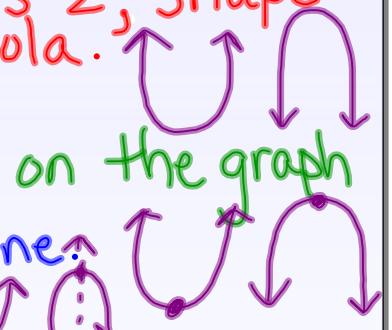
TOC Graphing Quadratics

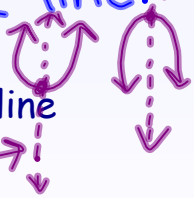
WWK

Quadratic - highest exponent is 2, shape is called a parabola.

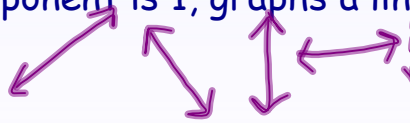


vertex - max. or min. point on the graph

axis of symmetry - symmetrical line



linear - highest exponent is 1, graphs a line



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TOC 79 Graphing Quadratics

Standard Form

$y = ax^2 + bx + c$

If $a > 0$; opens up

If $a < 0$; opens down

Vertex: $\left(-\frac{b}{2a}, f\left(\frac{-b}{2a}\right)\right)$

axis of symmetry: $x = \frac{-b}{2a}$

y-intercept: $(0, c)$

Dec 6-10:23 AM

$f(x) = x^2 + 4x + 2$ (a = 1, b = 4, c = 2)

Find the axis of symmetry

$x = -b/2a$

$x = \frac{-4}{2(1)} = \frac{-4}{2} = -2 = x$

Find the vertex (put the answer to the axis of symmetry in the function)

$y = (-2)^2 + 4(-2) + 2$

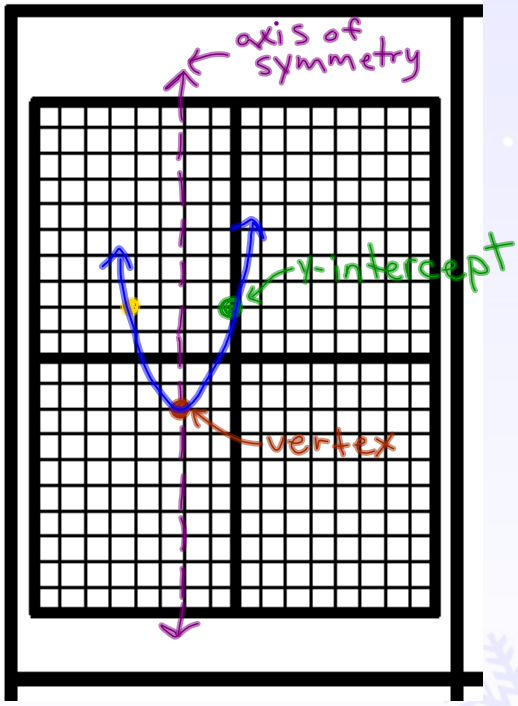
$= 4 - 8 + 2$

$= -2$

$(-2, -2)$

What is the y-intercept?

$(0, c) \rightarrow (0, 2)$



Dec 7-9:57 AM

$f(x) = 2x^2 + 4x - 3$ (a = 2, b = 4, c = 3)

Find the axis of symmetry

$x = -b/2a$

$x = \frac{-4}{2(2)} = \frac{-4}{4} = -1 = x$

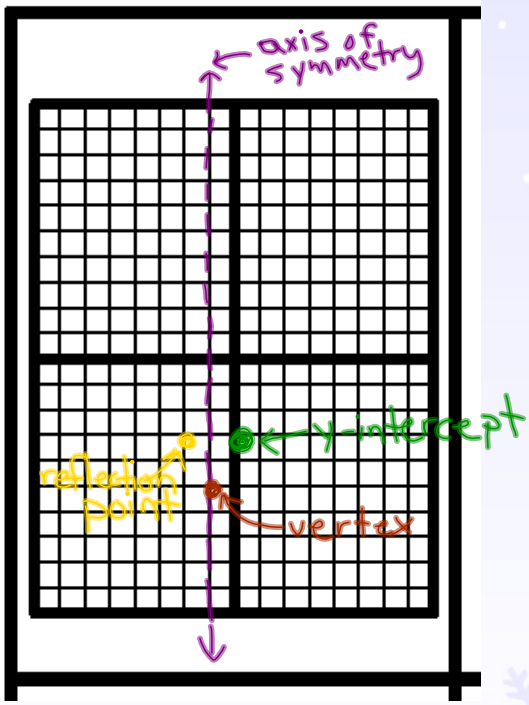
Find the vertex (put the answer to the axis of symmetry in the function)

$y = 2(-1)^2 + 4(-1) - 3$ $(-1, -5)$

$= 2(1) - 4 - 3 = 2 - 7 = -5$

What is the y-intercept?

