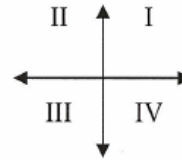Math 11   **Quadratics #2 – Review #1**

1. Which *quadrant* is the vertex of $(y + 3) = (x - 2)^2$ located in?

   a) I   b) II   c) III   (d) IV

Vertex:
$(2, -3) \Rightarrow$ QUADRANT IV

2. Which *quadrant* is the vertex of $\frac{1}{3}(y - 2) = (x + 3)^2$ located in?

   a) I   (b) II)   c) III   d) IV

Vertex:
$(-3, 2) \Rightarrow$ QUADRANT II

3. Rewrite the following equation in standard form: $-4(y - 1) = x^2$

   a) $y = -4x^2 + 1$ b) $y = -\frac{1}{4}x^2 + 1$ c) $y = 4x^2 - 1$ d) $y = \frac{1}{4}x^2 + 1$

$-4(y-1) = x^2$ (TF)
$y - 1 = -\frac{1}{4}x^2$
$y = -\frac{1}{4}x^2 + 1$ (SF)

1

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

Standard: $y = a(x-h)^2 + k$

Transformational: $\frac{1}{a}(y-k) = (x-h)^2$

③ $-4(y-1) = x^2$

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

$y-1 = -\frac{1}{4}(x-0)^2$

$y = -\frac{1}{4}(x-0)^2 + 1$

$$\boxed{y = -\frac{1}{4}x^2 + 1}$$

2

4. Rewrite the following equation in transformational form: $y = \frac{1}{3}(x-2)^2 + 1$

 (a) $3(y-1) = (x-2)^2$ b) $\frac{1}{3}(y+1) = (x-2)^2$ c) $\frac{1}{3}(y-1) = (x+2)^2$ d) $3(y+2) = (x-1)^2$

$y = \frac{1}{3}(x-2)^2 + 1$ (SF)

$y - 1 = \frac{1}{3}(x-2)^2$

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

5. Rewrite the following equation in general form: $y = 2(x-1)^2 + 3$

 a) $y = 2x^2 - 2x + 5$ b) $y = 2x^2 + 5$ c) $y = 2x^2 - 3$ (d) $y = 2x^2 - 4x + 5$

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

$y = 2x^2 - 2x - 2x + 2 + 3$
$y = 2x^2 - 4x + 5$ (GF)

6. Where is the axis of symmetry located in the following parabola: $2(y-1) = (x-3)^2$

 a) $x = 2$ b) $x = 1$ (c) $x = 3$ d) $y = 1$

Vertex: $(3, 1)$
Axis of Symmetry: $x = 3$

7. What would be the range of the following quadratic function: $-2(y-1) = (x+1)^2$ Vertex: $(-1, 1)$

 a) $\{y | y \geq -2, y \varepsilon R\}$ b) $\{x | x \leq -1, x \varepsilon R\}$ (c) $\{y | y \leq 1, y \varepsilon R\}$ d) $\{x | x \geq 1, x \varepsilon R\}$ Range:

✱ Opens Downward.
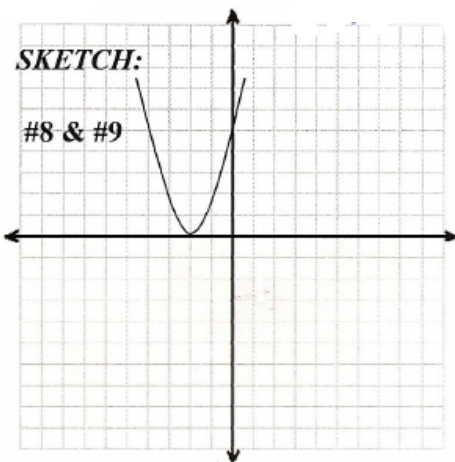
$\{y | y \leq 1, y \varepsilon R\}$

8. Given this graph and its equation: $\frac{1}{a}(y-k)=(x-h)^2$

   SKETCH:

