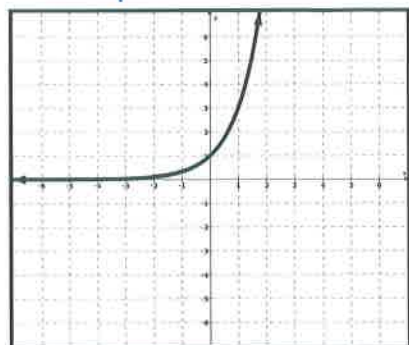


For #1 – 6, identify each function as linear, quadratic or exponential:

1. Exponential



2. Exponential

$$f(x) = -3^x$$

"x in the exponent"

3. Quadratic

x	y
-1	13
0	7
1	5
2	7
3	13

repeating y's

4. Linear

x	y
-2	5
-1	7
0	9
1	11
2	13

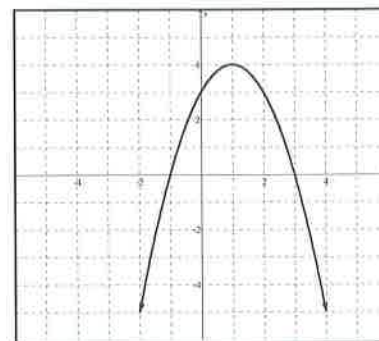
+2  
+2  
+2  
+2

5. Quadratic

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

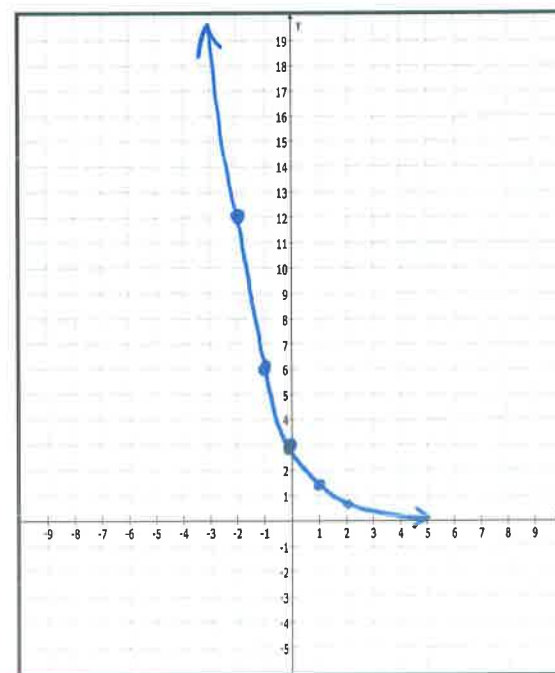
squared  
(makes a "u")

6. quadratic



7. A. Complete the table of values below for the exponential function:  $f(x) = 3 \cdot \left(\frac{1}{2}\right)^x$ . Then graph the function.

x	Process $f(x) = 3 \cdot \left(\frac{1}{2}\right)^x$	f(x)	(x, y)
-2	$3\left(\frac{1}{2}\right)^{-2}$	12	(-2, 12)
-1	$3\left(\frac{1}{2}\right)^{-1}$	6	(-1, 6)
0	$3\left(\frac{1}{2}\right)^0$	3	(0, 3)
1	$3\left(\frac{1}{2}\right)^1$	1.5	(1, 1.5)
2	$3\left(\frac{1}{2}\right)^2$	.75	(2, .75)



Use the graph to answer the following questions.

B. Determine the y-intercept of your graph. (0, 3)

C. Determine the value of x where  $f(x) = 0$ . D.N.E

D. Is  $f(x)$  an increasing or decreasing function? decreasing

E. What is the domain of the function? IR The range? y > 0

# Exponential Growth & Decay

$$y = a(1+r)^t$$

$$y = a(1-r)^t$$

8. In 2009 the Johnson family bought a boat for \$4000. The boat depreciates at a rate of 7% annually. In 2012 a person offers to buy the boat for \$3000. This depreciation is represented by the equation  $p = 4000(.93)^t$ . Should the Johnson family sell the boat? Explain your answer.

$$t = 3 \text{ years}$$

The boat is worth \$3217.43 in 2012.

$$p = 4000(.93)^3$$

9. According to one analyst, over one 18 month period, the number of blogs in existence doubled about every 6 months. The analyst estimated that there were about 600,000 blogs at the beginning of the period.

