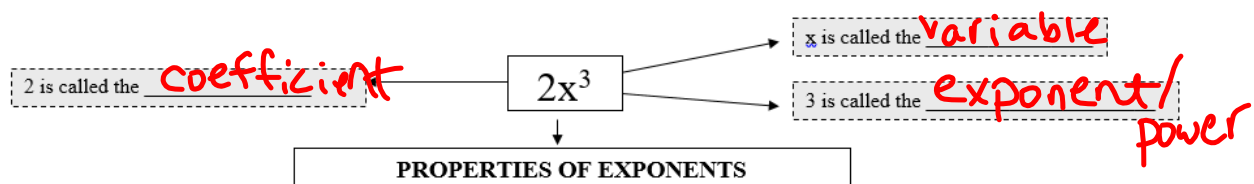


## Today's **order of operations**

- Write HW in your Agenda
- Take out your Exponent Investigation WS - we will go over
- Fill out the Graphic Organizer for Laws of Exponents as taught
- Get assignment
- Last 10-15 minutes of class you will use if needed to finish quiz



1. Replace each blank below with the value of the power in simplest form. What pattern do you see as you go down each column?

$2^x$	$10^x$	$5^n$
$2^4 = 16$	$10^4 = 10,000$	$5^4 = 625$
$2^3 = 8$	$10^3 = 1000$	$5^3 = 125$
$2^2 = 4$	$10^2 = 100$	$5^2 = 25$
$2^1 = 2$	$10^1 = 10$	$5^1 = 5$
$2^0 = 1$	$10^0 = 1$	$5^0 = 1$
$2^{-1} = \frac{1}{2}$	$10^{-1} = \frac{1}{10}$	$5^{-1} = \frac{1}{5}$
$2^{-2} = \frac{1}{4}$	$10^{-2} = \frac{1}{100}$	$5^{-2} = \frac{1}{25}$

What pattern do you notice in the row with zero as an exponent?

all equal 1

If it is not already, write the powers with negative exponents in simplest fraction form. Do you notice any pattern with negative exponents?

- All fractions  
- Denom. is the value of the positive exponent

**Zero as an Exponent** For every nonzero number  $a$ ,  $a^0 = 1$ .  
Examples  $4^0 = 1$                        $(-3)^0 = 1$                        $(5.14)^0 = 1$

Zero and Negative Exponents

1. Any nonzero number raised to the "0" power is equal to

Ex 1:  $(2)^0 = \underline{1}$

Ex 2:  $-2^0 = \underline{-1}$

Ex 3:  $(-2)^0 = \underline{1}$

$(-2)^0$   
 $-2^0 = -1$

**Negative Exponent** For every nonzero number  $a$  and integer  $n$ ,  $a^{-n} = \frac{1}{a^n}$ .

**Examples**  $7^{-3} = \frac{1}{7^3}$        $(-5)^{-2} = \frac{1}{(-5)^2}$

Zero and Negative Exponents

- How do negative exponents become positive?
- Ex 1:  $x^{-3} = \frac{1}{x^3}$
- Ex 2:  $x^2 y^{-3} = \frac{x^2}{y^3}$
- Ex 3:  $\frac{x^2}{x^5} = \frac{\cancel{x} \cdot \cancel{x}}{\cancel{x} \cdot \cancel{x} \cdot \cancel{x} \cdot \cancel{x} \cdot \cancel{x}} = \frac{1}{x^3}$

$\frac{1}{\frac{1}{2}} = 1$

$$2. \frac{5^{-3}}{1} = \frac{1}{5^3} = \frac{1}{125}$$

$$8. -\frac{(12x)^{-2}}{1} = -\frac{1}{(12x)^2} = -\frac{1}{(12x)(12x)} = -\frac{1}{144x^2}$$

$$4. \frac{2}{4^{-1}} = 2 \cdot 4 = 8$$

$$10. 6bc^0 = 6 \cdot b \cdot \underline{1} = 6b$$

$$6. \frac{46^{-1}}{1} = \frac{1}{46}$$

$$12. \left(\frac{2}{9}\right)^{-2} = \left(\frac{9}{2}\right)^2 = \frac{81}{4}$$

$$\frac{2^{-2}}{9^{-2}} = \frac{9^2}{2^2}$$

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$$14. \frac{5a^{-4}}{2c} = \frac{5}{2a^4c}$$

$(5a)^{-4}$

$$18. -\frac{(10a)^{-4}b^0}{(10a)^4} = -\frac{b^0}{(10a)^4}$$

$$= \frac{1}{10,000a^4}$$

$$16. \left(\frac{2m}{3n}\right)^{-3} = \left(\frac{3n}{2m}\right)^3$$

$$\frac{3n}{2m} \cdot \frac{3n}{2m} \cdot \frac{3n}{2m} = \frac{27n^3}{8m^3}$$

$$20. \frac{5m^{-1}}{9(ab)^{-4}c^7} = \frac{5(ab)^4}{9c^7m}$$

$$\frac{5a^4b^4}{9c^7m}$$

Evaluate each expression for  $a = -4$ ,  $b = 3$ , and  $c = 2$ .

22.  $b^{-3}$

$$\frac{(3)^{-3}}{1} = \frac{1}{(3)^3}$$
$$\boxed{\frac{1}{27}}$$

24.  $9a^0c^4$

$$9(-4)^0(2)^4$$
$$9 \cdot 1 \cdot 16$$
$$\boxed{144}$$

26.  $(-c)^{-2}$

$$\frac{(-2)^{-2}}{1} = \frac{1}{(-2)^2} = \frac{1}{(-2)(-2)} = \boxed{\frac{1}{4}}$$



Write each number as a power of 10 using negative exponents.

$$28. \frac{1}{10} \begin{array}{l} \nearrow 10^1 \\ \searrow 1 \\ \downarrow 1 \cdot 10^{-1} \end{array} = 10^{-1}$$

Write each expression as a decimal.

$$30. \frac{8}{1} \cdot 10^{-4} \begin{array}{l} \searrow \\ \downarrow \end{array}$$
$$\frac{8}{1} \cdot \frac{1}{10^4} = \frac{8}{10,000}$$
$$\boxed{0.\underline{0}\underline{0}\underline{0}\underline{0}8}$$

Homework

Pearson wb pgs 195 - 196

1 - 29 odd