

# LAWS OF EXPONENTS DAY 2

## AGENDA

Warm-Up  
HW Check/Spin  
Notes p. 71/Foldable  
HW #1-14

## REMINDERS

No School  
Monday!

## ESSENTIAL QUESTION

How do I use multiplication properties of exponents to simplify expressions?

Last night's HW should be OUT on your desk

## WADMIID

on a notecard

1. If  $y = x^5$ , what is equivalent to  $x^{20}$ ?

$$y = x \times x \times x \times x \times x$$

A.  $y^{100}$

B.  $y^{25}$

C.  $y^{15}$

D.  $y^4$

2. Are the expressions  $2^2$  and  $(-2)^2$  equivalent?  
Why or why not?

# QUESTIONS, COMMENTS, CONCERNS...

Algebra I — Unit 6, Topic 1 — Integer Exponents

Practice — Integer Exponents

Name \_\_\_\_\_ Date \_\_\_\_\_ Period \_\_\_\_\_

Simplify the expressions below.

1.  $4^{-2}$

2.  $(-5)^{-2}$

3.  $\frac{1}{2^0}$

4.  $\left(\frac{1}{4}\right)^2$

5.  $-5^2$

6.  $\frac{4}{2^{-3}}$

Simplified expressions are shown below. Fill in the box with the value that makes each equation true.

7.  $4n^{\square} = \frac{4}{n^2}$

8.  $\frac{a^{\square}}{3b^{\square}} = \frac{ab^3}{3}$



In the lab, the population of a certain bacteria doubles every month. A study uses the expression  $3000 \cdot 2^m$  to model a population of 3000 bacteria after  $m$  months of growth.

9. What is the population of bacteria at the beginning of the study when  $m=0$ ?

$$3000 \cdot 2^0 = 3000 \text{ bacteria}$$

10. What is the population of bacteria at  $m=-2$ ? What does this value represent?

$$3000 \cdot 2^{-2}$$

Evaluate each expression for  $x=-3$  and  $y=5$ .

11.  $3y^{-2}$   
 $3(5)^{-2}$

12.  $(4x)^{-2}$

13.  $\frac{1}{x^{-3}y^2}$

14.  $x^0y^{-3}$

Simplify each expression.