A. Which of the following is the function rule for this problem?

~~A.~~  $y = 600,000\left(\frac{1}{2}\right)^x$

**B.**  $y = 600,000(2)^x$

C.  $y = 600,000(3)^x$

D.  $y = 600,000(6)^x$

B. How many blogs were there at the end of the period?

a. 660,000

b. 1,200,000

**C.** 4,800,000

d. 16,200,000

$$x = 3$$

$$600000(2)^3$$

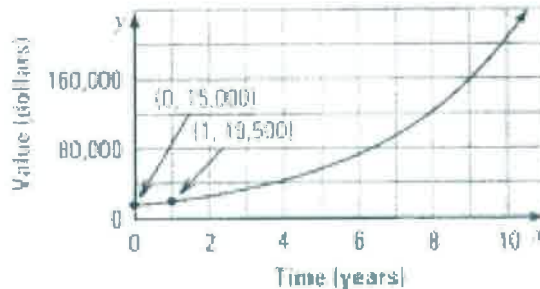
10. The graph of an exponential growth function below shows the value of a business over time. Which of the following equations models the value  $v$  (in dollars) of the business over time  $t$  (in years)?

**A.**  $v = 15,000(1.30)^t$

B.  $v = 15,000(0.70)^t$

C.  $v = 15,000(0.50)^t$

D.  $v = 15,000(0.30)^t$



Growth

11. Write an equation of variation for  $y = 0.225$  when  $x = 20$ , where  $y$  varies inversely as  $x$ .

$$y = \frac{k}{x}$$

$$20 \cdot 0.225 = \frac{k}{20} \cdot 20$$

$$4.5 = k$$

$$y = \frac{4.5}{x}$$

12. The number of hours,  $h$ , it takes for a block of ice to melt varies inversely as the temperature,  $t$ . If it takes 2 hours for a square inch of ice to melt at  $65^\circ$ , find the constant of proportionality. (K)

$$y = \frac{k}{x} \quad \text{vs. } 2 = \frac{k}{65} \cdot \text{vs}$$

$$h = \frac{k}{t}$$

$$k = 130$$

13. Which of the following equations shows a relationship in which  $y$  is inversely proportional to  $x$ ?

A. I only

B. II and III only

C. I, II and III

D. II only

**E.** I and II only

~~I.~~

~~II.~~

~~III.~~

$$xy = \frac{1}{-3} \quad y = -\frac{1}{3x}$$

$$y = \frac{1}{x+1}$$

$$y = x - 5$$

directly across

$$y = \frac{k}{x}$$

For #14 – 17, The type of bacteria that causes Norovirus has a very high exponential growth rate at 80% every hour. If a sample at Richardson High School began with 10 bacteria, use the table below to answer the following questions. #RHSplague

Hours	Amount of Bacteria
0	10
1	18
2	32.4
3	58.32
4	104.976

$\times 1.8$   
 $\times 1.8$   
 $\times 1.8$

14. What is the function that represents this situation?

$$y = 10 \cdot (1.8)^x$$

15. How many bacteria will there be in 5 hours?  
 (Round to the nearest whole number)

$$10 \cdot (1.8)^5 \quad 189 \text{ bacteria}$$

16. How many bacteria will there be in 1 day?  
 (Round to the nearest whole number) 24 hours

$$10 \cdot (1.8)^{24} \quad 1,338,2588 \text{ bacteria}$$

17. If there are 20,000 bacteria present, about how long has the bacteria been growing?

About 13 hours

18. If  $y$  varies inversely as  $x$  and  $y = 15$  when  $x = 6$ , then what is the value of the constant of proportionality,  $k$ ?

$$y = \frac{k}{x}$$

$$6 \cdot 15 = \frac{k}{6} \cdot 6$$

$$k = 90$$

19. A theater company plans to hire people to build a stage set. The work time  $t$  (in hours per person) varies inversely with the number  $p$  of people hired. The company estimates that 25 people working for 300 hours each can complete the job. Find the work time per person if the company hires 30 people.

$$y = \frac{k}{x}$$

$$t = \frac{k}{p}$$

$$25 \cdot 300 = \frac{k}{25} \cdot 25$$

$$7500 = k$$

$$y = \frac{7500}{x}$$

$$y = \frac{7500}{30}$$

250 hours

20. Which of the following tables indicates that  $x$  and  $y$  vary directly?

x	y
1	2
2	4
3	4
4	5
5	8

↑

x	y
1	1
2	4
3	9
4	16
5	25

↑

↑

But not constant

x	y
1	5
2	4
3	3
4	4
5	5

↑

↑

x	y
1	3
2	6
3	9
4	12
5	15

↑

↑