

**Exponential  
Growth & Decay  
Foldable**

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### Instructions

Print or copy page 3 and 4 double sided.

Place the paper so the examples are face down.

Cut along the dotted lines to create flaps.

Flip and fold the flaps inwards.

Glue the foldable into notes or on a piece of construction paper.

Go through the foldable with your students.

**Write an  
Exponential  
Model**

**What is an  
Exponential  
Growth or Decay  
Function?**

**Solve an  
Exponential  
Decay Word  
Problem**

**Solve an  
Exponential  
Growth Word  
Problem**

**Graph  
Exponential  
Decay Function**

**Graph of an  
Exponential  
Growth Function**

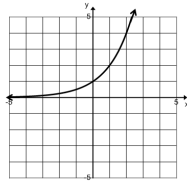
**Preview**

## What is an Exponential Function?

An exponential function has the form  $f(x) = ab^x$  where  $a \neq 0$  and  $b \neq 0$ .

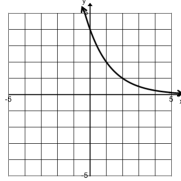
If  $b > 1$ , then it's a growth function.

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



If  $0 < b < 1$ , then it's a decay function

$$f(x) = 4(1/2)^x$$



## Write an Exponential Model

1) You buy a commemorative coin for \$110. Each year  $t$ , the value  $V$  of the coin appreciates by 4%.

2) You buy a stereo system for \$1000. Each year  $t$ , the value  $V$  of the stereo depreciates by 5%.

## Solve an Exponential Growth Word Problem

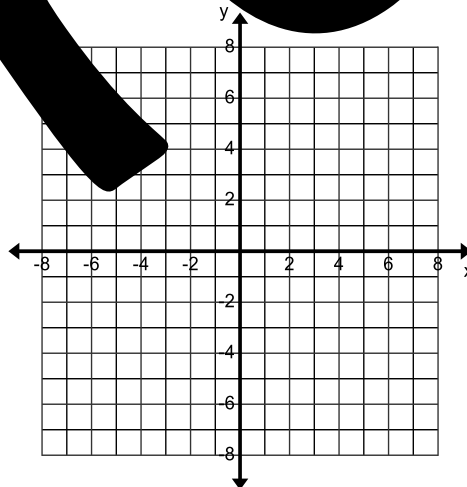
3) A town had a population of 48,000 in 2011. Then the population increased by 8% per year for the next 5 years. Write an exponential growth model for the town's population over the 5-year period. Use the model to find the population in 2014.

## Solve an Exponential Decay Word Problem

Between 2010 and 2016, the profits of a business decreased by approximately 0.5% each year. In 2010, the business's profit was \$1 million. Write an exponential decay model showing the business's profit  $P$  in year  $t$ . What was the profit in 2014?

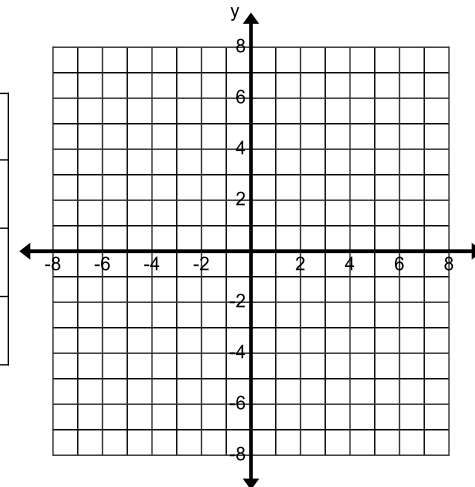
Graph:

x	$f(x) = 2(3)^x - 1$	y
-1	$2(3)^{-1} - 1 = 2/3 - 1 = -1/3$	-1/3
0	$2(3)^0 - 1 = 2(1) - 1 = 1$	1
1	$2(3)^1 - 1 = 6 - 1 = 5$	5



Graph:

x	$g(x) = 4(1/2)^x - 3$	y
-1	$4(1/2)^{-1} - 3 = 4(2) - 3 = 5$	5
0	$4(1/2)^0 - 3 = 4(1) - 3 = 1$	1
1	$4(1/2)^1 - 3 = 4(1/2) - 3 = -1$	-1

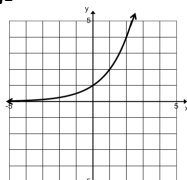


## What is an Exponential Function?

An exponential function has the form  $f(x) = ab^x$  where  $a \neq 0$  and  $b \neq 0$ .

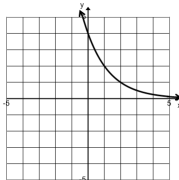
If  $b > 1$ , then it's a growth function.

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



If  $0 < b < 1$ , then it's a decay function

$$f(x) = 4(1/2)^x$$



## Write an Exponential Model

1) You buy a commemorative coin for \$110. Each year  $t$ , the value  $V$  of the coin appreciates by 4%.

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

$$y = 110(1 + 0.04)^t$$

$$y = 110(1.04)^t$$

2) You buy a stereo system for \$780. Each year  $t$ , the value of the stereo depreciates by 5%.

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

$$y = 780(1 - 0.05)^t$$

$$y = 780(0.95)^t$$

## Solve an Exponential Growth Word Problem

3) A town had a population of 48,000 in 2011. Then the population increased by 8% per year for the next 5 years. Write an exponential growth model for the town's population over the 5-year period. Use the model to find the population in 2014.

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

$$P = 48,000(1 + 0.08)^5$$

$$P = 48,000(1.08)^5$$

$$P = 60,466.7$$

60,466.7

## Solve an Exponential Decay Word Problem

Between 2010 and 2014, the profits of a business decreased by approximately 0.5% per year. In 2010, the business's profit was \$1,200,000. Write an exponential decay model showing the business's profit  $P$  in year  $t$ . What was the profit in 2014?

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

$$P = 1,200,000(1 - 0.005)^4$$

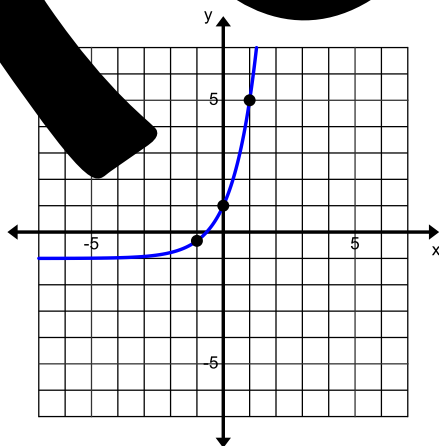
$$P = 1,200,000(0.995)^4$$

$$P = 1,176,179.401$$

\$1,176,179.40

Graph:

x	$f(x) = 2(3)^x - 1$	y
-1	$2(3)^{-1} - 1 = \frac{2}{3} - 1 = -\frac{1}{3}$	-1/3
0	$2(3)^0 - 1 = 2(1) - 1 = 1$	1
1	$2(3)^1 - 1 = 6 - 1 = 5$	5



Graph:

x	$g(x) = 4(1/2)^x - 3$	y
-1	$4(1/2)^{-1} - 3 = 4(2) - 3 = 5$	5
0	$4(1/2)^0 - 3 = 4(1) - 3 = 1$	1
1	$4(1/2)^1 - 3 = 4(1/2) - 3 = -1$	-1

