left\{ \begin{array}{l} x-4=0 \\ x=4 \end{array} \right.$</p> <p>$x = -7, 4$</p>	<p>2. $f(x) = -2x^2 + 16x - 34$</p> <p>The graph doesn't cross x-axis</p> 

VERBALLY – Write an equations or equations to represent the following. Then solve use factoring.

3. The product of two numbers is 640. Their difference is 12. Find these numbers.

① $x \cdot y = 640$
 $x - y = 12 \rightarrow$ ② $x = y + 12$

③ $(y+12)y = 640$
 $y^2 + 12y - 640 = 0$
 $(y-20)(y+32) = 0$
 $y-20=0 \left\{ \begin{array}{l} y=20 \\ y=32 \end{array} \right.$

④ $x = (20) + 12 \quad x = (-32) + 12$
 $x = 32 \quad x = -20$

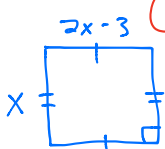
The numbers are 20 and 32.
 or
 The numbers are -20 and -32

4. One side of a rectangle is 3 feet shorter than twice the other side. Find the sides if the area is 209 ft².

① one side = $2x - 3$
 other side = x

② $A_{\text{Rec}} = b \cdot h$
 $209 = (2x - 3)x$
 $209 = 2x^2 - 3x$
 $0 = 2x^2 - 3x - 209$ → split middle term
 $0 = (2x^2 - 22x) + (19x - 209)$ → FACTOR BY Grouping
 $0 = 2x(x - 11) + 19(x - 11)$
 $0 = (x - 11)(2x + 19)$
 $x - 11 = 0 \left\{ \begin{array}{l} 2x + 19 = 0 \\ x = 11 \end{array} \right. \left\{ \begin{array}{l} 2x = -19 \\ x = -19/2 \text{ (MAKES NO SENSE)} \end{array} \right.$

③ other side = $x = 11$ feet
 one side = $2x - 3 = 2(11) - 3 = 22 - 3 = 19$ feet



5. The length of the sides of a right triangle are measured as three consecutive even numbers. Find the values of these sides.

① $x+2$ (middle side)
 $x+4$ (largest side)
 x (smallest side)

② $x^2 + y^2 = r^2$ (Pythagorean Theorem's Equation)
 $(x)^2 + (x+2)^2 = (x+4)^2$
 $x^2 + x^2 + 4x + 4 = x^2 + 8x + 16$
 $2x^2 + 4x + 4 = x^2 + 8x + 16$
 $x^2 - 4x - 12 = 0$
 $(x-6)(x+2) = 0$
 $x-6=0 \left\{ \begin{array}{l} x+2=0 \\ x=6 \end{array} \right. \left\{ \begin{array}{l} x=-2 \text{ (nonsensical)} \end{array} \right.$

③ Smallest = 6 units
 middle = 8 units
 Largest = 10 units

ALGEBRAICALLY

6. Chuck chucks a pair of Chucks upward from the top of a 1200 ft tall Chuck E Cheese. The height of the shoes, in ft, t seconds after he threw it is $h(t) = -16t^2 + 160t + 1200$.

a. What does the $h(3)$ mean? Find it.

How high are the Chucks at 3 seconds? 1536 feet

b. Use factoring to determine how long it takes for the shoes to hit the ground.

① At ground height is zero, i.e. $h(t) = 0$ ② $0 = -16t^2 + 160t + 1200$
 $0 = -16(t^2 - 10t - 75)$
 $0 = -16(t-15)(t+5)$
 $0 = -16 \left\{ \begin{array}{l} 0 = t-15 \\ 15 = t \end{array} \right\} \left\{ \begin{array}{l} t+5=0 \\ t=-5 \end{array} \right\}$ (nonSense)

③ It will take 15 seconds for the chucks to hit ground.

7. Write the equation of a quadratic function whose solutions are 3 and -2.

$$f(x) = (x-3)(x-(-2))$$

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

$$f(x) = x^2 - x - 6$$

8. Determine the value of k so that the roots of the equation $x^2 - kx + 36 = 0$ are equal.

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

$$x^2 - 12x + 36 = 0$$

$$k = 12$$

GRAPHICALLY

9. Use factoring to determine the zeros of $f(x) = x^3 - 2x^2 - 15x$. DO NOT GRAPH ON CALCULATOR!!!

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

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

$$0 = x \left\{ \begin{array}{l} 0 = x-5 \\ 5 = x \end{array} \right\} \left\{ \begin{array}{l} 0 = x+3 \\ -3 = x \end{array} \right.$$

$$x = -3, 0, 5$$

a. Now that you know the zeros of the function make a rough sketch of the graph WITHOUT your calculator given $f(-2) = 14$.

