

Exponential Functions

Date _____ Period _____

Identify the initial value (a) and the growth or decay factor (b). State whether it is growth or decay.

1) $y = 75 \cdot 1.46^t$

$a:$ 75

$b:$ 1.46

Growth or Decay?

2) $y = \frac{1}{4} \cdot 1.07^t$

$a:$ $\frac{1}{4}$

$b:$ 1.07

Growth or Decay?

3) $y = 2 \cdot 0.87^t$

$a:$ 2

$b:$ 0.87

Growth or Decay?

4) $y = 135 \cdot 0.99^t$

$a:$ 135

$b:$ 0.99

Growth or Decay?

5) $y = 10 \cdot 1.12^t$

$a:$ 10

$b:$ 1.12

Growth or Decay?

6) $y = 21 \cdot 0.45^t$

$a:$ 21

$b:$ 0.45

Growth or Decay?

Identify the growth or decay RATE and state whether it is growth or decay.

7) $y = \frac{1}{4} \cdot 0.93^t$

Rate: 7%

Growth or Decay?

8) $y = 15 \cdot 1.75^t$

Rate: 75%

Growth or Decay?

9) $y = 13 \cdot 0.79^t$

Rate: 21%

Growth or Decay?

10) $y = 64 \cdot 1.13^{7t} = 64(1.13^7)^t$

Rate: 135% = $64(2.35)^t$

Growth or Decay?

$$11) y = 28 \cdot 1.06^{18t} = 28(2.25)^t$$

Rate: 185%

Grow or Decay?

$$12) y = 594 \cdot 0.63^{7t} = 594(0.039)^t$$

Rate: 96.1%

Grow or Decay?

Neal opens a savings account that earn interest monthly. He can estimate the total dollars d in his account, t years after opening the account by using $d = 4000 \cdot 1.0008^{12t}$.

13) How much money did Neal initially put into the account?

4000

14) What is the YEARLY RATE on the account? Is it growing or decaying?

1.0008¹²
1.0096
0.96% growth.

15) How much money will Neal have in 20 years?

$$d(20) = 4000(1.0096)^{20} = \$4842.25$$

The deer population, p , in a forest preserve, t years after 2005 can be estimated using the function $p = 440 \cdot 0.92^t$.

16) What was the size of the deer population in 2005?

440

17) What was the size of the deer population in 2013? — 8 years

$$p(8) = 440(0.92)^8 = 226$$

18) What will be the size of the deer population in 2025? 20 years

$$p(20) = 440(0.92)^{20} = 83$$

19) What is the growth or decay RATE of the deer population? Is it a growth or decay?

8% decay.

A wolf population may be related to the deer population. The wolf population, w , can be estimated t , years after 2005 using the function $w = 117 \cdot 0.98^{2t}$.

20) What was the size of the wolf population in 2005?

117

$$\begin{aligned} &\hookrightarrow 0.98^2 \\ &= 0.96 \end{aligned}$$

21) What was the size of the wolf population in 2013? - 8 years

$$\begin{aligned} w(8) &= 117(0.96)^8 \\ &= 85 \end{aligned}$$

22) What will be the size of the wolf population in 2025? - 20 years

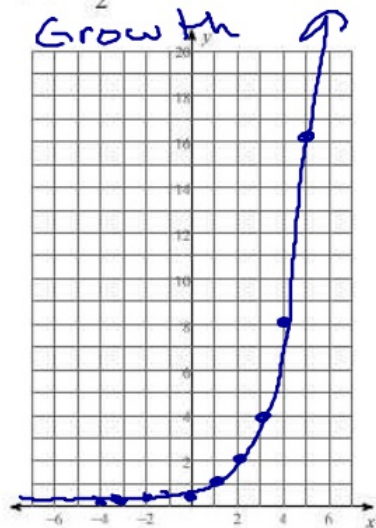
$$\begin{aligned} w(20) &= 117(0.96)^{20} \\ &= 52 \end{aligned}$$

23) Which population is changing faster between the deer and the wolves? Explain your answer.

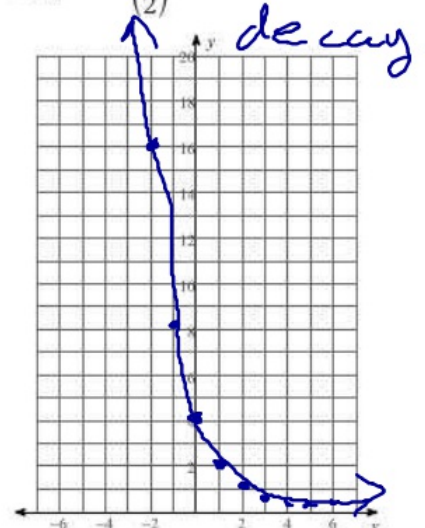
$w \Rightarrow 4\%$ decay
 $d \Rightarrow 8\%$ decay

Graph each exponential function. State whether it is a growth or decay function.

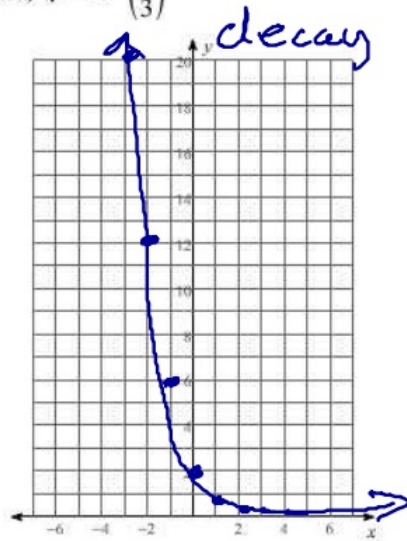
24) $y = \frac{1}{2} \cdot 2^x$



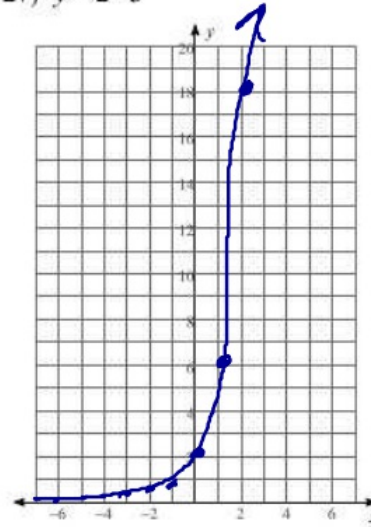
25) $y = 4 \cdot \left(\frac{1}{2}\right)^x$



26) $y = 2 \cdot \left(\frac{1}{3}\right)^x$



27) $y = 2 \cdot 3^x$



Perform the indicated operation.

28) $f(x) = x^3 + x$
 $g(x) = -2x$
 Find $(f \cdot g)(x)$

29) $g(x) = 2x - 5$
 $f(x) = 3x - 1$
 Find $(g + f)(x)$

Factor each completely.

30) $x^2 - 13x + 30$

31) $n^2 - 7n - 30$

32) $n^2 - 6n + 5$

33) $x^2 - 7x - 8$

34) $v^2 - 3v$

35) $r^2 + r - 72$

Find the x-intercepts by factoring.

36) $y = x^2 + 4x - 21$

37) $x^2 + 8x = 0$