

LESSON

Practice C**7-4****Division Properties of Exponents****Simplify.**

1. $\frac{6^8}{6^6}$

2. $\frac{h^4}{h^{-3}}$

3. $\frac{2^3 \cdot 4^3 \cdot 5}{5^2 \cdot 2^4}$

4. $\frac{x^5 y^2}{xy^3}$

5. $\frac{m^3 n^6}{m^4 n^4 p^8}$

6. $\frac{a^5 b^2 c^3}{a^6 b^2 c}$

7. $\left(\frac{4}{7}\right)^{-2}$

8. $\left(\frac{s^2}{t^3}\right)^2 =$

9. $-\left(\frac{ab}{6c}\right)^5$

10. $-\left(\frac{b^2 c}{2d^3 f^4}\right)^{-2}$

11. $\left(\frac{xyz^2}{-w}\right)^5 =$

12. $\left(\frac{10^3 \cdot 10^2}{10^{-6}}\right)^{-4}$

Simplify. Write the answer in scientific notation.

13. $(6.4 \times 10^7) \div (1.6 \times 10^3)$

14. $(8.1 \times 10^{-6}) \div (9 \times 10^{-15})$

15. $(2.8 \times 10^2) \div (7 \times 10^{-9})$

16. $(4.8 \times 10^5) \div (6 \times 10^{13})$

Find the missing exponent in each equation.

17. $\left(\frac{c^{\square}}{d}\right)^{-2} = \frac{d^2}{c^8}$

18. $\frac{b^{14}}{b^{\square}} = b^7$

19. $\left(\frac{s^{-3}}{t^4}\right)^{\square} = s^9 t^{12}$

20. An actor was paid $\$2.1 \times 10^6$ to star in a movie. If the movie was 1 hr 45 min long, what was the actor's salary per minute? Give your answer standard form. _____

LESSON 7-4 Practice A
Division Properties of Exponents

Simplify.

- $3^6 \div 3^2 = 3^{6-2} = 3^4 = 81$
- $b^8 \div b^5 = b^{8-5} = b^3$
- $t^2 \div t^7 = t^{2-7} = t^{-5} = \frac{1}{t^5}$
- $\frac{s^3 t^4}{(s^2)^3} = \frac{s^3 t^4}{s^6} = s^{3-6} \cdot t^4 = \frac{t^4}{s^3}$
- $\frac{(ab)^2}{(a^5 b^2)^3} = \frac{1^{13}}{a^{13} b^4}$
- $\frac{x^3 y}{(x^2 y^3)^2} = \frac{1}{xy^5}$
- $\frac{4^3 \cdot 3^4 \cdot 2^3}{3^2 \cdot 4^4 \cdot 2} = 9$
- $(\frac{2}{3})^4 = \frac{2^4}{3^4} = \frac{16}{81}$
- $(\frac{x}{4})^3 = \frac{x^3}{4^3} = \frac{x^3}{64}$
- $(\frac{4}{5})^{-2} = (\frac{5}{4})^2 = \frac{25}{16}$
- $(\frac{3ab}{4c^2})^4 = \frac{81a^4 b^4}{256c^8}$
- $(\frac{2b}{3c})^{-3} = \frac{27c^3}{8b^3}$
- $(\frac{3z^3}{4x^2 y})^{-4} = (\frac{4x^2 y}{3z^3})^4 = \frac{256x^8 y^4}{81z^{12}}$
- $(\frac{n}{4})^{-2} \cdot (\frac{6}{3n})^{-3} = (\frac{4}{n})^2 \cdot (\frac{3n}{6})^3 = 2n$

Simplify. Write each answer in scientific notation.

- $(4.5 \times 10^6) \div (3 \times 10^{-2}) = \frac{4.5 \times 10^6}{3 \times 10^{-2}} = \frac{4.5}{3} \times \frac{10^6}{10^{-2}} = 1.5 \times 10^8$
 - $(1.2 \times 10^5) \div (6 \times 10^3) = \frac{1.2 \times 10^5}{6 \times 10^3} = \frac{1.2}{6} \times \frac{10^5}{10^3} = 0.2 \times 10^2 = (2 \times 10^{-1}) \times 10^2 = 2 \times 10^1$
17. A retired business man calculated that he earned \$8.75 $\times 10^6$ after working for 35 years.
- Write the number of years in scientific notation. 3.5×10^1
 - Divide to find the average amount he earned per year. Write your answer in standard form. $\$250,000$

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LESSON 7-4 Practice B
Division Properties of Exponents

Simplify.

- $6^7 \div 6^2 = 6^{7-5} = 6^2 = 36$
- $t^{12} \div t^7 = t^{12-7} = t^5$
- $\frac{w^3}{w^2} = w^{3-2} = w$
- $\frac{f^2}{f^8} = \frac{1}{f^6}$
- $\frac{20m^5}{4m^2} = 5m^3$
- $\frac{c^3 d^2}{c^2 d^2} = \frac{c}{d^0} = \frac{c}{1} = c$
- $\frac{(x^4)^2}{(x^3)^5} = \frac{x^8}{x^{15}} = \frac{1}{x^7}$
- $(\frac{s^3 t}{st^4})^2 = \frac{s^6 t^2}{s^2 t^8} = \frac{s^4}{t^6}$
- $(\frac{2}{3})^{-3} = (\frac{3}{2})^3 = \frac{27}{8}$
- $(\frac{3a}{2b})^{-4} = (\frac{2b}{3a})^4 = \frac{16b^4}{81a^4}$
- $-(\frac{-t}{3v})^{-4} = -(\frac{3v}{-t})^4 = -\frac{81v^4}{t^4}$
- $(\frac{6}{7})^{-2} \cdot (\frac{4s}{6t})^{-2} = (\frac{7}{6})^2 \cdot (\frac{6t}{4s})^2 = \frac{49t^2}{16s^2}$
- $(\frac{3c}{-2})^{-1} (\frac{d}{4})^{-2} = (\frac{-2}{3c}) \cdot (\frac{4}{d})^2 = \frac{-32}{3cd^2}$
- $(\frac{3mn}{2})^{-1} = \frac{2}{3mn} = \frac{81m^4 n^4}{16}$

Simplify. Write the answer in scientific notation.

