

PreCalculus Review Lesson 7

Practice

1. Use the rate of change formula to determine if these tables represent a linear function.

a.

x	3	4	6	9
y	4	6	10	18

b.

x	0	3	5	6	9
y	4	13	19	22	31

$$\frac{\Delta y}{\Delta x} = \frac{y_2 - y_1}{x_2 - x_1}$$

◊ If the rate of change is constant, the data represents a linear function.

◊ If not, then it is not a linear function.

2. Transformations

Vertical and Horizontal Shifts:

- Horizontal shift **right** h units: $y = f(x - h)$
- Horizontal shift **left** h units: $y = f(x + h)$

- Vertical shift **upward** k units: $y = f(x) + k$
- Vertical shift **downward** k units: $y = f(x) - k$

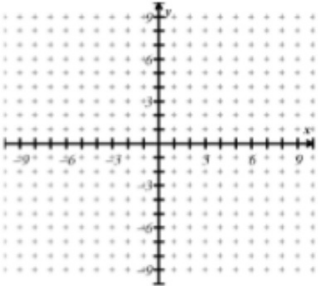
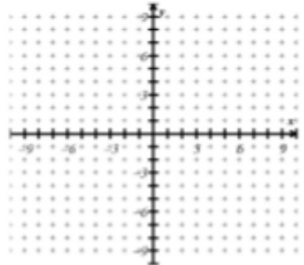
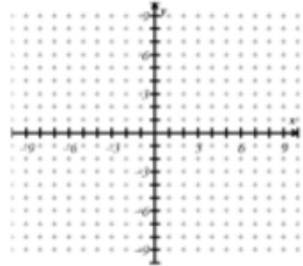
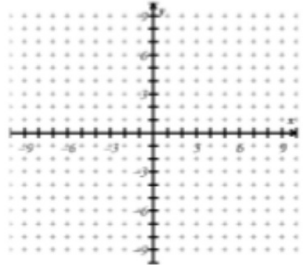
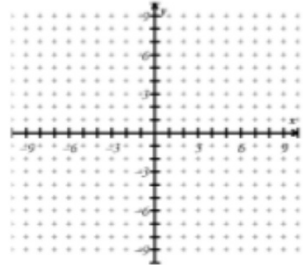
Reflections in the Coordinate Axes:

- Reflection in the x-axis: $y = -f(x)$
- Reflection in the y-axis: $y = f(-x)$

Non-rigid Transformations: transformations are those that cause a distortion – a change in the shape of the original graph.

- A **vertical stretch** in $y = af(x)$ if $a > 1$
- A **vertical shrink (or compression)** in $y = af(x)$ if $0 < a < 1$

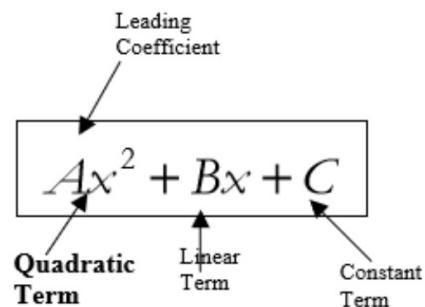
Try these sketches on scratch paper.

<p><u>Quadratic Functions</u></p> <p>Parent Function: $y = x^2$</p> 	<p>1. $y = (x - 4)^2$</p> 	<p>2. $y = 2x^2 + 1$</p> 
	<p>3. $y = -(x + 1)^2 + 3$</p> 	<p>4. $y = -2(x - 3)^2 + 2$</p> 

3. Factoring Quadratics

Remember: When your quadratic's leading coefficient is 1 ($a = 1$), then your two factor values are the numbers that multiply to equal c and add up to equal b .

BUT, if your leading coefficient is NOT 1, factor by grouping.



1. Decide your signs for the parentheses.
2. **Multiply** $A \cdot C$
3. Find 2 #'s that multiply to equal $A \cdot C$ and add to the linear term (B).
4. Rewrite Bx as a sum of the *two factors*. There will be **4 terms**.
5. Factor by grouping:

Group the first two terms and the last two terms

Factor the GCF out of each group {the parentheses should match}

Use distributive property to write as two binomials

Factor the expressions.

1.	$x^2 + x - 6$
2.	$x^2 - 8x + 15$
3.	$6x^2 + 5x + 1$

4. Properties of the Graph of a Quadratic Function

$$f(x) = ax^2 + bx + c \quad a \neq 0$$

Vertex = $\left(-\frac{b}{2a}, f\left(-\frac{b}{2a}\right)\right)$ Axis of symmetry: the

Vertical line $x = -\frac{b}{2a}$

Parabola opens up if $a > 0$; the vertex is a minimum point.

Parabola opens down if $a < 0$; the vertex is a maximum point.

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

vertex:

axis of symmetry:

y-intercept:

Be able to work this problem backwards as well. In other words, start with the graph, vertex, and y-intercept, and see if you can get back to the original equation.

