DO NOW

You need to have your graphing calculator.

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8.4 The Graph of a Quadratic Equation

Quadratic Equation - highest exponent on the variable is 2

Parabola - graph of a quadratic equation
↳ looks like a smile or frown

Standard Form:

$y = ax^2 + bx + c$

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QUADRATIC FUNCTIONS

$f(x) = ax^2 + bx + c$

- Quadratic functions are graphs that look like smiles or frowns.
- If ***a* is positive**, the parabola opens **upward** (smiles). It has a minimum point.
- If ***a* is negative**, the parabola opens **downward** (frowns). It has a maximum point.
- The **vertex**, or **turning point**, is either the minimum or maximum. It is an ordered pair.
- The **axis of symmetry** is a vertical line of symmetry. It is of the form "$x =$ " $\left(x = \frac{-b}{2a}\right)$
- The **end behavior of the graph** is whether it opens up or down.
- The **roots** are the x-intercepts. These are x values that make $y = 0$. ***There can be 0, 1 or 2 roots.
- The ***y*-intercept** is where the graph crosses the y-axis. It is where $x = 0$.

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USING THE GRAPHING CALCULATOR TO GRAPH:

1. Open a new document. (Choose no when asked to save document)
   Choose 2: Add Graphs
   Hit CTRL-G (or Tab) to open (or close) the equation entry line.
   Hit Enter to display the graph.
2. Look at the graph to approximate the vertex.
3. Hit CTRL-T to open (or close) a table of values. CTRL-6 will move the table of values to a separate page.
4. Locate the vertex in the table of values and position this as the middle entry in the table on screen. Copy these five ordered pairs to a table on your paper.
5. You will need to move the table to get one value above the copied table information and one value from below the copied table information. You will now have 7 ordered pairs in your table.
6. Graph the points on the coordinate plane and create the parabola.
7. From here, you can identify: turning point, axis of symmetry, roots, and y-intercept.

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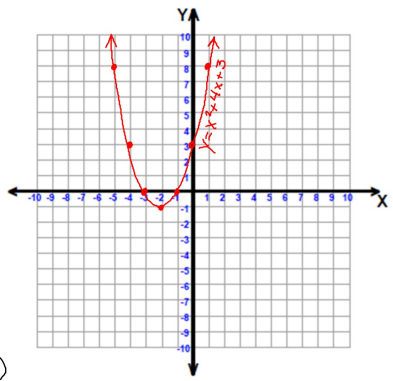
Graph: $y = x^2 + 4x + 3$

X	y
-5	8
-4	3
-3	0
-2	-1
-1	0
0	3
1	8



Turning point: (-2, -1) minimum

axis of symmetry: $x = -2$

y-intercept: $y = 3$ or $(0, 3)$ ← where $x = 0$

roots: ← where $y = 0$ (-3, 0) and (-1, 0) OR $x = -3$ $x = -1$

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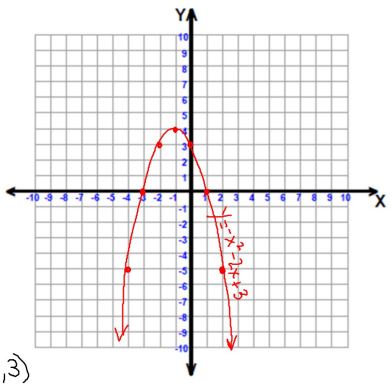
Graph: $y = -x^2 - 2x + 3$

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



Turning point: (-1, 4) maximum

axis of symmetry: $x = -1$

y-intercept: $y = 3$ or $(0, 3)$

roots: (-3, 0) and (1, 0) OR $x = -3$ $x = 1$

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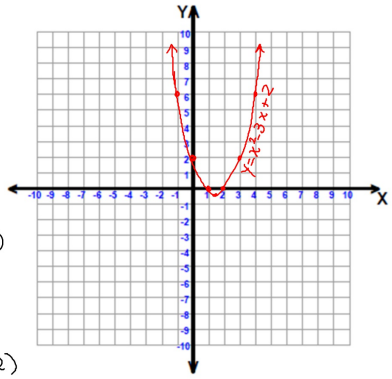
Graph: $y = x^2 - 3x + 2$

X	Y
-1	6
0	2
1	0
1.5	-.25
2	0
3	2
4	6



Turning point: (1.5, -.25)
minimum

axis of symmetry: X=1.5

y-intercept: Y=2 or (0,2)

roots: X=1 and X=2
or
(1,0) and (2,0)

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HOMEWORK

Worksheet - HW 8.4

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