$(0, c) \rightarrow (0, -3)$



Dec 7-9:57 AM

$f(x) = -3x^2 + 12x - 5$

Find the axis of symmetry

$x = -b/2a$

$x = \frac{-12}{2(-3)} = \frac{-12}{-6} = 2 = x$

Find the vertex (put the answer to the axis of symmetry in the function)

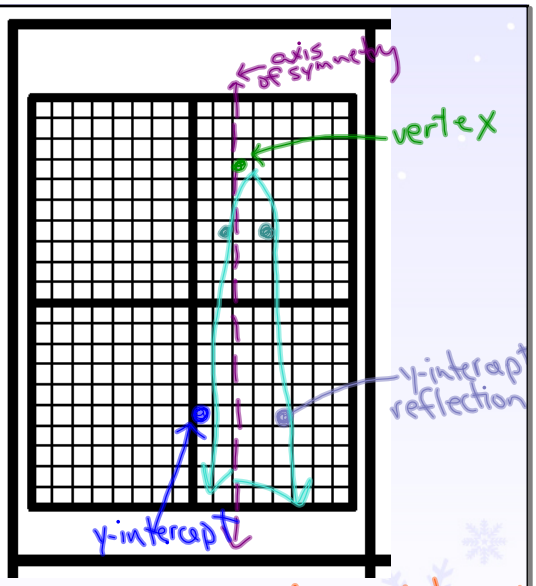
$y = -3(2)^2 + 12(2) - 5$

$= -3(4) + 24 - 5$ (2,7)

$= -12 + 19 = 7$

What is the y-intercept?

(0,c) → (0,-5)



x=1

$y = -3(1)^2 + 12(1) - 5$ (1,4)

$= -3(1) + 12 - 5$

$= -3 + 7$

$= 4$

pick a x-value

15

12

Find the x-intercept

$0 = -3x^2 + 12x - 5$

Does not Factor don't have to do

Dec 7-9:55 AM

Example (page 80): Use the quadratic equation $f(x) = 0.4x^2 - 36x + 1000$ to find f(30).

$f(x) = 0.4x^2 - 36x + 1000$

$f(30) = 0.4(30)^2 - 36(30) + 1000$

$f(30) = 300 - 1080 + 1000 = 1000$

$f(30) = 280$

Dec 7-10:22 AM

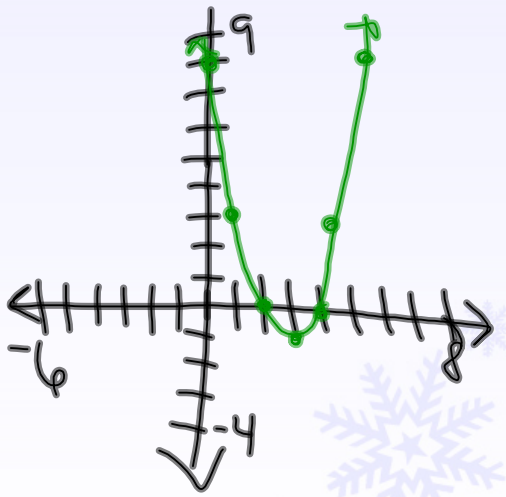
Ex 2 (page 80): Consider the quadratic function $y = x^2 - 6x + 8$.

a) Does the graph open upward or downward? upward

b) Use point plotting to graph the parabola. Select integers for x, $0 \le x \le 6$

X	Y
0	8
1	3
2	0
3	-1
4	0
5	3
6	8

$0^2 - 6(0) + 8$
8
$1^2 - 6(1) + 8$
$1 - 6 + 8$



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Example 3 (page 80)

a: Find the x-intercepts for the parabola $y = x^2 - 6x + 8$.

Factor
$0 = x^2 - 6x + 8$
$0 = (x-2)(x-4)$
$0 = x - 2 \quad 0 = x - 4$
$x = 2 \quad x = 4$

$\cancel{7 \quad 8}$
$\cancel{-1 \quad -8}$
$\cancel{2 \quad 4}$
$-2 \quad -4$

$\boxed{(2,0) \quad (4,0)}$

b: Find the y-intercepts

$(0,c) \rightarrow \boxed{(0,8)}$

(AS) axis of symmetry
(V) Vertex
(YI) y-intercept
(XI) x-intercept (Factor)
5 points

c: Find the vertex:

$x = \frac{-b}{2a}$
$x = \frac{-(-6)}{2(1)}$
$x = \frac{6}{2} = 3$

$y = 3^2 - 6(3) + 8$
$y = 9 - 18 + 8$
$y = -9 + 8$
$y = -1$

$\boxed{(3,-1)}$

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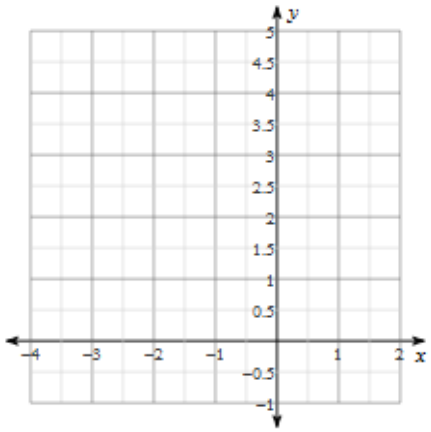
1) $y = x^2$