15.  $a^{-5}b^{-7}$

16.  $a^1c^1$

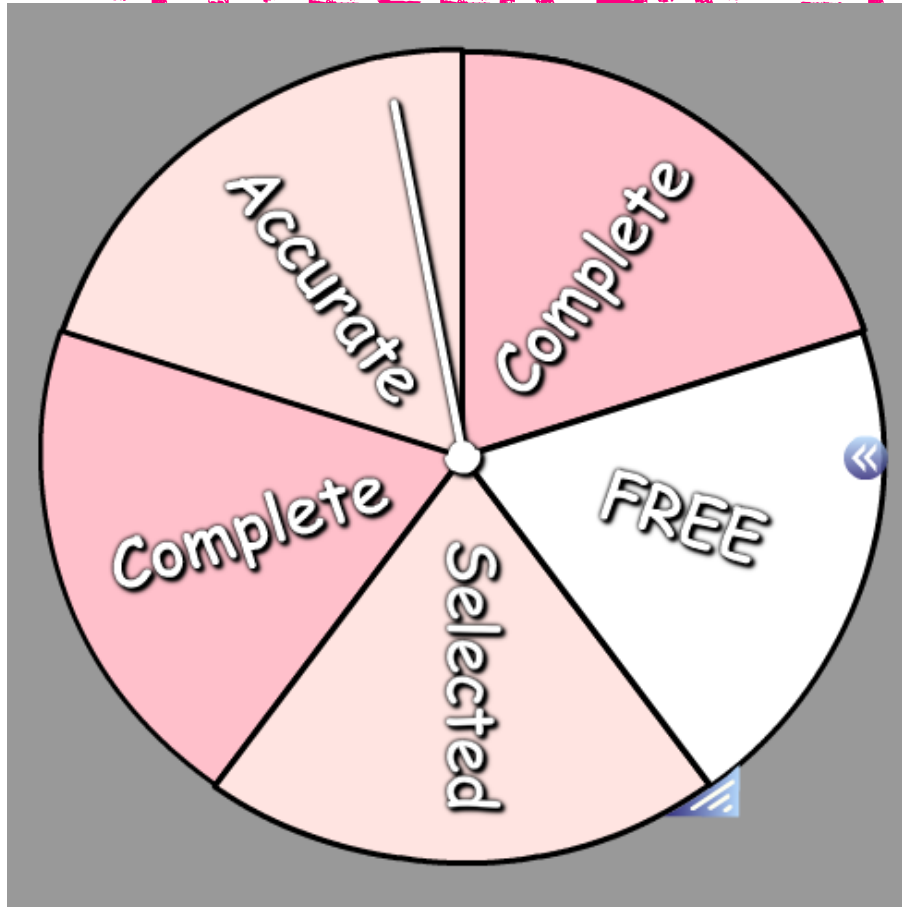
17.  $\frac{7ab^{-2}}{3w}$

18.  $\frac{15s}{5t^{-3}}$

$$a \cdot 1$$

$$\boxed{a}$$

# INTEGER EXPONENTS HW



Wheel spin only applies  
to HW turned into the  
tray right now!!

Any late HW will be  
graded for  
**ACCURACY.**

# LIVE OF EXPONENTS DAY 2

ESSENTIAL QUESTION How do I use multiplication properties of exponents to simplify expressions?

**Simplify the expression using the Product Rule.**

1.  $(q^2)(2q^4)$

$q q 2 q q q q$

$2q^6$

2.  $(-2u^2)(6u^6)$

$(-2)(6)u^{2+6}$

$-12u^8$

**Simplify the expression using the Power Rule.**

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

$(2a^3)(2a^3)(2a^3)(2a^3)$

$2^4 a^{12}$

4.  $3(4y^6)^4$

$3(4^4(y^6)^4)$

$3 \cdot 256 y^{6 \cdot 4} = 768 y^{24}$

**Simplify the expression using the Power of a Product.**

5.  $\left(\frac{2}{3}x^2y^3\right)^3$

$\left(\frac{2}{3}x^2y^3\right)\left(\frac{2}{3}x^2y^3\right)\left(\frac{2}{3}x^2y^3\right)$

$\left(\frac{2}{3}\right)^3(x^2)^3(y^3)^3$

$\left(\frac{2}{3}\right)^3 x^6 y^9$

6.  $(x^{12}y^4z^6)^{\frac{1}{2}}$

$(x^{12})^{\frac{1}{2}}(y^4)^{\frac{1}{2}}(z^6)^{\frac{1}{2}}$

$x^6 y^2 z^3$

## EXPONENTS LAWS

$$a^m a^n$$

product of powers

$$\frac{a^m}{a^n}$$

quotient of powers

$$(a^m)^n$$

power of a power

$$(ab)^m$$

power of a product

# EXPONENTS REVIEW

ex.  $(5x^2)(6x^7)$

$5 \cdot 6 \times 2+7$   
 $30x^9$

$$a^m a^n = a^{(m+n)}$$

(little #s)  
 Keep base, ADD exponents  
 MULTIPLY coefficients (big #s)

$$\frac{a^m}{a^n}$$

Quotient of Powers

ex.  $(x^2)^3 = x^{2 \cdot 3} = \boxed{x^6}$

$(x^2)(x^2)(x^2)$   
 $x \cdot x \cdot x \cdot x \cdot x \cdot x$

$$(a^m)^n = a^{mn}$$

MULTIPLY exponents

ex.  $(xy^2)^3$

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

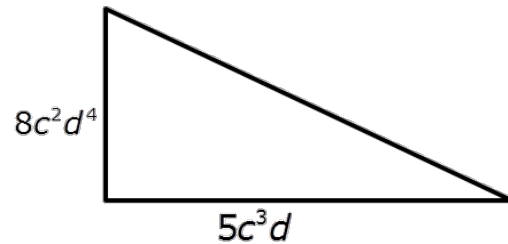
$$(ab)^m = a^m b^m$$

DISTRIBUTE exponent  
 to each part

# LAWS OF EXPONENTS DAY 2

ESSENTIAL QUESTION How do I use multiplication properties of exponents to simplify expressions?

