

# C11 - 4.0 - Solving Quadratics for x-intercepts Review

Factoring:  $y = bx + c$

$$y = 12x^2 + 8x$$

$$y = 4x(3x + 2)$$

$$0 = (4x)(3x + 2)$$

$$4x = 0$$

$$x = 0$$

$$3x + 2 = 0$$

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

Remove Greatest Common Factor "GCF."

Set  $y = 0$

Set brackets equal to zero "0"

Solve

$$(a)(b) = 0$$

$$(a) = 0 \quad (b) = 0$$

Factoring:  $y = ax^2 + bx + c$

$$y = x^2 + 5x + 6$$

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

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

$$x + 3 = 0$$

$$x = -3$$

$$x + 2 = 0$$

$$x = -2$$

Set brackets equal to zero "0"

Solve

$a = 1$

1,6

2,3

$$\underline{\quad 2 \quad} \times \underline{\quad 3 \quad} = \cancel{6}$$

Factor

set  $y = 0$

$$\underline{\quad 2 \quad} + \underline{\quad 3 \quad} = \cancel{5}$$

Factoring:  $y = ax^2 + bx + c$

$$y = 2x^2 + 7x + 6$$

$$y = 2x^2 + 3x + 4x + 6$$

$$y = (2x^2 + 3x)(+4x + 6)$$

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

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

$$x + 2 = 0$$

$$x = -2$$

$$2x + 3 = 0$$

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

Set brackets equal to zero "0"

Solve

$a \neq 1$

Decompose

Group

GCF

GCF/Switch

Set  $y = 0$

$$\underline{\quad 3 \quad} \times \underline{\quad 4 \quad} = \cancel{12}$$

$$\underline{\quad 3 \quad} + \underline{\quad 4 \quad} = \cancel{7}$$

Factoring:  $y = a^2 - b^2$

$$y = x^2 - 9$$

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

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

$$x + 3 = 0$$

$$x = -3$$

$$x - 3 = 0$$

$$x = 3$$

Set brackets equal to zero "0"