   #8 & #9

   What would happen if "h" was changes? The graph would:
   a) move sideways   b) move up or down

   c) be reflected in the x-axis   d) be stretched
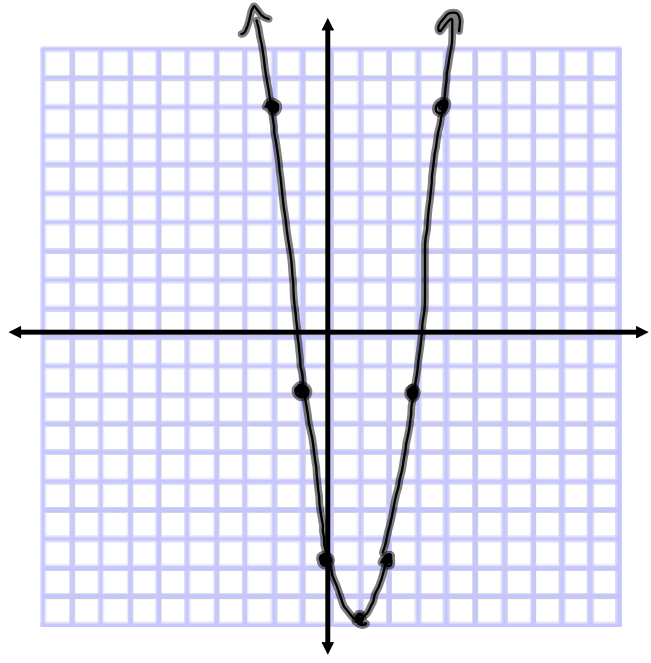
9. What would happen if "k" was changed? The graph would:
   a) move sideways   b) move up or down

   c) be reflected in the x-axis   d) be stretched

⑩ $y = 2(x-1)^2 - 10$ Vertex: (1,-10)

x	y
-2	8
-1	-2
0	-8
1	-10
2	-8
3	-2
4	8

Domain: $\{x \mid x \in R\}$

Range: $\{y \mid y \geq -10, y \in R\}$

10. Sketch the graph of : $y = 2(x - 1)^2 - 10$

x	y
-2	8
-1	-2
0	-8
1	-10
2	-8
3	-2

What is the Domain? $\{x \mid x \in R\}$

What is the Range? $\{y \mid y \geq -10, y \in R\}$
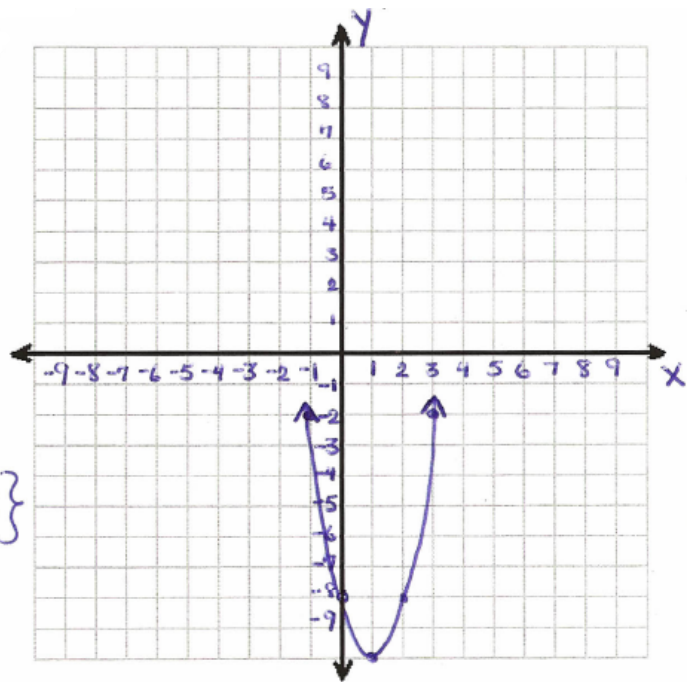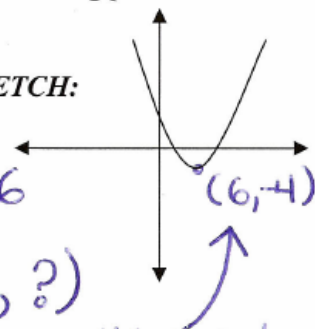
11. The x-intercepts of a parabola are (2, 0) and (10, 0). Which of the following points could be the vertex?

a) (12, 0)　　b) (6, -4)　　c) (6, 4)　　d) (8, -4)

SKETCH:

* Since the vertex will be half
  way in between the x-intercepts:

Average of x-values:　$\dfrac{2+10}{2} = \dfrac{12}{2} = 6$

=> Vertex: (6, ?)
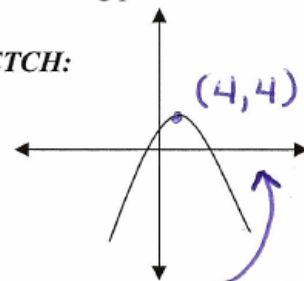
(6,-4)

** 2 possible solutions → check sketch!

12. The x-intercepts of a parabola are (-3, 0) and (11, 0). Which of the following points could be the vertex?

a) (8, -4)　　b) (7, 3)　　c) (4, 4)　　d) (4, -4)

SKETCH:

Average of x-values:

$\dfrac{-3+11}{2} = \dfrac{8}{2} = 4$

=> Vertex: (4, ?)

