

Practice

Form G

More Multiplication Properties of Exponents

Simplify each expression.

1. $(z^5)^3$
 z^{15}

2. $(m^4)^{10}$
 m^{40}

3. $(v^7)^{\frac{1}{2}}$
 $v^{\frac{7}{2}}$

4. $(k^{\frac{4}{3}})^3$
 k^4

5. $(x^7)^{-2}$
 $\frac{1}{x^{14}}$

6. $\left(r^{\frac{1}{4}}\right)^{-6}$
 $\frac{1}{r^{\frac{3}{2}}}$

7. $b(b^{-8})^{-3}$
 b^{25}

8. $h^2(h^7)^0$
 h^2

9. $(m^2)^{\frac{3}{2}}n^{\frac{1}{7}}$
 $m^3n^{\frac{1}{7}}$

10. $(x^6)^2(y^3)^0$
 x^{12}

11. $(g^5)^{-5}(g^6)^{-2}$
 $\frac{1}{g^{37}}$

12. $(v^2)^3(w^4)^{\frac{1}{3}}$
 $v^6w^{\frac{4}{3}}$

13. $(6a)^4$
 $1296a^4$

14. $(5f)^{-3}$
 $\frac{1}{125f^3}$

15. $(9z)^{\frac{1}{2}}$
 $3z^{\frac{1}{2}}$

16. $(10m^3)^{-2}$
 $\frac{1}{100m^6}$

17. $(6j^{-2})^{-3}$
 $\frac{j^6}{216}$

18. $(9d^{10})^{-2}$
 $\frac{1}{81d^{20}}$

19. $(gh)^0$
 1

20. $(qr^6)^{\frac{1}{2}}$
 $\frac{1}{q^{\frac{1}{2}}r^3}$

21. $(4a^3)^2a^5$
 $16a^{11}$

22. $\left(m^{\frac{4}{7}}n^3\right)^7(m^4)^3$
 $m^{16}n^{21}$

23. $(xy^2)(xy^2)^{-1}$
 1

24. $z(y^{-5}z^7)^{-1}y^{-5}$
 $\frac{1}{z^6}$

25. $(7t^{-3})^3\left(s^5t^{\frac{1}{4}}\right)^2$
 $\frac{343s^{10}}{t^{\frac{17}{2}}}$

26. $m^{-9}(m^{-1}n)^{\frac{1}{2}}n^8$
 $\frac{n^{\frac{17}{2}}}{m^{\frac{19}{2}}}$

27. $(3b^{-4}c^{-2})^6c^3$
 $\frac{729}{b^{24}c^9}$

28. $5x^{-5}y^2(2x^{-14})^2$
 $\frac{20y^2}{x^{33}}$

Simplify. Write each answer in scientific notation.

29. $(5 \times 10^7)^2$
 2.5×10^{15}

30. $(2 \times 10^4)^6$
 6.4×10^{25}

31. $(9 \times 10^{-12})^2$
 8.1×10^{-23}

32. $(3 \times 10^{-8})^3$
 2.7×10^{-23}

33. $(3.6 \times 10^5)^2$
 1.296×10^{11}

34. $(9.3 \times 10^{-6})^{-2}$
 1.16×10^{10}

35. $(1.7 \times 10^{-8})^3$
 4.913×10^{-24}

36. $(6.24 \times 10^{13})^3$
 2.4297×10^{41}

37. The radius of a cylinder is 5.4×10^6 cm. The height of the cylinder is 2.5×10^3 cm. What is the volume of the cylinder? (Hint: $V = \pi r^2 h$)

$2.28906 \times 10^{17} \text{ cm}^2$

38. The side length of a square is 9.6×10^5 in. What is the area of the square?

$9.216 \times 10^{11} \text{ in.}^2$

39. The side length of a cube is 3.78×10^3 ft. What is the volume of the cube?

$5.401 \times 10^{10} \text{ ft}^3$

Practice (continued)

Form G

More Multiplication Properties of Exponents

Complete each equation.

40. $(p^4)^\square = p^8$

2

41. $(z^\square)^6 = z^{-24}$

-4

42. $(t^{12})^\square = 1$

0

43. $(w^3)^\square = w^{-12}$

-4

44. $(n^{-8})^\square = n$

 $-\frac{1}{8}$

45. $10(g^2)^\square = 10g^6$

3

46. $(3a^\square)^3 = 27a^{\frac{3}{2}}$

 $\frac{1}{2}$

47. $(6q^4r^\square)^2 = 36q^8$

0

48. $(x^4y^3)^\square = \frac{1}{x^8y^6}$

-2

49. **Writing** Is $(y^m)^n = (y^n)^m$ a true statement? Explain your reasoning.

yes; $(y^m)^n = (y^n)^m$ because $y^{mn} = y^{nm}$. The product $mn = nm$ because of the commutative property.

50. **Reasoning** What is the difference between x^4x^3 and $(x^4)^3$? Justify your answer.

The product of x^4 and x^3 is $x^{4+3} = x^7$. The expression $(x^4)^3$ means x^4 times x^4 times x^4 or x^{12} , a product of three terms.

Simplify each expression.

51. $2^3(2m)^2$

32 m^2

52. $(68.68)^8(68.68)^{-8}$

1

53. $\left(d^{\frac{2}{3}}\right)^{-5} d^3$

 $\frac{1}{d^{\frac{10}{3}}}$

54. $(-7p)^3 + 7p^3$

-336 p^3

55. $4a\left(0^{\frac{1}{2}}\right)b^4(-b)^{-7}$

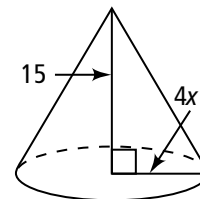
0

56. $(10^{-5})^3(9.9 \times 10^{-12})^2$

9.801 $\times 10^{-38}$

57. The volume of a circular cone can be determined by the formula

$V = \frac{1}{3}3.14r^2h$, where r is the radius of the base and h is the height of the cone. Find the volume of the cone shown at the right in terms of x .

251.2 x^6 

58. The volume of a sphere can be determined by the formula

$V = \frac{4}{3}3.14r^3$, where r is the radius. Find the volume of the sphere shown at the right in terms of t .

904.32 t^{12} 