

Name _____
Date _____

Period _____

Zero and negative exponents.

1) $13^0 = \boxed{1}$ 2) $2^1 = \boxed{2}$ 3) $2^2 = 2 \cdot 2 = \boxed{4}$

4) $5^3 = 5 \cdot 5 \cdot 5 = \boxed{125}$ $5^{-3} = \frac{1}{5^3} = \frac{1}{5 \cdot 5 \cdot 5} = \boxed{\frac{1}{125}}$

5) $\frac{3}{3^{-4}} = \frac{3^0 \cdot 3^4}{3^0} \rightarrow 3^5 = 3 \cdot 3 \cdot 3 \cdot 3 \cdot 3$
 $\frac{3}{9 \cdot 9 \cdot 3} = \frac{3}{81 \cdot 3} = \frac{3}{243} = \frac{1}{81}$

6) $\frac{2}{4^{-4}} = \frac{2 \cdot 4^4}{2 \cdot 4 \cdot 4 \cdot 4 \cdot 4}$
 $\frac{2 \cdot 16 \cdot 16}{2 \cdot 256} = \frac{512}{512} = 1$

7) $46^{-1} = \frac{1}{46}$

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

9) $-6^0 = \boxed{1}$

10) $125^0 = \boxed{1}$

11) $\left(\frac{45^2}{36^7}\right)^0 = \boxed{1}$

$$13) \frac{1}{8^0} = \frac{1}{1} = \boxed{1}$$

$$14) 6b c^0 = 6b \cdot 1 = \boxed{6b}$$

$$15) -(11x)^0 = \boxed{-1}$$

$$16) \left(\frac{2^4}{9^2}\right)^{-2} \cdot \frac{2^{-2}}{9^{-2}} \cdot \frac{9^2}{2^2} = \boxed{\frac{81}{4}}$$

$$17) \left(\frac{3^4}{6^2}\right)^{-2} \cdot \frac{3^{-2}}{6^{-2}} \cdot \frac{6^2}{3^2} \cdot \frac{36}{9} = \boxed{4}$$

$$18) \left(\frac{2^4}{5^3}\right)^{-3} \cdot \frac{2^{-3}}{5^{-3}} \cdot \frac{5^3}{2^3} \cdot \frac{5 \cdot 5 \cdot 5}{2 \cdot 2 \cdot 2} = \boxed{\frac{125}{8}}$$

$$19) 3m^{-8}p^0 = \frac{3}{m^8} \cdot 1 = \boxed{\frac{3}{m^8}}$$

$$20) \frac{5a^{-4}}{2c} = \boxed{\frac{5}{2a^4c}}$$

$$21) - (10a)^{-4} b^0$$

$$\frac{1}{-(10a)^4} \cdot 1$$

$$\frac{1}{-10 \cdot 10 \cdot 10 \cdot 10 a^4}$$

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

$$22) \frac{11 x y^{-1} z^0}{v^3} = \frac{11x}{v^3 y}$$

$$23) \frac{5 m^{-1}}{9 (ab)^{-4} c^7} = \frac{5 a^4 b^4}{9 c^7 m}$$

notes:

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24) $-(10a)^{-4} b^0$

$$\frac{1}{-(10a)^4}$$

$$\frac{1}{-(10 \cdot 10 \cdot 10 \cdot 10) a^4}$$

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

25) $\frac{11xy^{-1}z^0}{v^3}$

$$\frac{11x \cdot 1}{v^3 y^1}$$

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

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

$$\frac{5a^4b^4}{9c^7m^1}$$

27) $\frac{4a^{-2}b^0}{2a^3}$

$$\frac{4 \cdot 1}{2a^2a^3} = \frac{4}{2a^5}$$

$$\frac{2}{a^5}$$



$$28) 37^0 = \boxed{1}$$

$$29) 3^{-4} = \frac{1}{3^4} = \frac{1}{\underbrace{3 \cdot 3 \cdot 3 \cdot 3}_{9 \cdot 9}} = \boxed{\frac{1}{81}}$$

$$30) \frac{5}{5^{-2}} = 5 \cdot 5^2 = 5^3 = 125$$
$$31) \frac{3}{6^1} = \frac{3^{\cancel{1} \div 3}}{6^{\cancel{1} \div 3}} = \boxed{\frac{1}{2}}$$

$$32) 112^{-1} = \boxed{\frac{1}{112}}$$

$$33) -11^0 = \boxed{1}$$
$$34) -(7n)^{-2} = \frac{1}{(7n)^2} = \frac{1}{49n^2}$$

$$35) -(15p)^0 = -1$$

$$36) \left(\frac{3^1}{5^1}\right)^{-2} = \frac{3^{-2}}{5^{-2}} = \frac{5^2}{3^2} = \boxed{\frac{25}{9}}$$

$$37) 4x^{-3}y^0 = \frac{4}{x^3} \cdot 1 = \boxed{\frac{4}{x^3}}$$

$$38) \frac{8m^{-2}}{4m^1} = \frac{2m^{\cancel{1} \div 2}}{m^{\cancel{1} \div 2} m^1} = \boxed{\frac{2}{m}}$$

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39) $(-)$ 3.2×10
40) (0.8×10^5) (0.6×10^{-17})
 $0.48 \times 10^{-12-1}$
 4.8×10^{-13}

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

45) $\frac{1}{1000}$ $\frac{1}{10^3}$ 10^{-3}

46) $\frac{1}{10}$ $\frac{1}{10^1}$ 10^{-1}

47) $\frac{1}{10,000}$ $\frac{1}{10^4}$ 10^{-4}

Write each expression as a decimal.

48) 10^{-3} 0.001
 0.001
 $\leftarrow 3$

49) $8 \cdot 10^{-4}$ 0.0008 0.0008
 $\frac{8.}{10^4}$ $\frac{8}{10,000}$

50) 10^{-5} 0.00001 0.00001
 $\leftarrow 5$

$$39) \frac{10f g^{-5} h^0}{h^2}$$

$$\frac{10f \cdot 1}{g^5 h^2}$$

$$\frac{10f}{g^5 h^2}$$

$$40) - (6yz)^{-2} x^0$$

$$\frac{1}{-(6yz)^2} \cdot 1$$

$$\frac{1}{-36y^2z^2}$$

Evaluate when $a = -4$ $b = 3$ $c = 2$

$$41) 3a^{-1}$$

$$\frac{3}{a^{-1}} \left(\frac{3}{-4} \right)$$

$$42) b^{-3}$$

$$\frac{1}{b^3}$$

$$\frac{1}{(3)^3}$$

$$\frac{1}{\frac{3 \cdot 3 \cdot 3}{9 \cdot 3}}$$

$$\left(\frac{1}{27} \right)$$

43)

$$4a^2 b^{-2} c^3$$

$$\frac{4a^2 c^3}{b^2}$$

$$\frac{4(-4)^2 (2)^3}{(3)^2}$$

2 \cdot 2 \cdot 2

$$\frac{4(-4)^2 (3)^{-2} (2)^3}{(3)^2}$$

$$\frac{4(16)(8)}{(9)}$$

$$= \frac{512}{9}$$

$$44) 9a^0 c^4$$

$$9(-4)^0 (2)^4$$

$$9 \cdot 1 \cdot 2 \cdot 2 \cdot 2 \cdot 2$$

$$9 \cdot 16 = 144$$