

Do Now:

- 1.) $8 + (-5)$
- 2.) $-6 + 2$
- 3.) $7 - 9$
- 4.) $10 - (-3)$

Do Now:

Describe and correct the error in simplifying $2^5 * 2^4$.

~~$2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2$~~

$$\underline{2^5} * \underline{2^4} = (2 * 2)^{5+4}$$

$$= \underline{4^9}$$

$$\underline{2^9}$$

#27, 47, 55, 57, 49

(27) $8z^{11}$ ✓ (57) $4w^{10}$ ✓

(47) $4m^5n^7$ ✓ (49) p^7q^4 ✓

(55) $\frac{3a^3}{7}$ ✓

4.6 Negative and Zero Exponents

7.NS
8.EE

- SWBAT work with negative and zero exponents.
- SWBAT understand patterns and how operations are related

- Calculators: No

How can we simplify the fraction below?!

1.) $\frac{x^7}{x^5} = \frac{\cancel{x \cdot \cancel{x} \cdot \cancel{x} \cdot \cancel{x} \cdot \cancel{x} \cdot \cancel{x} \cdot x \cdot x}{\cancel{x \cdot \cancel{x} \cdot \cancel{x} \cdot \cancel{x} \cdot \cancel{x}}} = \frac{x^2}{1} = x^2$
 OR $x^{7-5} = x^2$ ← Same $\frac{x^2}{1} = \frac{1}{x^2}$

2.) $\frac{x^5}{x^7} = \frac{\cancel{x \cdot \cancel{x} \cdot \cancel{x} \cdot \cancel{x} \cdot \cancel{x}}{\cancel{x \cdot \cancel{x} \cdot \cancel{x} \cdot \cancel{x} \cdot \cancel{x} \cdot x \cdot x}} = \frac{1}{x^2}$
 OR $x^{5-7} = x^{-2}$ ← Same $\frac{x^{-2}}{1} = \frac{1}{x^2}$

Complete the table.

| | |
|----------|----------------|
| 2^3 | 8 |
| 2^2 | 4 |
| 2^1 | 2 |
| 2^0 | 1 |
| 2^{-1} | $\frac{1}{2}$ |
| 2^{-2} | $\frac{1}{4}$ |
| 2^{-3} | $\frac{1}{8}$ |
| 2^{-4} | $\frac{1}{16}$ |

Negative and Zero Exponents

- For any nonzero number a,

$$a^0 = 1$$
- For any nonzero number and any integer n,

$$a^{-n} = \frac{1}{a^n} \quad \text{Also: } \frac{1}{a^{-n}} = a^n$$

Evaluate: (Solve) Exponents need to be positive!

a.) $3^{-4} = \frac{1}{3^4} = \frac{1}{3 \cdot 3 \cdot 3 \cdot 3} = \frac{1}{81}$

b.) $\frac{1}{3^{-4}} = \frac{3^4}{1} = 3^4 = 3 \cdot 3 \cdot 3 \cdot 3 = 81$

Evaluate:

a.) $g^{-2} = \frac{1}{g^2}$

b.) $\frac{1}{g^{-2}} = \frac{g^2}{1} = g^2$

Evaluate:

a.) $(-2)^{-5} = \frac{1}{(-2)^5} = \frac{1}{-32}$

$-2 \cdot -2 \cdot -2 \cdot -2 \cdot -2$
 $4 \cdot 4 \cdot (-2)$
 $16 \cdot -2$
 -32

b.) $q^{-1} = \frac{1}{q} = \frac{1}{q}$

Simplify. Write the expression using only positive exponents.

a.) 3^{-5}

Simplify. Write the expression using only positive exponents.

b.) $m^0 n^{-4} = \frac{m^0 \cdot n^{-4}}{1} = \frac{m^0}{n^4} = \frac{1}{n^4}$

$\hookrightarrow m^0 n^{-4} = 1 \cdot n^{-4} = n^{-4} = \frac{1}{n^4}$

Simplify. Write the expression using only positive exponents.

$$c.) \frac{16x^{-6}y}{1} = \frac{16 \cdot x^{-6} \cdot y}{1} = \frac{16y}{x^6}$$

Simplify. Write the expression using only positive exponents.

$$a.) 7^{-2} = \frac{7^{-2}}{1} = \frac{1}{7^2} = \frac{1}{49}$$

$$b.) a^{-5}b^0 = \frac{b^0}{a^5} = \frac{1}{a^5}$$

$$c.) 4m^{-4}n^3 = \frac{4n^3}{m^4}$$

Write the expression without using a fraction bar.

$$a.) \frac{1}{16}$$

$$b.) \frac{a^2}{c^3}$$

Write the expression without using a fraction bar.

$$a.) \frac{1}{25}$$

$$b.) \frac{x^6}{y^2}$$

Find the product or quotient, use only positive exponents

a.) $5^{10} * 5^{-6}$

b.) $\frac{8n^{-3}}{n^2}$

Find the product or quotient, use only positive exponents

a.) $3^8 * 3^{-10}$

b.) $\frac{10a^4}{a^{-4}}$

Exit Pass 4.6

Evaluate the expression.

1. 7^{-2} 2. $(-2)^{-5}$ 3. $6 * 6^{-3}$ 4. $10^{-5} * 10^7$

Simplify. Write the expression using only positive exponents.

5. $-6m^{-1}$

6. $b^2 * b^{-2}$

7. $\frac{5x^4}{x^7}$

8. $\frac{10a^{-3}}{a^4}$

"Don't blame the sea if you cannot catch a fish."

Working individually or with a partner, complete the workbook.

Workbook pg.



Reflection of Today's Lesson

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- SWBAT work with negative and zero exponents.
- SWBAT understand patterns and how operations are related.

• Calculators: No

Homework

pg. 202 #16-38 evens, 41, 56-59 all

