

Unit 3, Test Review:

Name: Cori's

Simplifying Exponential Expressions and Scientific Notation

Finish each rule.

1. $a^m \cdot a^n = a^{m+n}$

2. $(a^m)^n = a^{m \cdot n}$

3. $(ab)^m = a^m b^m$

4. $\frac{a^m}{a^n} = a^{m-n}$

5. $a^0 = 1$

6. $a^{-n} = \frac{1}{a^n}$

Simplify the expression. The simplified expression should have no negative exponents.

7. $(x^5)^6 = x^{30}$

8. $3x^2 \cdot (4x^3)^2 = 3x^2 \cdot 4^2 x^6 = 3 \cdot 16 \cdot x^8 = 48x^8$

9. $6^7 \cdot 6^9 = 6^{16}$

10. $(-2x)^4 = (-2)^4 (x^4) = 16x^4$

11. $(-5)^0 \cdot x = 1 \cdot x = x$

12. $\left(\frac{1}{3}\right)^{-1} = \frac{1^{-1}}{3^{-1}} = \frac{1}{\frac{1}{3}} = 3$

13. $\frac{4^5 \cdot 4^3}{4^2} = \frac{4^8}{4^2} = 4^{8-2} = 4^6$

14. $\frac{y^8}{y^9} = y^{8-9} = y^{-1} = \frac{1}{y}$

15. $x^3 \cdot x^4 \cdot x^2 = x^9$

16. $\frac{(x^3)^2}{(x^5)^3} = \frac{x^6}{x^{15}} = \frac{1}{x^9}$

17. $(x^2)^4 = x^8$

18. $(3^{-2})^{-1} = 3^2 = 9$

$$19. \left(\frac{2x^3y^2}{3xy} \right)^{-3} = \left(\frac{2}{3} \cdot \frac{x^3}{x} \cdot \frac{y^2}{y} \right)^{-3}$$

$$20. \frac{1}{3x^{-3}} = \frac{1}{3} \cdot \frac{x^3}{1} = \boxed{\frac{x^3}{3}}$$

$$\left(\frac{2}{3} \cdot \frac{x^2}{1} \cdot \frac{y^1}{y} \right)^{-3} = \frac{2^{-3}}{3^{-3}} x^{-2} y^{-1} = \frac{2^3}{3^3} \cdot \frac{1}{x^2} \cdot \frac{1}{y} = \boxed{\frac{2^3}{8x^2y}}$$

Rewrite the number in decimal form.

$$21. 4.3269 \times 10^3 \leftarrow 3 \text{ times bigger!}$$

$$\boxed{4,326.9}$$

$$22. 7.1532 \times 10^{-5} \leftarrow 5 \text{ times smaller!}$$

$$\underbrace{0.0007.1532}_{\text{5 places}} = \boxed{0.000071532}$$

Rewrite the number in scientific notation.

$$23. 0.0032 = \boxed{3.2 \times 10^{-3}}$$

$$24. 1042000. = \boxed{1.042 \times 10^6}$$

Evaluate the expression without using a calculator. Write the result in decimal form.

$$25. (6 \times 10^{-2}) \cdot (7 \times 10^{-3})$$

$$42 \times 10^{-5} = \underbrace{0.00042}_{\text{4 places}} = \boxed{4.2 \times 10^{-4}}$$

$$26. \frac{7.85 \times 10^{26}}{6.02 \times 10^{23}} = \frac{7.85}{6.02} \cdot \frac{10^{26}}{10^{23}} = \boxed{1.3039867 \times 10^3}$$

$$27. \frac{(8.2 \times 10^{-3})(-7.9 \times 10^5)}{7.3 \times 10^{16}} = \frac{(8.2)(-7.9)}{7.3} \times \frac{(10^{-3})(10^5)}{10^{16}}$$

$$= \frac{-64.78}{7.3} \times \frac{10^{-8}}{10^{16}}$$

$$= 8.87397 \times 10^{-8-16}$$

$$\boxed{8.87 \times 10^{-24}}$$

Simplify the expression. The simplified expression should have no negative exponents.

