Warm Up

A population of two headed turtles has a decay factor of 0.82 each year. If there are 74 turtles remaining after 5 years, how many did we start with?

Basic Equation: $y = ab^x$

initial amount, factor

$\frac{74}{0.82^5} = \frac{a(0.82)^5}{0.82^5}$

$200 = a$

x	y
0	
1	
2	
3	
4	
5	74

÷0.82

÷0.82

It is much more efficient to use an equation than to count back on a table.

What is the decay rate?

18%

Write the equation that relates the turtle population to the number of years.

$y = 200(0.82)^x$

Growth and Decay Unit Test Topics

- Create a table and a graph of an exponential growth or decay relationship given a description or equation
- Write an exponential growth or decay equation given text, a graph, table, or two points
- Write numbers in scientific notation and standard form
- Write an exponential equation with a y-intercept other than 1
- Write the equation of a linear or exponential relationship given text, a table, graph, or equation
- Identify whether a table is linear, exponential, or neither and write the equation
- Estimate when an exponential relationship will reach a certain number
- Calculate a growth or decay factor from text, a table, graph, or two points

Homework Questions?

$$(4u^1v^1)(-1u^1)(2u^4v^1) = -8u^6v^2$$

Part B

When a number is raised to a power and then raised to a power again, the result follows a consistent pattern. Copy and complete the table below in your notebook. Expand each expression into factored form and then rewrite it with new exponents as shown in the example.

Original Form	Factored Form	Simplified Exponent Form
$(5^2)^5$	$(5\cdot5)(5\cdot5)(5\cdot5)(5\cdot5)(5\cdot5)$	5^{10}
$(2^2)^4$		
$(3^7)^2$		
$(x^3)^5$		
$(x^3y^2)^2$		

1. Work with your group to describe the pattern between the exponents in the original form and the exponent(s) in the simplified exponent form. **Write a statement to describe the relationship you see.**

2. Visualize $(20^{12})^8$ written in factored form.

   a. What is multiplied (what is the base)? 20

   b. How many times is it multiplied? 96

   c. Use the expression you visualized to help you rewrite the expression in simplified exponent form.

   d. Describe in detail how you figured out what exponent to use in the simplified exponent form.

   e. In Part A, #2 you visualized the factored form of the expression $20^{12} \cdot 20^8$. Compare the **factored** form of that expression to the **factored** form of $(20^{12})^8$ from above. How are the two expressions different?

$20^{12} \cdot 20^8 \stackrel{?}{=} (20^{12})^8$

$20^{20} \stackrel{?}{=} 20^{12} \cdot 20^{12} \cdot 20^{12} \cdot 20^{12} \cdot 20^{12} \cdot 20^{12} \cdot 20^{12} \cdot 20^{12}$

$20^{20} \neq 20^{96}$

$(x^2)^3 = x^6$

$(xy^2)^4 = x^4y^8$

$(2x^3y)^3 = 8x^9y^3$

$(x^2)^5 \cdot (x^3) = x^{10} \cdot x^3 = x^{13}$

$(4x^2b)^2 = 16x^4b^2 = 16b^2x^4$

$(-3ab^4)^3 = -27a^3b^{12}$

NAME _____ DATE _____ PERIOD _____

8-1 Study Guide and Intervention *(continued)*

Multiplying Monomials

Powers of Monomials An expression of the form $(x^m)^n$ is called a **power of a power** and represents the product you obtain when x^m is used as a factor n times. To find the power of a power, multiply exponents.

Power of a Power	For any number a and all integers m and n, $(a^m)^n = a^{mn}$.
Power of a Product	For any number a and all integers m and n, $(ab)^m = a^m b^m$.

Example **Simplify $(-2ab^2)^3(a^2)^4$.**

$(-2ab^2)^3(a^2)^4 = (-2ab^2)^3(a^8)$ Power of a Power

$= (-2)^3(a^3)(b^2)^3(a^8)$ Power of a Product

$= (-2)^3(a^3)(a^8)(b^2)^3$ Commutative Property

$= (-2)^3(a^{11})(b^2)^3$ Product of Powers

$= -8a^{11}b^6$ Power of a Power

The product is $-8a^{11}b^6$.

Exercises

Simplify.

1. $(y^5)^2$

2. $(n^7)^4$

3. $(x^2)^5(x^3)$

4. $-3(ab^4)^3$

5. $(-3ab^4)^3$

6. $(4x^2b)^3$

7. $(4a^2)^2(b^3)$

8. $(4x)^2(b^3)$

9. $(x^2y^4)^5$

10. $(2a^3b^2)(b^3)^2$

11. $(-4xy)^3(-2x^2)^3$

12. $(-3j^2k^3)^2(2j^2k)^3$

13. $(25a^2b)^3\left(\frac{1}{5}abc\right)^2$

14. $(2xy)^2(-3x^2)(4y^4)$

15. $(2x^3y^2z^2)^3(x^2z)^4$

16. $(-2n^6y^5)(-6n^3y^2)(ny)^3$

17. $(-3a^3n^4)(-3a^3n)^4$

18. $-3(2x)^4(4x^5y)^2$

Homework

Finish Classwork