

Directions: Evaluate each expression. Leave your answer in exponential form. You may not leave negative exponents in your answer. You must show work for each question.

1) $5^3 \times 5^7$

$$5^{3+7} = 5^{10}$$

5) $\frac{3^8}{3^3}$

$$3^{8-3} = 3^5$$

2) $c^2 \times c^{-6}$

$$c^{2+-6} = c^{-4} = \frac{1}{c^4}$$

6) $\frac{n^6}{n^{-7}}$

$$n^{6--7} = n^{6+7} = n^{13}$$

3) $12^{-4} \times 12^9$

$$12^{-4+9} = 12^5$$

7) $\frac{4^{-12}}{4^{-5}} = \frac{4^5}{4^{12}}$

$$4^{5-12} = 4^{-7} = \frac{1}{4^7}$$

4) $1^{-17} \times 1^{20}$

$$1^{-17+20} = 1^3 = 1$$

8) $\frac{y^{22}}{y^{12}}$

$$y^{22-12} = y^{10}$$

9) $(7^3)^4$

$$7^{3 \times 4} = 7^{12}$$

11)

$$\frac{12a^{10}b^8}{3a^5b^1}$$

$$\frac{12}{3} \cdot \frac{a^{10}}{a^5} \cdot \frac{b^8}{b^1}$$

$$4a^5b^7$$

10) $(r^{-3})^4$

$$r^{-3 \cdot 4} = r^{-12} = \frac{1}{r^{12}}$$

12)

$$(-6x^3y^4)(3x^2y^3)$$

$$(-6 \cdot 3)(x^3 \cdot x^2)(y^4 \cdot y^3)$$

$$-18x^5y^7$$

Directions: Evaluate each expression. Leave your answer in standard form (No exponents). SHOW YOUR WORK

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

$$= \frac{8}{27}$$

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

$$= \frac{2^4}{1^4} = \frac{2 \cdot 2 \cdot 2 \cdot 2}{1 \cdot 1 \cdot 1 \cdot 1}$$

$$= 16$$

14) 9^0

$$1$$

16) $\frac{8^{19}}{8^{15}} = 8^{19-15} = 8^4$

$$= 8 \cdot 8 \cdot 8 \cdot 8$$

$$= 4,096$$

- 17) Explain why any non-zero base number raised to the zero power is equivalent to 1. Use words, numbers, and/or symbols to help with your explanation.

When an exponent is 0, it means that the quantity in the numerator is the same as the quantity in the denominator. This will always simplify to 1. Example:

$$\frac{5^2}{5^2} = 1$$

$$\frac{5^2}{5^2} = 5^{2-2} = 5^0 = 1$$

- 18) Part A

Evaluate the expression below. Keep your answer in exponential form:

$$(2g^2)^4 = (2g^2)(2g^2)(2g^2)(2g^2)$$
$$2 \cdot 2 \cdot 2 \cdot 2 \cdot g^2 \cdot g^2 \cdot g^2 \cdot g^2$$

$$16g^8$$

Answer _____

Part B

Explain how you came to your answer. Be specific.

OR $(2g^2)^4$

$$2^4 \cdot (g^2)^4$$
$$16g^8$$

I applied the exponent of 4 to both 2 and g^2 .
 $2^4 = 16$ and $(g^2)^4 = g^{2 \times 4} = g^8$.

19) Part A

Evaluate the expression below. Write your answer using positive exponents:

$$\frac{9^{-4}}{9^{-9}} = \frac{9^9}{9^4} = 9^{9-4} = 9^5$$

INVERSE!

Answer

9⁵

Part B

Explain how you came to your answer. Be specific.

First I applied the negative exponents by using the multiplicative inverse. Then, I kept the base of 9 and subtracted the exponents to get 9⁵.

20) Evaluate the expression below. Write your answer in standard form

$$\underline{4^2} \cdot 3^2 \cdot \underline{4^2} \quad \text{Commutative property}$$

$$4^2 \cdot 4^2 \cdot 3^2$$

$$4^4 \cdot 3^2 = 4 \cdot 4 \cdot 4 \cdot 4 \cdot 3 \cdot 3$$

$$256 \cdot 9 = \underline{2304}$$

Answer