(4,4)

* 2 possible solutions → check sketch!

13. Rewrite the following equation in transformational form: $y = 3(x-1)^2 + 2$

   a) $(y+2) = 3(x-1)^2$ b) $\frac{1}{3}(y-2) = (x-1)^2$ c) $3(y-2) = \frac{1}{3}(x-1)^2$ d) $3y - 2 = (x-1)^2$

$$y = 3(x-1)^2 + 2 \quad (SF)$$
$$y - 2 = 3(x-1)^2$$
$$\frac{1}{3}(y-2) = (x-1)^2 \quad (TF)$$

14. Rewrite the following equation in transformational form: $y = 3x^2 - 12x + 5$

   a) $\frac{1}{3}(y+7) = (x-2)^2$ b) $3(y-7) = (x-2)^2$ c) $-\frac{1}{3}(y-7) = (x+2)^2$ d) $3(y+2) = (x-7)^2$

$$y = 3x^2 - 12x + 5 \quad (GF)$$
$$y - 5 = 3x^2 - 12x$$
$$y - 5 = 3(x^2 - 4x)$$
$$y - 5 + 12 = 3(x^2 - 4x + 4)$$
$$y + 7 = 3(x-2)^2$$
$$\frac{1}{3}(y+7) = (x-2)^2 \quad (TF)$$

15. Place the following functions in both standard and transformational form:

a) $y = x^2 + 12x + 40$ b) $y = -2x^2 + 8x - 10$

$y - 40 = x^2 + 12x$ $y + 10 = -2x^2 + 8x$

$y - 40 + 36 = (x^2 + 12x + 36)$ $y + 10 = -2(x^2 - 4x)$

$y - 4 = (x + 6)^2$ $y + 10 - 8 = -2(x^2 - 4x + 4)$

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

(SF) $y = (x + 6)^2 + 4$ (SF) $y = -2(x - 2)^2 - 2$

(TF) $(y - 4) = (x + 6)^2$ (TF) $\dfrac{-1}{2}(y + 2) = (x - 2)^2$

c) $y = 3x^2 + 12x$ d) $y = -2x^2 + 14x - \frac{1}{2}$

$y = 3(x^2 + 4x)$ $y + \frac{1}{2} = -2x^2 + 14x$

$y + 12 = 3(x^2 + 4x + 4)$ $y + \frac{1}{2} = -2(x^2 - 7x)$

$y + 12 = 3(x + 2)^2$ $y + \frac{1}{2} - \frac{98}{4} = -2(x^2 - 7x + \frac{49}{4})$

(SF) $y = 3(x + 2)^2 - 12$ $y + \frac{2}{4} - \frac{98}{4} = -2(x - \frac{7}{2})^2$

(TF) $\dfrac{1}{3}(y + 12) = (x + 2)^2$ $y - \frac{96}{4} = -2(x - \frac{7}{2})^2$

(SF) $y = -2(x - \frac{7}{2})^2 + 24$ } lowest

(TF) $-\dfrac{1}{2}(y - 24) = (x - \frac{7}{2})^2$ } Terms!

(15) $-\dfrac{1}{5}(y+2) = (x-1)^2$ (Transformational)

$y = -5(x-1)^2 - 2$ (Standard)

$a = 5$ $h = 1$ $K = -2$

Vertex: $(1, -2)$ Axis of Symmetry: $x = 1$

Direction: Down   Domain: $\{x \mid x \in R\}$

Stretch: 5   Range: $\{y \mid y \leq -2, y \in R\}$

(16) $3(y-2) = (x-0)^2$ (Transformational)

$y - 2 = \dfrac{1}{3}(x-0)^2$

$y = \dfrac{1}{3}(x-0)^2 + 2$

$y = \dfrac{1}{3}(x-0)^2 + 2$ (Standard)

$a = \dfrac{1}{3}$ $h = 0$ $K = 2$

⑤ $y = 2(x-1)^2 + 3$ (Standard)

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

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

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

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

$y = 2x^2 - 4x + 5$ (General)