

Do you know HOW?

Simplify each expression.

1. $5^{-1}(3^{-2})$

2. $\frac{mn^{-4}}{p^0q^{-2}}$

3. $3x^{-4}$

4. $d^{-4}t^3$

5. $3^0s^{-2}t^2$

Write each expression in simplest form.

6. $(2x^5)(3x^{\frac{3}{5}})$

7. $a^2b^0(a^{-3})$

8. $6x^{\frac{1}{3}} \cdot 5x^{\frac{2}{3}}$

9. $b^{\frac{1}{2}} \cdot b^{\frac{1}{2}}$

10. $(a^3)(a^3)$

Simplify each expression.

11. $(x^{\frac{1}{4}}y^{\frac{3}{4}})^4$

12. $(3t^{\frac{1}{6}})^3(2t^0)^{-3}$

13. $(a^3)^4$

14. $(a^{\frac{3}{5}})^5$

15. $(xy^3z^5)^2$

Simplify each quotient.

16. $\frac{7b^6}{b^4}$

17. $\frac{a^4}{a^6}$

18. $\frac{6x^7}{3x^4}$

19. $\frac{-25a^{\frac{3}{4}}b^6}{5a^{\frac{1}{2}}b^4}$

20. $\frac{12s^{\frac{5}{2}}t^{\frac{7}{3}}}{s^2t^2}$

STEM 21. **Astronomy** The radius of Mars is 3.4×10^3 km. What is the surface area of Mars? Use the formula for the surface area of a sphere, $S.A. = 4\pi r^2$. Write your answer in scientific notation.

22. **Geometry** A box has a length $3x^2$ cm. The height is $2x$ cm. What is the volume of the box?

23. Evaluate $\frac{1}{2}a^{-4}b^2$ for $a = -2$ and $b = 3$.

Do you UNDERSTAND?

24. **Reasoning** A population of bacteria is modeled by the expression 2^w , where w is the number of weeks after the population is first observed. What is the population size after 5 weeks?

25. Use the properties of exponents to simplify each of the following expressions.

a. $2^5 \cdot 2$

b. 2^2

26. **Reasoning** Can you simplify $(x^2)^3$? Explain.

27. **Writing** Is the following expression *sometimes*, *never*, or *always* true?

A number raised to a power is negative.

28. **Error Analysis** Identify the error in the student's work below.

$$\begin{aligned} & \cancel{x^6 \cdot x \cdot x^3 =} \\ & \phantom{\cancel{x^6 \cdot x \cdot x^3 =}} = \end{aligned}$$