

Name KEY

Date _____

Quiz – Laws of Exponents

I. Simplify each expression. Show work. Circle final answers. (2 points each)

1. $20a^2 \cdot 5a$

$100a^3$

2. $\frac{42x^5}{14x^4}$

$3x$

3. $(3^2m^3n^4)^2$

$3^4m^6n^8$

4. $((50^2)^0)^5$

1

5. $\frac{10d^2}{20d^7}$

$\frac{1}{d^5}$

6. $(f^{-2}g^3h)^{-1}$

$\frac{f^2}{g^3h}$

7. $\frac{1}{(r^2s^{-4})}$

$\frac{s^4}{r^2}$

8. $\left(\frac{2x^4}{x}\right)^3$

$8x^9$

9. $(2a^{-3}b^2) \cdot (-3a^2b^{-1})$

$\frac{-6b}{a}$

10. $\left(\frac{7x^3y^{-1}}{14x^{-2}y^4}\right)^{-1}$

$\frac{2y^5}{x^5}$

11. $(2xyz)^{-2} \cdot (2^2x^2y^2z^2)$

1

12. $\frac{6de^2f \cdot 4d^{-2}ef \cdot 5ef}{30def}$

$\frac{4e^3f^2}{d^2}$

II. Solve for the value of the variable.

13. $2^x = 4^5$

$$\begin{aligned} 2^x &= (2^2)^5 \\ 2^x &= 2^{10} \\ x &= 10 \end{aligned}$$

14. $\frac{20^5}{20^y} = 20^9$

$$\begin{aligned} 20^{5-y} &= 20^9 \\ 5-y &= 9 \\ -y &= 9-5 \\ -y &= 4 \\ y &= -4 \end{aligned}$$

15. $7^x(7^7) = \frac{1}{7}$

$$\begin{aligned} 7^{x+7} &= 7^{-1} \\ x+7 &= -1 \\ x &= -1-7 \\ x &= -8 \end{aligned}$$

III. Answer each question completely. (2 points each)

16. In your own words, explain why the rule $x^a \cdot x^b = x^{a+b}$ is valid.

Sample answer: $x^3 \cdot x^2 = (x \cdot x \cdot x)(x \cdot x) = x^5 = x^{3+2}$

17. Give specific examples or provide a reason why $x^0 = 1$ except when $x = 0$.

Sample Answer: $\frac{3^5}{3^5} = 1$
because dividing a number

18. Compare ($>$, $<$ or $=$).

a. $(4 \cdot 3)^5 \underline{\quad} = \underline{\quad} 12^5$

b. $(2 + 5)^5 \underline{\quad} < \underline{\quad} 10^5$

by itself is 1.

Using the quotient rule,

$$\frac{3^5}{3^5} = 3^{5-5} = 3^0.$$

Therefore, $3^0 = 1$.