

$$y = \underline{a(1+r)^t}$$

## Exponential Growth

(4.1)

The population in Goodtown is 20,000 in "Year 0."  
The population *increases* by 75% each year.

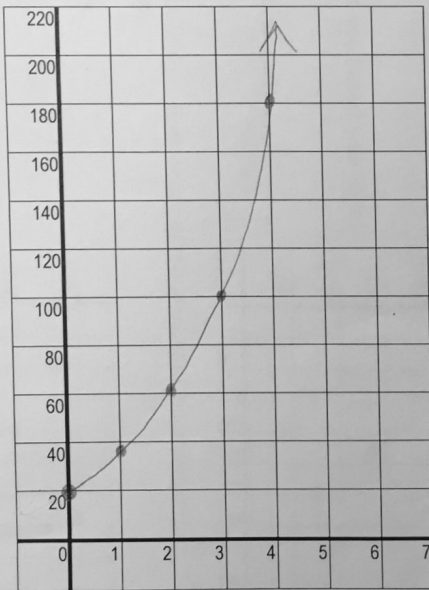
$$20,000 (1.75)^t$$

The asymptote is  $y = 0$ .

The starting point is  $(0, 20,000)$ .

$y$  gets multiplied by  $1.75$  each time  $x$  increases by 1.

x (year)	y (thousands)
0	20
1	35
2	61.25
3	107
4	188
5	328
6	574



## Exponential decay

(4.2)

The population in Badtown is 20,000 in "Year 0."  
The population *decreases* by 75% each year.

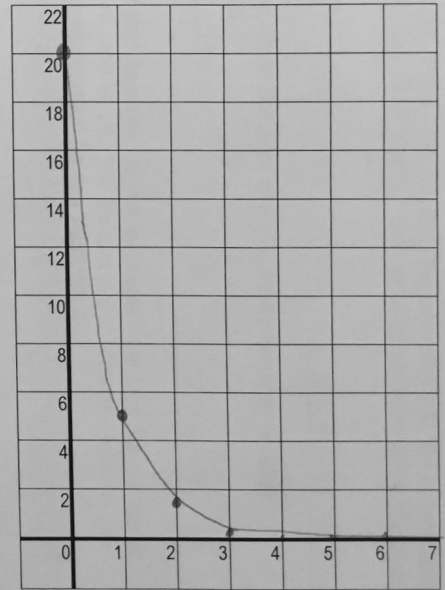
$$y = 20,000 (.25)^t$$

The asymptote is  $y = 0$ .

The starting point is  $(0, 20,000)$ .

$y$  gets multiplied by  $.25$  each time  $x$  increases by 1.

x (year)	y (thousands)
0	20,000
1	5,000
2	1250
3	312.5
4	78.125
5	19.53
6	4.88



1. In 1932, the price of a stamp was 2¢. From 1932 to 1981, the price of a U.S. stamp increased by approximately 3.5% each year. Call 1932 "Year 0," then write an equation giving the price of a U.S. stamp in "Year  $x$ ."

$$y = .02(1 + .035)^x$$

$$y = 0.02(1.035)^x$$

If this pattern had continued, what would the price of a U.S. stamp be today, in 2008?  
(Hint: Think about years since 1932.)  $x = 86$

$$y = .02(1.035)^{86}$$

$$y = .38$$

2. You put \$1,000 in a bank account that pays 6% interest each year. Let  $x$  be the number of years since you opened the account, and let  $y$  be the amount in the account. Assume you never withdraw any money. Write an equation for this situation.

$$y = 1000(1.06)^x$$

How much money will there be in your account 20 years after you open it?

$$\$ 3207.14$$

3. You buy a new car for \$22,000. Each year ( $x$ ), the value of the car ( $y$ ) decreases by 12.5%.

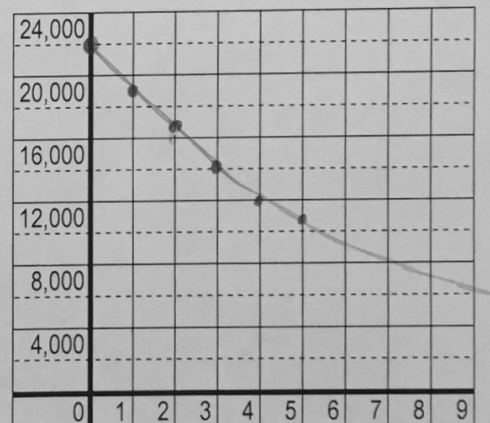
Write an equation for this situation.

$$y = 22,000(.875)^x$$

Graph your equation.

Based on your graph, when would you expect your car's value to be about \$10,000?

Btw 5 and 6 yrs.



4. An adult takes 400 milligrams of ibuprofen. Each hour ( $x$ ), the amount of ibuprofen in the system ( $y$ ) decreases by about 29%.

Write an equation for this situation.

$$y = 400(.71)^x$$

Graph your equation.

A doctor knows she cannot administer a certain drug until there is less than 200 mg of ibuprofen in the patient's system. Approximately when can the doctor administer this drug?

After about 2 hrs.