Solve

Differences of Squares

Factor

Set  $y = 0$

Factoring:  $y = ax^2 + bx + c$

$$y = 2x^2 + 6x + 4$$

$$x_{int} = \frac{-(-6) \pm \sqrt{(-6)^2 - 4(2)(4)}}{2(2)}$$

$$x_{int} = \frac{-6 + \sqrt{4}}{4}$$

$$x_{int} = \frac{-6 + 2}{4}$$

$$x_{int} = -1$$

$$x_{int} = \frac{-6 - \sqrt{4}}{4}$$

$$x_{int} = \frac{-6 - 2}{4}$$

$$x_{int} = -2$$

One **Positive** Equation

One **Negative** Equation

Solve

**Discriminant:**  $b^2 - 4ac$

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

Factoring:  $y = a(x - p)^2 + q$

$$y = 2(x - 2)^2 - 2$$

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

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

$$1 = (x - 2)^2$$

$$\pm\sqrt{1} = \sqrt{(x - 2)^2}$$

$$\pm 1 = (x - 2)$$

$$\pm 1 + 2 = x$$

$$x = +1 + 2$$

$$x = 3$$

$$x = -1 + 2$$

$$x = 1$$

Solve using the **Square Root Method**

set  $y = 0$

Square root both sides of the equation

One **Positive** Equation, One **Negative** Equation

Solve

# C11 - 4.0 - $x - int, y = 0 (x, 0)$ Review

## Graphing TOV $y = x^2 - 2x - 3$

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

$x - int:$   
 $(-1, 0)$  ✓  
 $(3, 0)$  ✓

## Factoring

$$y = x^2 - 2x - 3 \quad 1, 3$$

$$0 = (x - 3)(x + 1) \quad x - int, y = 0$$

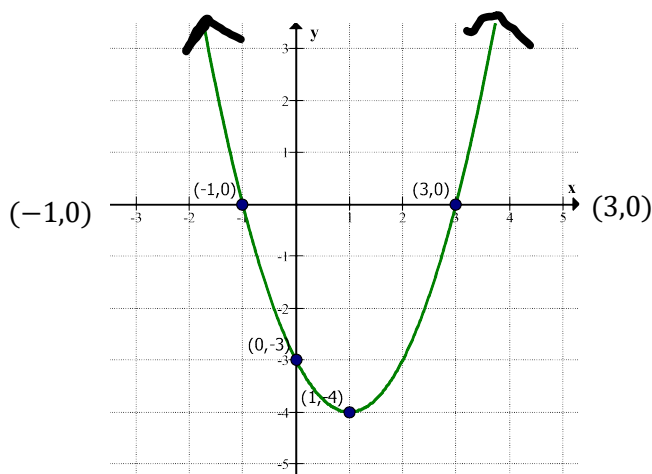
$$x - 3 = 0 \quad x + 1 = 0$$

$$x = 3 \quad x = -1$$

$x - int:$

$(3, 0)$        $(-1, 0)$

## Graphing Calculator: 2ND CALC



## Find Standard Form

Get = to 0

$$x = 3 \quad x = -1$$

$$-3 \quad -3 \quad +1 \quad +1$$

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

$$y = (x - 3)(x + 1)$$

$$b^2 - 4ac = 0 \text{ (Perfect Square)}$$

## Complete Square/Square Root Method

$$y = x^2 - 2x - 3$$

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

$$y = (x^2 - 2x) - 3$$

$$y = (x^2 - 2x + 1 - 1) - 3$$

$$y = (x - 1)^2 - 4 \quad \text{vertex: } (1, -4)$$

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

$$4 = (x - 1)^2 \quad x - int, y = 0$$

$$\pm\sqrt{4} = \sqrt{(x - 1)^2}$$

$$\pm 2 = x - 1$$

$$+2 = x - 1$$

$$x = 3$$

$$-2 = x - 1$$

$$x = -1$$

$x - int:$

$(3, 0)$

$(-1, 0)$

## Quad Formula

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

$$y = x^2 - 2x - 3$$

$$x_{int} = \frac{2 \pm \sqrt{(-2)^2 - 4(1)(-3)}}{2(1)}$$

$$x_{int} = \frac{2 \pm \sqrt{16}}{2}$$

$$x_{int} = \frac{2 + 4}{2}$$

$$x_{int} = 3$$

$$x_{int} = \frac{2 - 4}{2}$$

$$x_{int} = -1$$

$x - int:$

$(3, 0)$

$(-1, 0)$

# C11 - 4.0 - Quadratic Formula TI-83/84 Program Notes

Prgm    New    Enter  
 Right

Quadform    Spell it out    Enter    2nd    Alpha    :if necessary

Prgm    I/O    Prompt    Enter  
 Right    Down

Alpha    A    ,    Alpha    B    ,    Alpha    C    Enter

Above 7

Prgm    I/O    Disp    Enter  
 Down

$(-B + \sqrt{B^2 - 4AC})/(2A)$     Negative 1st, minus' between    Enter

Prgm    I/O    Disp    Enter

$(-B - \sqrt{B^2 - 4AC})/(2A)$     Negative 1st, minus' between    Enter

2nd    Quit

```

PROGRAM:QUAD    To View Program    PRGM
:Prompt A,B,C
:Disp (-B + sqrt(B^2-4AC))/(2A)    Edit
:Disp (-B - sqrt(B^2-4AC))/(2A)    Enter
    
```

Running the Program    2nd    Quit

Prgm    Quadform    Enter    Enter

A = #    Enter    B = #    Enter    C = #    Enter    Enter values for A, B, C

Answers are x-intercepts

If I does not work    Prgm    Edit    Enter    If it does not look like the box above something is wrong

Remember to try a question you know how to factor and solve, and graph a TOV and check your calculator (Don't let your teacher/friend press: 2nd Mem 7 enter! Deletes all programs!!!)

# Top Row!!!

## C11 - 4.0 - Calculator Buttons

Use a Graphing Calculator to graph and Find: Vertex, Max/Min, Intercepts, Intersections.

**GRAPH:**  $y =$   $y = x^2 - 2x - 3$  **CLEAR** **ZOOM** 6 *If can't see parabola or change window.* **Window**

If Y = is not empty

**y- INTERCEPT:** **2ND** **CALC** **TRACE** **1** **ANY x VALUE** **Value**  
 $y =$   $y_2 =$  **y value**  
**Find Intersection**

**2ndCalc**  $X = ?$  **0** **ENTER**  $Y = -3$   
**y - int:** (0, -3)

**VERTEX:** **2ND** **CALC** **TRACE** **3** *If opens upward* **Minimum**  
**4** *If opens downward* **Maximum**

**Left Bound?** **<** *Move barely left of vertex* **ENTER**

**Right Bound?** **>** *Move barely right of vertex* **ENTER**

**Guess?** **ENTER** **Vertex:** (1, -4)

**x- INTERCEPT:** **2ND** **CALC** **TRACE** **2** **OR**  $y_2 = 0$  *and find intersections*

**Left Bound?** **<** *Move barely left of x-int* **ENTER**

**Right Bound?** **>** *Move barely right of x-int* **ENTER**

**Guess?** **ENTER** **x - intercept:** (-1, 0)

**REPEAT:** *Left and Right Bound Change!* **x - intercept:** (3, 0)

**Find x - value**  
**Find Intersection**

**x - intercept:** (-1, 0), (3, 0)

**Logic!**

**x - intercept:** (-1, 0), (3, 0)

**INTERSECTION:** Graph two equations:  $y_1 =$   $y = x^2 - 2x - 3$   $y_2 =$   $y = x - 3$

**Find Intersection:** **2ND** **CALC** **TRACE** **5** **Intersection**

$y_1 =$  *LHS* **Hand Side**  $y_2 =$  *RHS*  
 $x^2 - 2x - 3 = x - 3$  *Find x - int's*

Using **>** and **<** go near an intersection

**First Curve?** **ENTER** **Second Curve?** **ENTER** *Go to other Line if not automatic!*

**Guess?** **ENTER** **Intersection:** (3, 0)

**REPEAT:** *Go Near other intersection* **Intersection:** (0, -3)

**Foundations Plotting Points on a Graph**

Enter Table of Values (TOV) **L1\* = x** **L2\* = y** **STAT** **EDIT** **ENTER** **STAT** **CALC** **2nd** **y =** **Enter** **On/Off** **Enter** **Graph**

Enter Data L1\*, L2 **4Lin/5Quad/0ExpReg\*** **Don't forget to turn it off!!!** **(L1\*L2)**