

Are there any Homework Questions you would like to see on the board?

pp. 399-401 # 1 – 3, 5 – 11, 14, 16, 17

10 f, c

## Today's Learning Goal(s):

By the end of the class, I will be able to:

- Evaluate numerical expressions involving integer exponents.
- Evaluate "zero" exponents.

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10. Write each power in simplified form.

a)  $4^3$  as a base 2 power      d)  $(-8)^4$  as a base  $-2$  power

b)  $9^5$  as a base 3 power      e)  $\left(\frac{1}{4}\right)^3$  as a base  $\frac{1}{2}$  power

c)  $27^5$  as a base 3 power      f)  $\left(\frac{1}{25}\right)^4$  as a base  $\frac{1}{5}$  power

$$3 \cdot 3 \cdot 3 \\ = 3^3$$

$$= (3^3)^5 \\ = 3^{15}$$

$$= \left( \left( \frac{1}{5} \right)^2 \right)^4 \\ = \left( \frac{1}{5} \right)^8$$

## Develop Zero and Negative (see notes)

$$\begin{array}{l}
 5^4 \div 5^1 \\
 = 5^{4-1} \\
 = 5^3 \\
 \hline
 5^3 \div 5^1 \\
 = 5^{3-1} \\
 = 5^2 \\
 \hline
 5^2 \div 5^1 \\
 = 5^{2-1} \\
 = 5^1 \\
 \hline
 5^1 \div 5^1 \\
 = 5^{1-1} \\
 = 5^0
 \end{array}$$

$$\begin{array}{l}
 5^4 = 625 \\
 \div 5 \rightarrow 5^3 = 125 \\
 \div 5 \rightarrow 5^2 = 25 \\
 \div 5 \rightarrow 5^1 = 5 \\
 \div 5 \rightarrow 5^0 = 1 \\
 \div 5 \rightarrow 5^{-1} = \frac{1}{5} \\
 \div 5 \rightarrow 5^{-2} = \frac{1}{25} \\
 \div 5 \rightarrow 5^{-3} = \frac{1}{125}
 \end{array}$$

$$5^0 = 1$$

$$5^{-n} = \left(\frac{1}{5}\right)^n$$

$$\begin{array}{l}
 \frac{1}{5} \div \frac{1}{5} \\
 = \frac{1}{5} \times \frac{5}{1} \\
 = \frac{1}{1} \\
 = 1
 \end{array}$$

$$\begin{array}{l}
 \frac{1}{25} \div \frac{1}{5} \\
 = \frac{1}{25} \times \frac{5}{1} \\
 = \frac{1}{5}
 \end{array}$$

$$\begin{array}{l}
 * ( )^? \\
 (-6)^0 \text{ vs } -6^0 \\
 = 1 \quad \quad = -(1) \\
 \quad \quad = -1
 \end{array}$$

$$\begin{array}{l}
 -2^2 \text{ vs } (-2)^2 \\
 = -(2)(2) \quad = (-2)(-2) \\
 = -4 \quad \quad = 4
 \end{array}$$

MCF 3MI

## 7.3 Working with Integer Exponents

Date: Dec. 3 / 19

Ex. 1: Evaluate.

a)  $2^0$       b)  $(-11)^0$       c)  $(-3)^2$       d)  $-3^2$       e)  $\frac{6^4}{(6^2)^2}$       f)  $4^{-2}$

$= 1$        $= 1$        $= (-3)(-3) = 9$        $= -(3)(3) = -9$        $= \frac{6^4}{6^{2 \times 2}} = \frac{6^4}{6^4} = 1$        $= \left(\frac{1}{4}\right)^2 = \frac{(1)^2}{(4)^2} = \frac{1}{16}$

g)  $(-3)^{-3}$       h)  $(-3)^{-4}$       i)  $\left(\frac{2}{3}\right)^{-3}$       j)  $\left(\frac{-2}{3}\right)^{-3}$       k)  $2^{-3} \times 2^7$       l)  $\frac{9^{-1}(9^{-7})}{(9^{-3})^2}$

$= \left(\frac{1}{-3}\right)^3 = \frac{(1)^3}{(-3)^3} = \frac{1}{-27}$        $= \left(\frac{1}{-3}\right)^4 = \frac{1}{(-3)^4} = \frac{1}{81}$        $= \left(\frac{3}{2}\right)^3 = \frac{(3)^3}{(2)^3} = \frac{27}{8}$        $= \left(\frac{3}{-2}\right)^3 = \frac{(3)^3}{(-2)^3} = \frac{27}{-8}$        $= 2^{-3+7} = 2^4 = 16$        $= \frac{9^{-1+(-7)}}{9^{-3 \times 2}} = \frac{9^{-8}}{9^{-6}} = 9^{-8-(-6)} = 9^{-2} = \left(\frac{1}{9}\right)^2 = \frac{1}{81}$

m)  $\frac{a^{-2}b^{-3}c^4d^5}{e^6f^7g^{-8}h^{-9}}$

$= \frac{a^2 \cdot \frac{1}{b^3} \cdot c^4 \cdot d^5}{e^6 \cdot f^7 \cdot \frac{1}{g^8} \cdot \frac{1}{h^9}}$

$= \frac{c^4 d^5}{a^2 b^3} \div \frac{e^6 f^7}{g^8 h^9}$

$= \frac{c^4 d^5}{a^2 b^3} \times \frac{g^8 h^9}{e^6 f^7}$

$= \frac{c^4 d^5 g^8 h^9}{a^2 b^3 e^6 f^7}$

$\frac{a^{-2}b^{-3}c^4d^5}{e^6f^7g^{-8}h^{-9}}$

$= \frac{c^4 d^5 g^8 h^9}{a^2 b^3 e^6 f^7}$

$= \left(\frac{1}{9}\right)^2 = \frac{1}{81}$

Ex. 2: Rewrite each expression as an equivalent expression with a positive exponent.  
DO NOT EVALUATE.

a)  $3^{-2}$       b)  $\left(\frac{8}{3}\right)^{-11}$       c)  $(-4)^{-2}$       d)  $\frac{x^6}{x^9}$       e)  $x^{10}y^{14} \div x^2y^{20}$

$= \left(\frac{1}{3}\right)^2$   
 $= \frac{1}{3^2}$

$= \left(\frac{3}{8}\right)^{11}$

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

$= x^{6-9}$   
 $= x^{-3}$   
 $= \left(\frac{1}{x}\right)^3$

$= x^{10-2} y^{14-20}$   
 $= x^8 y^{-6}$   
 $= \frac{x^8}{y^6}$

Summary

$b^0 = 1$

$\left\{ \begin{array}{l} b^{-n} \\ = \left(\frac{1}{b}\right)^n \\ \text{or } \frac{1}{b^n} \end{array} \right. \quad \neq b \neq 0$

$\left\{ \begin{array}{l} \left(\frac{a}{b}\right)^{-n} \\ = \left(\frac{b}{a}\right)^n \end{array} \right. \quad \left\{ \begin{array}{l} \neq b \neq 0 \\ a \neq 0 \end{array} \right.$

**Today's Homework:**

**READ: p.407**

pp. 407-409 # 1 – 9, 11, 12

**SWYK Soon (not Tomorrow)**