7. Express the area of the triangle as monomial. The formula for area of a triangle is  $A = \frac{1}{2}bh$ .



$$\begin{aligned} A &= \frac{1}{2}(5c^3d)(8c^2d^4) \\ &= \frac{1}{2}(5)(8)c^{3+2}d^{1+4} \\ &= 20c^5d^5 \end{aligned}$$

8. Which expression best represents the area of this square?

☒ A

$9x^4y^4$

B

$9x^2y^2$

C

$6x^2y^2$

D

$6x^4y^4$

$$A = s^2$$

$$\begin{aligned} A &= (3x^2y^2)^2 \\ &= 3^2(x^2)^2(y^2)^2 \\ &= 9x^4y^4 \end{aligned}$$



$\text{--- } 3x^2y^2 \text{ ---}$

## Algebra I – Unit 6: Topic 1 – Multiplication Properties of Exponents

**Practice – Multiplication Properties of Exponents**

Name \_\_\_\_\_ Date \_\_\_\_\_ Period \_\_\_\_\_

Simplify the expressions below:

1.  $n^5 \cdot n^2$

2.  $x^2 \cdot x^{-3} \cdot x^4$

3.  $(-3)^3 \cdot (-3)^2$

4.  $a^5 \cdot a^0 \cdot a^{-5}$

Simplify the expressions below:

5.  $(x^3)^4$

6.  $(3^2)^4$

7.  $(a^{-3})^4 \cdot (a^2)^2$

8.  $(p^4 q^2)^7$

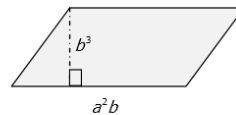
Find the missing exponent in each expression:

9.  $a^{\square} a^6 = a^{10}$

10.  $(a^2 b^{\square})^4 = a^8 b^{12}$

11.  $(a^3 b^6)^{\square} = \frac{1}{a^9 b^{18}}$

12. Write an expression for the area of the figure below:

13. Which expression best represents  $(3a^2b^3c)(-3ab)(-2a^3bc^3)$ ?

F  $18a^6b^5c^4$

G  $-18a^6b^3c^3$

H  $18a^6b^9c^4$

J  $-8a^6b^5c^4$

14. Which expression describes the area in square units of a rectangle that has a length of  $10x^3y^4$  units and a width of  $5x^2y$  units?

F  $2x^5y^4$

G  $15x^5y^5$

H  $50x^5y^4$

J  $50x^5y^5$



# ~~HW HELP: MULT. PROPERTIES OF EXP~~

~~NO WORK = NO CREDIT = NO KNOWING~~ Wheel Spun on Tuesday!

## ~~HELP~~

Use your foldable!!!!

#1-4. Remember, if a power has the same base, then you can KEEP the base and ADD the exponents.

#2-8. Distribute the exponent on the outside to EVERY piece inside...then multiply exponents!

9. How many a's are you missing on the left side to make 10 a's total?

10. Remember, we MULTIPLY a power raised to a power.

11. What kind of exponent makes variables cross the line? Look at Thursday's notes for extra help!

12. Area =  $b \cdot h$

13. MULTIPLY coefficients (big numbers) and ADD exponents on same bases.

14.  $A = b \cdot h$

## ~~SOLUTIONS~~

- |                   |              |
|-------------------|--------------|
| 1. $n^8$          | 9. 4         |
| 2. $x^3$          | 10. 3        |
| 3. $(-3)^5$       | 11. -3       |
| 4. 1              | 12. $a^2b^4$ |
| 5. $x^{10}$       | 13. F        |
| 6. 6561           | 14. J        |
| 7. $a^2$          |              |
| 8. $p^{28}q^{14}$ |              |