- $(3.8 \times 10^5) \div (1.9 \times 10^{-6}) = 2 \times 10^{11}$
 - $(2.5 \times 10^3) \div (5 \times 10^{-8}) = 5 \times 10^6$
17. A textile factory produces 1.08×10^8 yards of fabric every year. If the factory is in operation 360 days a year, what is the average number of yards of fabric produced each day? Give your answer in standard form. $300,000$ yards
18. It takes 5 yards of fabric to manufacture a dress. If the textile factory turned their entire yearly production of 1.08×10^8 yards of fabric into dresses, how many could they make? Give your answer in scientific notation. 2.16×10^7 dresses

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LESSON 7-4 Practice C
Division Properties of Exponents

Simplify.

- $\frac{6^8}{6^6} = 6^2$ or 36
- $\frac{h^4}{h^{-3}} = h^7$
- $\frac{2^3 \cdot 4^3 \cdot 5}{5^2 \cdot 2^4} = \frac{32}{5}$
- $\frac{x^5 y^2}{xy^3} = \frac{x^4}{y}$
- $\frac{m^3 n^6}{m^4 n^4 p^8} = \frac{n^2}{mp^8}$
- $\frac{a^5 b^2 c^3}{a^6 b^2 c} = \frac{c^2}{a}$
- $(\frac{4}{7})^{-2} = \frac{49}{16}$
- $(\frac{s^2}{t^2})^2 = \frac{s^4}{t^4}$
- $-(\frac{ab}{6c})^5 = -\frac{a^5 b^5}{7776c^5}$
- $-(\frac{b^2 c}{2d^2 f})^{-2} = \frac{4d^6 f^8}{b^4 c^2}$
- $(\frac{xyz^2}{-w})^5 = \frac{-x^5 y^5 z^{10}}{w^5}$
- $(\frac{10^3 \cdot 10^2}{10^{-6}})^{-4} = \frac{1}{10^{44}}$

Simplify. Write the answer in scientific notation.

- $(6.4 \times 10^7) \div (1.6 \times 10^3) = 4 \times 10^4$
- $(8.1 \times 10^{-6}) \div (9 \times 10^{-15}) = 9 \times 10^8$
- $(2.8 \times 10^2) \div (7 \times 10^{-9}) = 4 \times 10^{10}$
- $(4.8 \times 10^5) \div (6 \times 10^{13}) = 8 \times 10^{-9}$

Find the missing exponent in each equation.

- $(\frac{c^3}{d})^{-2} = \frac{c^2}{c^8}$
 - $\frac{b^{14}}{b^7} = b^7$
 - $(\frac{s^{-3}}{t^4})^{-3} = s^9 t^{12}$
20. An actor was paid $\$2.1 \times 10^6$ to star in a movie. If the movie was 1 hr 45 min long, what was the actor's salary per minute? Give your answer standard form. $\$20,000$ per minute

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LESSON 7-4 Reteach
Division Properties of Exponents

The **Quotient of Powers Property** can be used to divide terms with exponents.

$$\frac{a^m}{a^n} = a^{m-n} \quad (a \neq 0, m \text{ and } n \text{ are integers.})$$

Simplify $\frac{7^5}{7^2}$.

$$\frac{7^5}{7^2} = 7^{5-2} = 7^3$$

Simplify $\frac{x^7 y}{x^3}$.

$$\frac{x^7 y}{x^3} = x^{7-3} \cdot y = x^4 y$$

The **Positive Power of a Quotient Property** can be used to raise quotients to positive powers.

$$(\frac{a}{b})^n = \frac{a^n}{b^n} \quad (a \neq 0, b \neq 0, n \text{ is a positive integer.})$$

Simplify $(\frac{2}{5})^4$.

$$(\frac{2}{5})^4 = \frac{2^4}{5^4} = \frac{16}{625}$$

Use the Positive Power of a Quotient Property.

Simplify $(\frac{2x^5}{y^4})^3$.

$$(\frac{2x^5}{y^4})^3 = \frac{(2x^5)^3}{(y^4)^3} = \frac{2^3(x^5)^3}{(y^4)^3} = \frac{8x^{15}}{y^{12}}$$

Use the Positive Power of a Quotient Property.

Use the Power of a Product Property.

Simplify.

Simplify.

- $\frac{5^6}{5^4} = 25$
- $\frac{x^6 y^5}{y^2} = x^6 y^3$
- $\frac{a^2 b^4}{(ab)^3} = \frac{b}{a}$
- $(\frac{2}{5})^3 = \frac{8}{125}$
- $(\frac{x^3}{y^2})^6 = \frac{x^{18}}{y^{12}}$
- $(\frac{3m^3}{n^2})^2 = \frac{9m^6}{n^4}$
- $(\frac{a}{b^2})^3 = \frac{a^3}{b^6}$
- $(\frac{x^3}{xy})^2 = \frac{x^4}{y^2}$
- $(\frac{30}{20})^2 = \frac{9}{4}$

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