

# Warm Up

April 4, 2019

1.) Identify the y-intercept of the following functions:

A.  $3x - 2y = 8$

$$\begin{array}{r} 3x - 2y = 8 \\ -3x \quad -3x \\ \hline -2y = -3x + 8 \\ \frac{-2y}{-2} = \frac{-3x + 8}{-2} \\ y = \frac{3}{2}x - 4 \end{array}$$

The y-intercept is  $(0, -4)$ .

B.  $y = 2(1.08)^x - 4$

The y-intercept is  $(0, -2)$ .

2.) Identify whether the table below is linear or exponential, then write the appropriate function.

x	0	1	2	3	4	5	6	7
y	12	8	4	0	-4	-8	-12	-16

Linear or exponential?  $y =$  \_\_\_\_\_

$y = mx + b$

$y = -4x + 12$

## Linear vs. Exponential Scenarios

- If the growth or decay involves increasing or decreasing by a fixed number, use a **linear** function. The equation will look like:

$$y = mx + b$$

$$f(x) = (\text{rate})x + (\text{starting amount}).$$

- If the growth or decay is expressed using multiplication (including words like “doubling” or “halving”) use an **exponential** function. The equation will look like:

$$f(x) = (\text{starting amount}) \cdot (\text{base})^x.$$

Ex. 1) A library has 8000 books, and is adding 500 more books each year.

Linear or Exponential

$$y = \underline{500x + 8000}$$

Ex. 2) A gym's customers must pay \$50 for a membership, plus \$3 for each time they use the gym.

Linear or Exponential

$$y = 3x + 50$$

Ex. 3) A bank account starts with \$10. Every month, the amount of money in the account triples. • 3 = factor

Linear or Exponential

$$y = 10(3)^x$$

Ex. 4) At the start of a carnival, you have  $\overset{b}{50}$  ride tickets. Each time you ride the roller coaster, you have to pay  $\underset{b}{6}$  tickets.

$$m = -$$

Linear or Exponential

$$y = \underline{-6x + 50}$$

Ex. 5) There are  $\overset{a}{20,000}$  owls in the wild. Every decade, the number of owls is halved.  $r = 0.5$

Linear or Exponential

$$y = \underline{20,000(0.5)^x}$$

Practice: The function  $f(t) = 45(1.2)^t$  gives the approximate number of fish in a large pond after  $t$  years.

Select all of the true statements.

- A. There were originally 45 fish in the pond.
- B. There were originally 54 fish in the pond.
- C. The number of fish increases by 9 every year.
- D. The number of fish doubles every year.
- E. The number of fish increases by a factor of 1.2 every year.

**Identify whether each scenario models a linear or exponential function.**

A. A taxi charges an initial fee of \$2.00, and \$1.50 for each additional mile. linear

B. The population in a town decreases by 15% each year.  
exponential

C. An airplane flying at an altitude of 33,000 feet descends at a rate 20 feet per minute. linear

D. A pizza restaurant charges \$5.50 per pizza, and \$0.50 for each additional topping. linear

E. A cell doubles in size every 2 hours.  
exponential



The amount of carbon 14 decays in an exponential fashion. Which table could show the approximate amount of carbon 14 over the 5-year interval shown?

Year	Amount of Carbon 14 (in grams)
1	19.800
2	19.602
3	19.406
4	19.212
5	19.020

Year	Amount of Carbon 14 (in grams)
1	20.200
2	20.402
3	20.606
4	20.812
5	21.020

Year	Amount of Carbon 14 (in grams)
1	19
2	18
3	17
4	16
5	15

Year	Amount of Carbon 14 (in grams)
1	21
2	22
3	23
4	24
5	25

1, 2, 3, 4, ...

For which positive integer value of  $x$  will the value of  $f(x) = 5(1.25)^x$  first exceed the value of  $f(x) = 12x + 25$ ?

$$y_1 = 5(1.25)^x$$

$$y_2 = 12x + 25$$

become  
bigger

2<sup>nd</sup> graph

$$x = 18$$



Clara and Michelle's parents started saving for college in 1998.  $Y_1$

○ Clara's college fund can be modeled by the function  $f(x) = 500x + 2500$

○ Michelle's college fund can be modeled by the function  $f(x) = 2500(1.1)^x$ , where  $x$  is the number of years since 1998.  $Y_2$

**About** what year will Michelle's college fund first exceed Clara's college fund?

$$1998 + 15 = 2013$$

>

$Y_1$

$x$	$f(x)$	$g(x)$
0	-2	2
3	2	17