$1. 2^3 \cdot 2^5 = \boxed{2^8}$	$2. (y^2)^4 = \boxed{y^8}$
$3. (-3x^3)^4 = (-3)^4 x^{12} = \boxed{81x^{12}}$	$4. 4^0 = \boxed{1}$
$5. (-3a^3)^3 \cdot (4a)^0 = (-3)^3 a^9 \cdot 1 = \boxed{-27a^9}$	$6. (-a^3b^5)^2 (a^4b)^2 = (-1)^2 a^6 b^{10} \cdot a^8 b^2 = 1 \cdot a^{14} b^{12} = \boxed{a^{14}b^{12}}$
$7. 3^{-5} = \boxed{\frac{1}{3^5}}$	$8. \left(\frac{4}{7}\right)^{-2} = \frac{4^{-2}}{7^{-2}} = \frac{7^2}{4^2} = \boxed{\frac{49}{16}}$
$9. 2^{-1} \cdot 2^5 = \frac{1}{2^1} \cdot \frac{2^5}{1} = \boxed{2^4}$	$10. x^0 y^{-4} = 1 \cdot y^{-4} = 1 \cdot \frac{1}{y^4} = \boxed{\frac{1}{y^4}}$
$11. 5x^{-2} = \boxed{\frac{5}{x^2}}$	$12. (-5x^{-3}y^5)^2 = (-5)^2 (x^{-6})(y^{10}) = \boxed{\frac{25y^{10}}{x^6}}$
$17. \frac{6x^{-2}y^2}{3y^{-4}} = \frac{6}{3} \cdot \frac{x^{-2}}{1} \cdot \frac{y^2}{y^{-4}} = 2 \cdot \frac{1}{x^2} \cdot y^6 = \boxed{\frac{2y^6}{x^2}}$	$18. (-2x^2)^{-3} (4x^8) = (-2)^{-3} x^{-6} \cdot 4x^8 = \frac{1}{(-2)^3} \cdot \frac{1}{x^6} \cdot 4x^8 = \frac{1 \cdot 4 \cdot x^8}{-8x^6} = -\frac{1}{2} \cdot x^2 = \boxed{-\frac{x^2}{2}}$

$$19. \frac{15x^3z^{-5}}{25y^{-4}} = \frac{15}{25} \cdot \frac{x^3}{1} \cdot z^{-5} \cdot \frac{1}{y^{-4}}$$

$$= \frac{3x^3y^4}{5z^5}$$

$$20. \frac{m^{-5}}{m^7 \cdot m^{-4}} = \frac{m^4}{m^7 \cdot m^5} = \frac{m^4}{m^{12}} = \frac{1}{m^8}$$

$$21. \frac{-20xy^8}{3x^{-4}y^2} \cdot \frac{-5x^{-3}y^5}{(-2y)^3} = \frac{(-20)(-5)x^{-2}y^{13}}{(3)(-2)^3x^{-4}y^2y^3}$$

$$\frac{100x^{-2-(-4)}y^{13-5}}{-24} = \frac{25x^2y^8}{-6}$$

$$22. \left(\frac{4x^{-3}y^3}{6xy^{-3}}\right)^{-2} \cdot \frac{y^4}{x^6y^{-5}}$$

$$\left(\frac{2}{3} \cdot x^{-4} \cdot y^5\right)^{-2} \cdot \frac{y^4}{x^6y^{-5}}$$

$$\frac{2^{-2}}{3^{-2}} \cdot \frac{x^8}{1} \cdot \frac{y^{-10}}{1} \cdot \frac{y^4}{x^6} = \frac{3^2}{2^2} \cdot \frac{x^8}{x^6} \cdot y^{-10} \cdot y^4$$

$$= \frac{9x^2y^{-1}}{4} = \frac{9x^2}{4y}$$

Write in Scientific Notation

$$23. 150,000 = 1.5 \times 10^5$$

$$24. 0.000002 = 2.0 \times 10^{-6}$$

Write in Standard Form

$$25. 2.5 \times 10^{-2} = 0.025$$

$$26. 3.069 \times 10^6 = 3,069,000$$

Multiply or Divide. Your final answer should be written in Scientific Notation.

$$27. (2.6 \times 10^{-2})(1.6 \times 10^3)$$

$$= 4.16 \times 10^1$$

$$28. (2.46 \times 10^4)(5.5 \times 10^5)$$

$$= 13.53 \times 10^9 = 1.353 \times 10^{10}$$

$$29. \frac{(4.9 \times 10^{-1})}{(5.5 \times 10^2)}$$

$$= 0.891 \times 10^{-3}$$

$$0.000891 = 8.91 \times 10^{-4}$$

$$30. \frac{(4.56 \times 10^3)}{(1.35 \times 10^{-5})}$$

$$= 3.38 \times 10^8$$