

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

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

Today's Learning Goal(s):

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

- a) Evaluate numerical expressions involving integer exponents.
- b) Evaluate "zero" exponents.

p. 401

14. a) What can you conclude about the numbers
- a
- and
- b
- if

T $3^a \times 3^b = 3^n$ and n is an even number? \rightarrow if n is even, then

- b) If
- 5^m
- is a perfect square, what can you conclude about
- m
- ?

$$\langle 5^2, 5^4, 5^6$$

$\therefore m$ is even

$a + b$ are both even

or

$a + b$ are BOTH odd

16. Simplify, then determine the number that makes each statement true.

a) $(n^2)^5 \div n^5 = 243$ b) $\left(\frac{m^7}{m^6}\right)^2 = 196$

$$n^{2 \times 5} \div n^5 = 243$$

$$n^{10} \div n^5 = 243$$

$$n^{10-5} = 243$$

$$n^5 = 243$$

$$\therefore n = 3$$

$$b) (m^{7-6})^2 = 196$$

$$(m^1)^2 = 196$$

$$m^{1 \times 2} = 196$$

$$m^2 = 196$$

$$\therefore m = 14$$

17. Simplify.

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

b) $(5x^3y^4)^3$

c) $\left(\frac{3x^3}{2y^4}\right)^2 \left(\frac{2y^2}{3x^4}\right)^3$

$$= \frac{(3)^2(x^3)^2}{(2)^2(y^4)^2} \cdot \frac{(2)^3(y^2)^3}{(3)^3(x^4)^3}$$

$$= \frac{9x^6 \cdot 8y^6}{4y^8 \cdot 27x^{12}}$$

$$= \frac{2}{3} x^{6-12} y^{6-8}$$

$$= \frac{2}{3} x^{-6} y^{-2}$$

$$= \frac{2}{3x^6y^2}$$

Develop Zero and Negative (see notes)

$$\begin{array}{l}
 \begin{array}{l}
 \div 5 \swarrow 5^4 \\
 \quad \quad \quad \searrow \\
 \div 5 \swarrow 5^3 \\
 \quad \quad \quad \searrow \\
 \div 5 \swarrow 5^2 \\
 \quad \quad \quad \searrow \\
 \div 5 \swarrow 5^1 \\
 \quad \quad \quad \searrow \\
 \div 5 \swarrow 5^0 \\
 \quad \quad \quad \searrow \\
 \div 5 \swarrow 5^{-1} \\
 \quad \quad \quad \searrow \\
 \div 5 \swarrow 5^2 \\
 \quad \quad \quad \searrow \\
 \div 5 \swarrow 5^3
 \end{array}
 \begin{array}{l}
 = 625 \\
 = 125 \\
 = 25 \\
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 = 1 \\
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 = \frac{1}{25} \\
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 \begin{array}{l}
 = \frac{1}{5^2} \\
 = \frac{1}{5^3}
 \end{array}
 \begin{array}{l}
 \frac{1}{5} \div 5 \\
 = \frac{1}{5} \times \frac{1}{5} \\
 = \frac{1}{25}
 \end{array}
 \left| \begin{array}{l}
 \frac{1}{25} \div 5 \\
 = \frac{1}{25} \times \frac{1}{5} \\
 = \frac{1}{125}
 \end{array}
 \right.
 \end{array}$$

$$5^0 = 1 \qquad 5^{-n} = \left(\frac{1}{5}\right)^n$$

* () vs ()

$$\begin{array}{l}
 (-6)^0 \quad \text{vs.} \quad -6^0 \\
 = 1 \qquad \qquad = -(6^0) \\
 \qquad \qquad \qquad = -1
 \end{array}
 \qquad
 \begin{array}{l}
 -2^2 \quad | \quad (-2)^2
 \end{array}$$

MCF 3MI

7.3 Working with Integer Exponents

Date: May 13/19

Ex. 1: Evaluate.

a) $2^0 = 1$ b) $(-11)^0 = 1$ c) $(-3)^2 = (-3)(-3) = 9$ d) $-3^2 = -(3)(3) = -9$ e) $\frac{6^4}{(6^2)^2} = \frac{6^4}{6^{2 \times 2}} = \frac{6^4}{6^4} = 6^{4-4} = 6^0 = 1$ f) $4^{-2} = (\frac{1}{4})^2 = \frac{1^2}{4^2} = \frac{1}{16}$

g) $(-3)^{-3} = (\frac{-1}{3})^3 = \frac{(-1)^3}{(3)^3} = \frac{-1}{27}$ h) $(-3)^{-4} = (\frac{-1}{3})^4 = \frac{(-1)^4}{(3)^4} = \frac{1}{81}$ i) $(\frac{2}{3})^{-3} = (\frac{3}{2})^3 = \frac{(3)^3}{(2)^3} = \frac{27}{8}$ j) $(\frac{-2}{3})^{-3} = (\frac{3}{-2})^3 = \frac{(3)^3}{(-2)^3} = \frac{-27}{8}$ k) $2^{-3} \times 2^7 = 2^{-3+7} = 2^4 = 16$ l) $\frac{9^{-1}(9^{-7})}{(9^{-3})^2} = \frac{9^{-1-7}}{9^{-3 \times 2}} = \frac{9^{-8}}{9^{-6}} = 9^{-8-(-6)} = 9^{-2} = (\frac{1}{9})^2 = \frac{1}{81}$

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

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

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

a) 3^{-2}

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

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

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

c) $(-4)^{-2}$

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

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

d) $\frac{x^6}{x^9}$

$= x^{6-9}$

$= x^{-3}$

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

e) $x^{10}y^{14} \div x^2y^{20}$

$= x^{10-2}y^{14-20}$

$= x^8y^{-6}$

$= \frac{x^8}{y^6}$

$$\begin{aligned} &\rightarrow x^8 \cdot \left(\frac{1}{y}\right)^6 \\ &= x^8 \cdot \frac{(1)^6}{y^6} \\ &= x^8 \cdot \frac{1}{y^6} \end{aligned}$$

$(a \neq 0, b \neq 0)$

Summary

$b^0 = 1$

$(b \neq 0)$

b^{-n}

$= \frac{1}{b^n}$

$(b \neq 0)$

$$\begin{aligned} &\left(\frac{a}{b}\right)^{-n} \\ &= \left(\frac{b}{a}\right)^n \end{aligned}$$

Today's Homework:

pp. 407-409 # 1 – 9, 11, 12

SWYK Tomorrow?

↳ NO! wed May 15th.