

1.5 The Exponent Rules

MATHPOWER™ Nine, pp. 20-21

To multiply powers with the same base, add the exponents.

$$y^m \times y^n = y^{m+n}$$

To divide powers with the same base, subtract the exponents.

$$y^m \div y^n = y^{m-n}$$

To raise a power to a power, multiply the exponents.

$$(y^m)^n = y^{m \times n}$$

Simplify.

1. $4^4 \times 4^2$ 2. $3^5 \times 3^3$ 3. $2^2 \times 2^3$

4. $10^3 \times 10$ 5. $5^4 \times 5^3$ 6. 6×6^4

7. $x^2 \times x^5$ 8. $y^3 \times y^3$ 9. $z^3 \times z^2$

Find the missing exponent.

10. $3^2 \times 3^{\square} = 3^4$ 11. $5^{\square} \times 5^4 = 5^7$

12. $8^3 \times 8^{\square} = 8^5$ 13. $7^{\square} \times 7^3 = 7^4$

14. $y^5 \times y^{\square} = y^8$ 15. $b^{\square} \times b^5 = b^9$

16. $x \times x^9 = x^{\square}$ 17. $s^6 \times s^{\square} = s^7$

Simplify.

18. $5^4 \div 5^2$ 19. $4^6 \div 4^3$ 20. $3^3 \div 3^2$

21. $9^5 \div 9^2$ 22. $7^4 \div 7^3$ 23. $2^6 \div 2^4$

24. $x^7 \div x^5$ 25. $y^8 \div y^6$ 26. $a^5 \div a^4$

Find the missing exponent.

27. $2^5 \div 2^{\square} = 2^3$ 28. $3^4 \div 3^{\square} = 3^2$

29. $4^{\square} \div 4^2 = 4^4$ 30. $5^{\square} \div 5^3 = 5$

31. $n^4 \div n^{\square} = n^2$ 32. $c^{\square} \div c^4 = c^3$

33. $v^{\square} \div v^2 = v^2$ 34. $7^9 \div 7^{\square} = 7$

Simplify.

35. $(3^2)^3$ 36. $(2^4)^2$ 37. $(7^3)^4$

38. $(6^2)^4$ 39. $(5^3)^2$ 40. $(4^5)^3$

41. $(x^3)^3$ 42. $(s^2)^2$ 43. $(r^5)^2$

Find the missing exponent.

44. $(3^3)^{\square} = 3^9$ 45. $(2^5)^{\square} = 2^{10}$

46. $(5^{\square})^2 = 5^8$ 47. $(4^{\square})^3 = 4^{12}$

48. $(g^2)^{\square} = g^6$ 49. $(m^3)^{\square} = m^9$

50. $(s^{\square})^5 = s^{20}$ 51. $(t^{\square})^2 = t^6$

Find the value of each expression.

Replace the blanks with the corresponding letter or symbol to decode the message.

52. $2^3 \times 2^2$ C 53. $2^9 \div 2^2$ R

54. $2^4 \div 2^3$ A 55. $(2^3)^2$ O

56. $2^{13} \div 2^3$ C 57. $(2^6)^2$!

58. 2×2 L 59. $(2^4)^2$ R

60. $2^2 \times 2^2$ * 61. $2^2 \times 2$ L

62. $(2^3)^3$ E 63. $2^{12} \div 2$ T

$\overline{2^1}$ $\overline{2^2}$ $\overline{2^3}$ $\overline{2^4}$ $\overline{2^5}$ $\overline{2^6}$ $\overline{2^7}$ $\overline{2^8}$ $\overline{2^9}$ $\overline{2^{10}}$ $\overline{2^{11}}$ $\overline{2^{12}}$

1.9 Powers of Monomials

MATHPOWER™ Nine, pp. 32-34

To find the power of a monomial, find that power of the coefficient and of each variable.

$$\begin{aligned} (2x^2y^3)^4 &= (2)^4 (x^2)^4 (y^3)^4 \\ &= 2^4 \times x^8 \times y^{12} \\ &= 16x^8y^{12} \end{aligned}$$

In general, $(x^m y^n)^a = x^{am} y^{an}$

Simplify.

1. $(y)^2$ _____ 2. $(x)^4$ _____
 3. $(-s^2)^2$ _____ 4. $(c^3)^2$ _____
 5. $(-m^5)^3$ _____ 6. $(f^3)^0$ _____

Simplify. Then, cross out the box with the answer. After you have finished, read the answer to the question "If you walked through a swamp, what kind of journey would you have?"

7. $(st)^4$ _____ 8. $(-x^2y)^3$ _____
 9. $(cd^2)^2$ _____ 10. $(yz)^2$ _____
 11. $(rs)^3$ _____ 12. $(-a^2b^2)^3$ _____
 13. $(-f^3g^2)^2$ _____

FI r^3s^3	AD a^2b^3	TH c^2d^4	ES s^4t^4	IR c^5d^2	LA $-x^6y^3$
ND y^2z^2	TY y^3z^3	SH f^6g^4	TR s^2t^2	RN $-a^6b^6$	EK x^2y^3

Simplify.

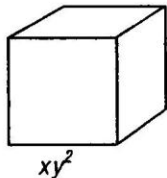
14. $(3ty)^2$ _____ 15. $\left(\frac{-2x}{z}\right)^3$ _____
 16. $(-2a^2b)^3$ _____ 17. $(3r^3s)^2$ _____
 18. $(5k^3m^2)^2$ _____ 19. $(-3q^2r^2)^3$ _____

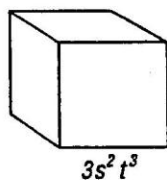
Simplify.

20. $(yz)^2(y^3z)$ _____
 21. $(-2ab)(-ab)^2$ _____

22. $(5s^2t^2)^2(-st)$ _____
 23. $(-4k^2m^3)^2\left(\frac{k}{2m}\right)^3$ _____
 24. $(2r^2s^2t)(3rst)^2$ _____
 25. $(4abc)^2(2a^2bc)(ab^3c^3)$ _____
 26. $(x^2y^2z^2)^2(xyz)(-3xy^3z^3)$ _____

For each cube, write and simplify an expression for a) the area of each face b) the volume

27.  a) _____
 b) _____

28.  a) _____
 b) _____

Explain the error in each case and correct it.

29. $(a^2)^3 = a^5$ _____

 30. $(fg^3)^2 = f^2g^9$ _____

 31. $(-2x^2y^2)^2 = -4x^4y^4$ _____

