

Name: KEY Hour: _____ Date: _____

NOTES: Section 10.4 – Solving Quadratic Equations in Factored Form

Goals: #1 - I can solve quadratic equations in factored form.



Homework: Section 10.4 Worksheet

Notes:

When two or more numbers are multiplied, each of the number is a factor of the product.

A polynomial is in factored form if it is written as the product of two or more factors.

Examples: $(x+2)(x-3)=0$ $x(x-5)=0$
 factor factor factor factor

To solve these equations, set the quadratic equation equal to 0 and use the ZPP:

- Zero Product Property:

If $a \cdot b = 0$, then $a = 0$ OR $b = 0$

Example #1: Solve the equation.

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

2. $x(x-2)=0$
 ↓ ↓
 $x=0$ $x-2=0$
 +2 +2
 $x=2$

Example #2: Solve the equation.

1. $(x + 5)^2 = 0$

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

$$\begin{array}{cc} \downarrow & \downarrow \\ x+5=0 & x+5=0 \\ -5 & -5 \end{array}$$

$x = -5$ $x = -5$
same factor

2. $(4x - 1)^2 = 0$

$$(4x-1)(4x-1) = 0$$

$$\begin{array}{cc} \downarrow & \uparrow \\ 4x-1=0 & \text{same} \\ +1 & +1 \\ \frac{4x}{4} = \frac{1}{4} & \text{factor} \end{array}$$

$x = \frac{1}{4}$

You practice: Solve the equation.

1. $(2x - 1)(x + 7) = 0$

$$\begin{array}{cc} 2x-1=0 & x+7=0 \\ +1 & +1 \\ \frac{2x}{2} = \frac{1}{2} & \frac{x}{1} = -7 \end{array}$$

$x = \frac{1}{2}$ $x = -7$

2. $(a - 4)^2 = 0$

$$(a-4)(a-4) = 0$$

$$\begin{array}{cc} a-4=0 & \text{same} \\ & \text{factor} \end{array}$$

$a = 4$

3. $(x + 1)^2 = 0$

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

$$\begin{array}{cc} x+1=0 & \text{same} \\ -1 & -1 \\ \text{factor} \end{array}$$

$x = -1$

4. $(x + 4)(x + 1) = 0$

$$\begin{array}{cc} x+4=0 & x+1=0 \\ -4 & -1 \\ \frac{x}{1} = -4 & \frac{x}{1} = -1 \end{array}$$

$x = -4$ $x = -1$

Example #2: Solve the equation.

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

$$\begin{array}{ccc} 2x+1=0 & 3x-2=0 & x-1=0 \\ -1 & +2 & +1 \\ \frac{2x}{2} = \frac{-1}{2} & \frac{3x}{3} = \frac{2}{3} & \frac{x}{1} = 1 \end{array}$$

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

2. $(y - 3)^2(2y + 3) = 0$

$$(y-3)(y-3)(2y+3) = 0$$

$$\begin{array}{cc} y-3=0 & \text{same} \\ +3 & \text{factor} \\ \frac{y}{1} = 3 & 2y+3=0 \\ & -3 \end{array}$$

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

You practice: Solve the equation.

