

## Lines, Exponents and Exponential Equations

1. The amount of radioactive ore in a sample can be modeled by the equation  $y = 20(0.997)^x$ , where  $x$  represents years and  $y$  is the amount of ore remaining in milligrams.

a. What was the initial amount of radioactive ore?

20

b. Is this an example of exponential growth or decay?

Decay

c. What percentage of the ore is being lost or gained according to this model?

.003

d. When will there be half of the initial amount of the radioactive ore?

230 years

2. Complete the following table.

Explicit Function	Initial Value	Base of Exponent	Growth or Decay?
$y = 2(3)^x$	2	3	Growth
$y = 1(.89)^x$	1	.89	Decay
$y = 0.125(4)^x$	0.125	4	Growth
$y = ab^x$	a	$b > 1$	Growth

3. Simplify each expression using positive exponents.

a.  $(y^3)(y^6)$

$y^9$

b.  $(5x^2y^4)(2xy^3)$

$10x$

c.  $\frac{a^7}{a^5}$

$a^2$

d.  $\left(\frac{5}{3}\right)^3$

$\frac{125}{27}$

e.  $(pq)^3$

$p^3q^3$

f.  $(7p^3q^2)^2$

$49p^6q^4$

g.  $(T^3)^2$

$T^6$

h.  $\frac{2}{p^{-4}}$

$2p^4$

i.  $-5^2$

$-25$

j.  $(-5)^2$

$25$

k.  $2a^0$

$2$

l.  $(2a)^0$

$1$

m.  $4a^{-2}$

$\frac{4}{a^2}$

n.  $(4a)^{-2}$

$\frac{1}{16a^2}$

4. When you opened a savings account on your 15<sup>th</sup> birthday, you deposited the money from your summer job (\$2000). The banker informed you that you would receive 1.5% interest each year. If you never add any other money to the account, how much money will you have in the account when you turn 21?

$$y = 2000(1.015)^x$$

$$y = 2000(1.015)^6 =$$

5. For the following scenario, write an equation, and define your variables:

The town of Braeford was first established in 1890 when it had a population of 24. Since then it has grown by a percentage of 20% each decade.

$$y = 24(1.2)^x$$

$x = \#$  of decades

$y =$  Population

IV

6. Determine whether the following exponentials are growth or decay. Then identify the factor and rate at which the grow or decay.

a.  $y = 30(1.6)^x$

Growth

I.V. = 30

Rate = 60%

b.  $y = 5(1.5)^x$

Growth

I.V. = 5

Rate = 50%

c.  $y = 4(0.8)^x$

Decay

I.V. = 4

Rate = 20%

d.  $y = 600,000(0.97)^x$

Decay

I.V. = 600,000

Rate = 3%

7.

Simplify the following Exponents using the properties of exponents:

a.  $x(x^2)(x^7)$

$$x^{10}$$

b.  $\frac{c^0}{c^{-3}}$

$$c^3$$

c.  $\frac{-6x^6y^7z^9}{48xy^5z^6}$

$$\frac{-x^5y^2}{8z}$$

d.  $(2r^{-2}s^3t^{-3})^2$

$$\frac{4s^6}{r^4t^6}$$

8. Describe the translation occurring in the exponential equations:

a.  $y = 2(3)^{x+3} - 4$

b.  $y = -3(0.5)^x + 1$

down 4

left 3

stretch by 2  
(narrower  
steeper)

up 1

flip over x-axis

stretch by 3

9. Write the equation of a line in slope intercept form.

a. Slope = 3, goes through the point (-3, 4)

$$y = 3x + 13$$

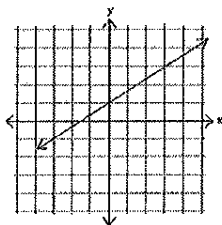
b. Perpendicular to  $y = 1/2x - 4$ , goes through the point (-5, -10)

$$y = -2x - 20$$

c. Goes through points (12, 5) and (3, 2)

$$y = \frac{1}{3}x + 1$$

d.



$$y = 1 + \frac{2}{3}x$$

10. Solve for y in each equation

a.  $2x - 3y = 18$

$$y = -6 + \frac{2}{3}x$$

b.  $y - 12x + 13 = 0$

$$y = 12x - 13$$

c.  $12x - 12y = 4$

$$y = -\frac{1}{3} + x$$

11) Addy really wants to visit a pumpkin patch to get a pumpkin Halloween. She has two options for places to go. Write an equation to model each.

a) Patterson Farms charges \$15 for the wagon ride to the pumpkin patch plus \$0.49 per pound of pumpkin

$$y = 15 + .49x$$

b) Carrigan Farms charges \$10 for the wagon ride to the pumpkin patch plus \$0.78 per pound of pumpkin

$$y = 10 + .78x$$

c) If she wants a 30-pound pumpkin, where would be the cheaper place to go?

Patterson Farms

d) If she wants a 5-pound pumpkin where would be the cheaper place to go?

Carrigan Farms

12) McGuire needs a lawn mower to start. He finds one for \$2675. He puts \$500 down. Each monthly payment is \$125.

a) Write a equation to model the situation.

b) How many months will it take to for him to pay half the balance?