

4-7 Negative Exponents (Pages 181–185)

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

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

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 $\frac{1}{3^2}$ as an expression using negative exponents.

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

Try These Together

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

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

2. Write $\frac{1}{5^2}$ as an expression using negative exponents.

HINT: The exponent will be -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. $\frac{1}{2^7}$

15. $\frac{-4}{m^{10}}$

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

Answers: 1. $\frac{1}{1}$	2. 5^{-2}	3. $\frac{x^5y^8}{1}$	4. $\frac{n^7}{1}$	5. $\frac{p}{1}$	6. $\frac{q^2}{s^3}$	7. $\frac{t^2}{c}$	8. -2×8^9	9. $(-3)^4 p^{10}$	10. $\frac{(-1)^9}{m^2}$	11. t^7	12. 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. $\frac{5.52}{\text{cm}^3}$	22. D
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