1. $(x - 4)(x + 6)(4x + 3) = 0$

$$\begin{array}{r} x - 4 = 0 \\ +4 \quad +4 \end{array}$$

$$\boxed{x = 4}$$

$$\begin{array}{r} x + 6 = 0 \\ -6 \quad -6 \end{array}$$

$$\boxed{x = -6}$$

$$\begin{array}{r} 4x + 3 = 0 \\ -3 \quad -3 \end{array}$$

$$\frac{4x}{4} = \frac{-3}{4}$$

$$\boxed{x = -\frac{3}{4}}$$

2. $(2x + 1)(x - 8)^2 = 0$

$$\begin{array}{r} 2x + 1 = 0 \\ -1 \quad -1 \end{array}$$

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

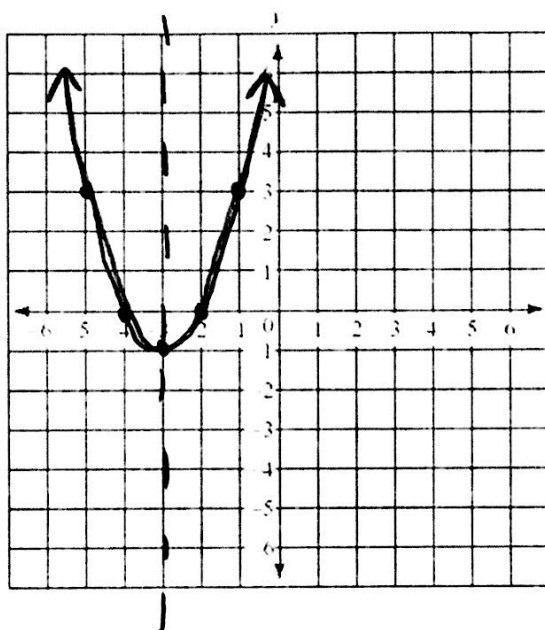
$$\boxed{x = -\frac{1}{2}}$$

$$\begin{array}{r} x - 8 = 0 \\ +8 \quad +8 \end{array}$$

$$\boxed{x = 8}$$

Exploration #2: Graph $y = (x + 4)(x + 2)$ using a table of values.

x	y
-5	3
-4	0
-3	-1
-2	0
-1	3



1. What are the x-intercepts?

$$-4, -2$$

2. What is the AOS?

$$x = -3$$

3. What do you notice about your graph?

Notes:

We can use the following properties to graph *any* quadratic function in factored form.

$$y = a(x - p)(x - q)$$

- The graph opens up if a is + and opens down if a is -.

- The x-intercepts are p & q.

- The AOS & vertex is halfway between p and q.

It has the equation $x = \frac{p+q}{2}$.

Name: _____ Hour: _____ Date: _____

Example #3: Graph $y = (x + 3)(x - 1)$.

x-intercepts: -3, 1

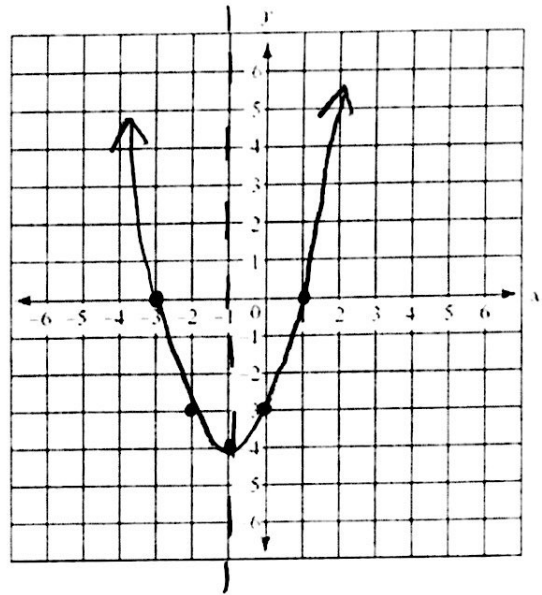
AOS: $X = -1$

Vertex: $(-1, -4)$

Opens: UP

x	-3	-2	-1	0	1
y	0	-3	-4	-3	0

$$X = \frac{p+q}{2} = \frac{-3+1}{2} = \frac{-2}{2} = -1$$



You practice: Graph $y = (x - 1)(x - 6)$.

x-intercepts: 1, 6

AOS: $X = 3.5$

Vertex: $(3.5, -6.25)$

Opens: UP

x	1	2	3.5	5	6
y	0	-4	-6.25	-4	0

$$X = \frac{p+q}{2} = \frac{1+6}{2} = \frac{7}{2} = 3.5$$