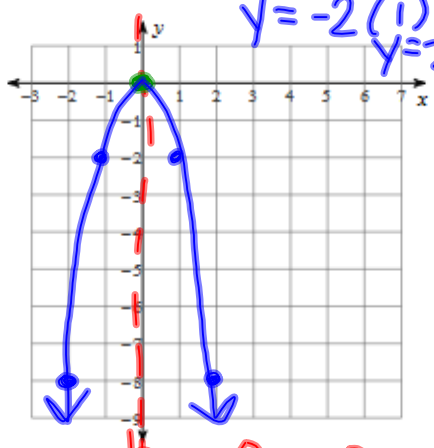


x	y
1	-2
2	-8

$y=-2(2)^2$
$y=-2(4)$
$y=-8$

2) $y = -2x^2$

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



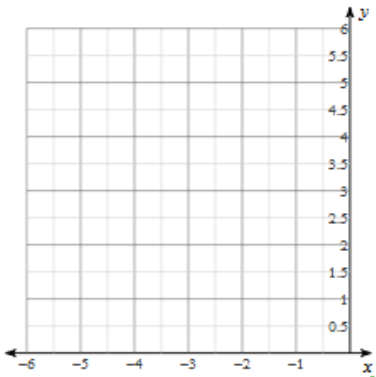
AS: $x=\frac{-b}{2a}=\frac{-0}{2(-2)}=\frac{0}{-4}=0$

V: $y=-2(0)^2$
$y=-2(0)$
$y=0$

$(0,0)$

Nov 8-8:55 AM

3) $y = x^2 + 4x + 5$

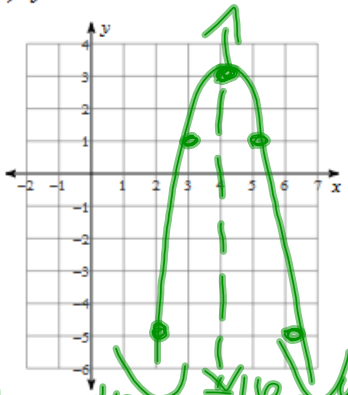


x	y
2	-5
3	1
5	
6	

vertex
$\boxed{(4,3)}$

4) $y = -2x^2 + 16x - 29$

a b c



$x=\frac{-b}{2a}=\frac{-16}{2(-2)}=\frac{-16}{-4}=4$ $\boxed{x=4}$

$y=-2(4)^2+16(4)-29$
$-32+64-29$
$=3$
$\boxed{y=3}$

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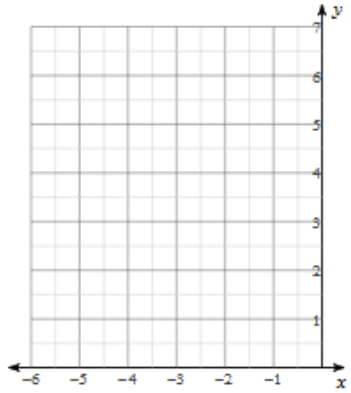
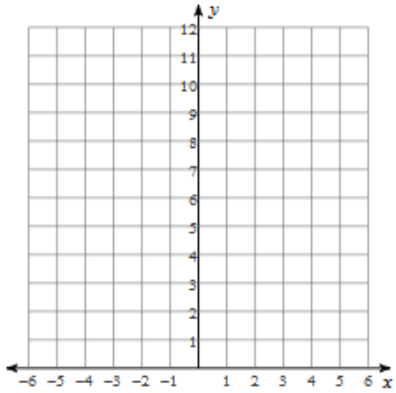
5) $y = x^2 + 7x + 15$



$\frac{-7}{2(1)}$

$\frac{-7}{2} = -3.5$

6) $y = 2x^2 - 4x + 5$



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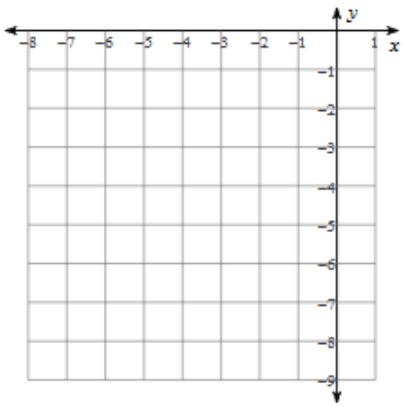
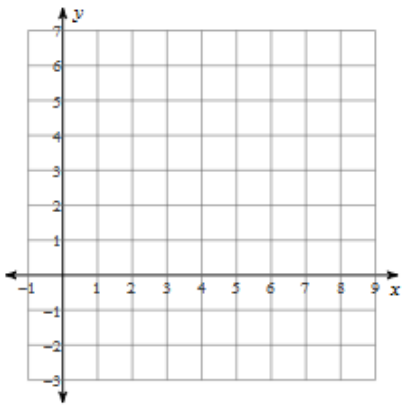
7) $y = -x^2 - 8x - 20$



8) $y = 2x^2 - 12x + 16$



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