

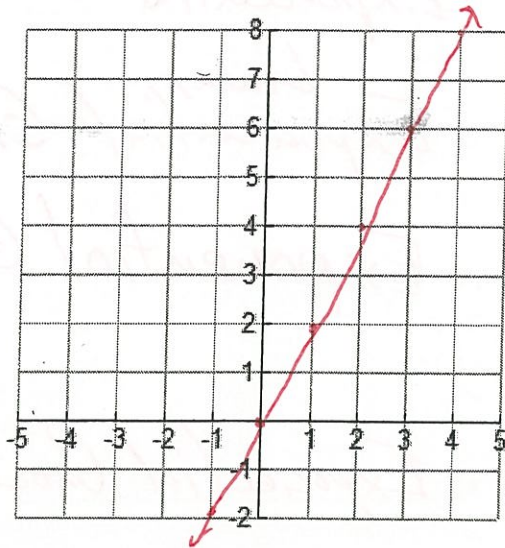
# Linear versus Exponential

Name Key

Directions: Read carefully.

1. Linear:  $y = 2x$

a) Graph:



b) Find the average rate of change from  $x = -1$  to  $x = 0$ . 2

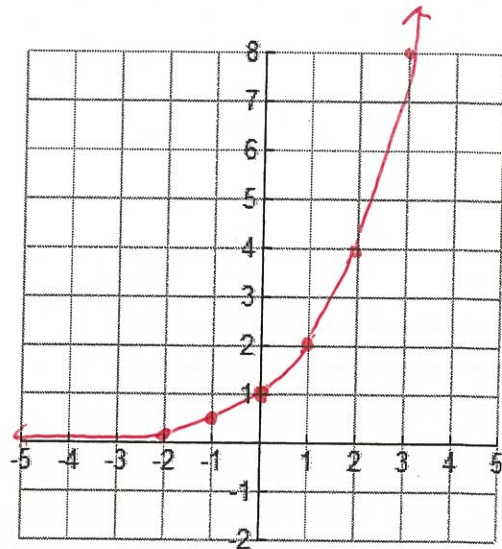
c) Find the average rate of change from  $x = 0$  to  $x = 1$ . 2

d) Find the average rate of change from  $x = 1$  to  $x = 2$ . 2

e) Find the average rate of change from  $x = 2$  to  $x = 3$ . 2

2. Exponential:  $y = 2^x$

a) Graph:



b) Find the average rate of change from  $x = -1$  to  $x = 0$ . 1/2

c) Find the average rate of change from  $x = 0$  to  $x = 1$ . 1

d) Find the average rate of change from  $x = 1$  to  $x = 2$ . 2

e) Find the average rate of change from  $x = 2$  to  $x = 3$ . 4

3. Based upon your findings, complete the following:

a) In a linear graph, the average rate of change over equal intervals stays the same.

b) In an exponential graph, the average rate of change over equal intervals grows exponentially based on the base.

4. Examine each of the following situations and determine if it describes a situation which is **linear**, **exponential growth**, **exponential decay**, or **other**.

a)  $2x + y = 12$

$y = -2x + 12$

b) There are currently 12 rabbits on a small farm. This population will increase by 24% each year.

c)  $y = 1^x$

d) Partial table:

|     |     |   |   |   |    |
|-----|-----|---|---|---|----|
| $x$ | -1  | 0 | 1 | 2 | 3  |
| $y$ | 1/3 | 1 | 3 | 9 | 27 |

e)  $y = 3.5^x$

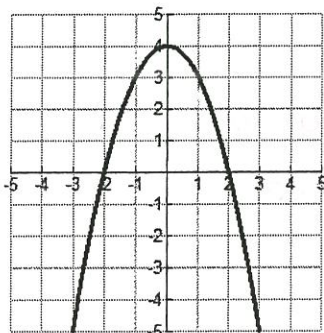
f) The population in Genoa City increases each year by 120 people.

g) A height of a softball is modeled by the equation  $h = -16t^2 + 24t + 1$  where  $h$  is the height in feet and  $t$  is the time in seconds.

h) The length of a rectangle is five times its width.

i)  $y = 300 + 0.6^x$

j)



a) Linear

b) Exponential Growth

c) ~~Exponential Growth~~  
Linear

d) Exponential Growth

e) Exponential Growth

f) ~~Exponential~~ Linear

g) Other

h) ~~Other~~ Linear

i) Exponential Decay

j) Other