

4-9 Negative Exponents (Pages 210–214)

What does a negative exponent mean? Look at some examples:

$$2^{-2} = \frac{1}{2^2} \text{ or } \frac{1}{4} \qquad 3^{-4} = \frac{1}{3^4} \text{ or } \frac{1}{81}$$

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| Negative Exponents | For any nonzero number a and integer n , $a^{-n} = \frac{1}{a^n}$. |
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EXAMPLES

A Write 2^{-3} using a positive exponent.

$$2^{-3} = \frac{1}{2^3}$$

B Write $\frac{1}{9}$ as an expression using negative exponents.

$$\begin{aligned} \frac{1}{9} &= \frac{1}{3^2} \\ &= 3^{-2} \end{aligned}$$

Try These Together

1. Write 7^{-4} using a positive exponent.

HINT: This is $\frac{1}{7^4}$.

2. Write $\frac{1}{25}$ as an expression using negative exponents.

HINT: $25 = 5^2$.

PRACTICE

Write each expression using positive exponents.

3. $x^{-5}y^{-8}$

4. n^{-7}

5. pq^{-2}

6. s^3t^{-2}

7. $a^{-4}b^{-3}c$

8. $\frac{-2x^8}{y^{-9}}$

9. $\frac{(-3)^4}{p^{-10}}$

10. $(-1)^{-3}m^2n^{-1}$

11. $\frac{1}{t^{-7}}$

Write each fraction as an expression using negative exponents.

12. $\frac{1}{2^5}$

13. $\frac{1}{y^6}$

14. $\frac{1}{27}$

15. $\frac{-4}{-}$

16. $\frac{16}{s^3t^2}$

17. $\frac{a^4}{b^3}$

Evaluate each expression for $n = -2$.

18. n^{-4}

19. 3^n

20. n^{-2}

21. **Physics** The average density of the earth is about 5.52 grams per cubic centimeter, or $5.52 \text{ g} \cdot \text{cm}^{-3}$. Write this measurement as a fraction using positive exponents.

22. **Standardized Test Practice** Express $a^3b^{-4}c^2d^{-1}$ using positive exponents.

A $\frac{a^3b^4}{c^2d}$

B $a^3b^4c^2d$

C $\frac{b^4d}{a^3c^2}$

D $\frac{a^3c^2}{b^4d}$

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| Answers: 1. $\frac{1}{2^3}$ 2. 5^{-2} 3. $\frac{1}{8}$ 4. $\frac{1}{2}$ 5. $\frac{1}{d}$ 6. $\frac{1}{s^3}$ 7. $\frac{a^4b^3}{c}$ 8. -2×8^9 9. $(-3)^4 d^{10}$ 10. $\frac{(-1)^9 n}{m^2}$ 11. t^7 12. $2 \cdot 2^{-5}$ 13. y^{-6} 14. 3^{-3} 15. $-4m^{-10}$ 16. $16s^{-3}t^{-2}$ 17. $\frac{a^{-4}}{b^{-3}}$ 18. $\frac{16}{1}$ 19. $\frac{9}{1}$ 20. $\frac{4}{1}$ 21. $\frac{5.52 \text{ gm}^3}{\text{cm}^3}$ 22. D |
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