

# PreCalculus Review Lesson 7

Key

## 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

$\frac{6-4}{4-3} = \frac{2}{1} = 2$   
 $\frac{18-10}{9-6} = \frac{8}{3}$

no.

b.

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

$\frac{10-6}{6-4} = \frac{4}{2} = 2$

$\frac{13-4}{3-0} = \frac{9}{3} = 3$   
 $\frac{22-19}{6-5} = \frac{3}{1} = 3$   
 $\frac{19-13}{5-3} = \frac{6}{2} = 3$   
 $\frac{31-22}{9-6} = \frac{9}{3} = 3$

yes.

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

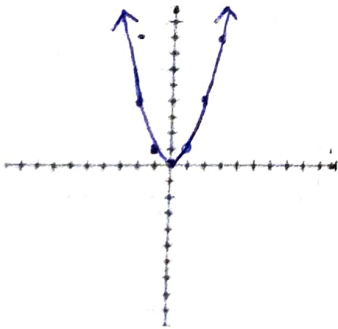
◦ If the rate of change is constant, the data represents a linear function

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

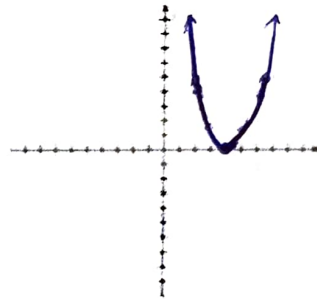
Try these sketches on scratch paper.

### Quadratic Functions

Parent Function:  $y = x^2$



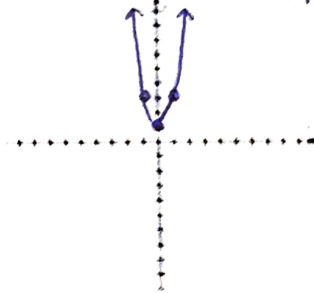
1.  $y = (x-4)^2$



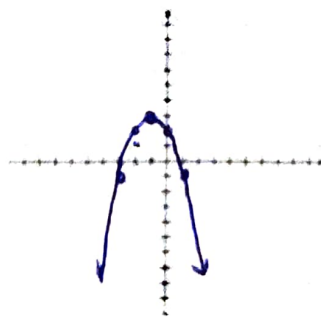
2.  $y = 2x^2 + 1$

$\frac{x}{y}$   
 $\frac{-1}{3}$   
 $\frac{1}{3}$

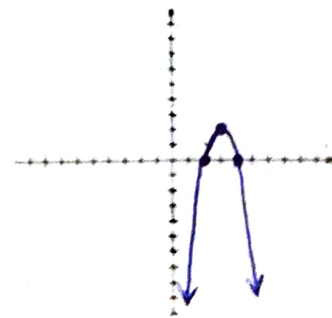
$2(-1)^2 + 1$   
 $= 2 + 1 = 3$



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



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



Factor the expressions.

1.  $x^2 - x - 6$

a · c	b
mult. to -6	add to 1
-2 · 3	-2 + 3 = 1

$(x-2)(x+3)$

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2.  $x^2 - 8x + 15$

a · c	b
mult. to 15	add to -8
3 · 5	3 + 5 = 8
-3 · -5	-3 + (-5) = -8 ✓

$(x-3)(x-5)$

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3.  $\frac{6x^2 - 5x + 1}{a > 1 \text{ GROUPING}}$

a · c	b
mult. to 6	add to 5
2 · 3	2 + 3 = 5

$6x^2 + 2x + 3x + 1$   
 $2x(3x+1) + 1(3x+1)$

Factors:  $(3x+1)(2x+1)$

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

vertex: x-coordinate:  $-\frac{b}{2a}$

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

y-coordinate:  $f(-1) = (-1)^2 + 2(-1) - 1$   
 $= 1 - 2 - 1 = -2$

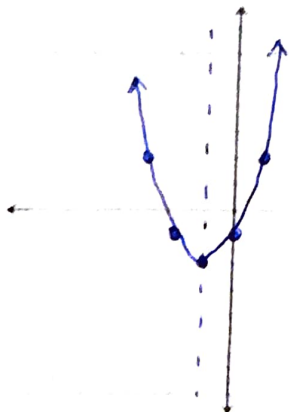
axis of symmetry:

$x = -1$

y-intercept:

$f(0) = (0)^2 + 2(0) - 1$   
 $= 0 + 0 - 1 = -1$

y-int.  $(0, -1)$



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

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.

Looking at the graph:

vertex is at  $(-1, -2)$   
 $h, k$

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

↑  $a=1$  b/c we have not stretched/compressed the parent function  $y=x^2$

$y = (x+1)(x+1) - 2$  FOIL.  
 $x^2 + x + x + 1 - 2 = x^2 + 2x - 1$  ✓