

Section 5.1 Multiplying and Dividing Expressions with Common Bases

Section 5.1 Calculator Exercises

1. 1.338225578

3. 6691.127888

5. 3370.8

Section 5.1 Practice Exercises

1. (a) exponent

(b) base; exponent

(c) 1

(d) $I = Prt$

(e) compound interest

3. Base: x ; exponent: 4

5. Base: 3; exponent: 5

7. Base: -1 ; exponent: 4

9. Base: 13; exponent: 1

11. Base: 10; exponent: 3

13. Base: t ; exponent: 6

15. v

17. 1

19. $(-6b)(-6b) = (-6b)^2$

21. $-6 \cdot b \cdot b = -6b^2$

23. $(y+2)(y+2)(y+2)(y+2) = (y+2)^4$

25. $\frac{-2}{t \cdot t \cdot t} = \frac{-2}{t^3}$

27. No; $-5^2 = -25$ and $(-5)^2 = 25$

29. Yes; $-2^5 = -32$ and $(-2)^5 = -32$

31. Yes; $\left(\frac{1}{2}\right)^3 = \frac{1}{8}$ and $\frac{1}{2^3} = \frac{1}{8}$

33. Yes; $-(-2)^4 = -16$ and $-(2)^2 = -16$

35. $16^1 = 16$

37. $(-1)^{21} = (-1)(-1)^{20} = (-1)(1) = -1$

39. $\left(-\frac{1}{3}\right)^2 = \left(-\frac{1}{3}\right)\left(-\frac{1}{3}\right) = \frac{1}{9}$

41. $-\left(\frac{2}{5}\right)^2 = -\left(\frac{2}{5}\right)\left(\frac{2}{5}\right) = -\frac{4}{25}$

43. $3 \cdot 2^4 = 3 \cdot 16 = 48$

45. $-4(-1)^7 = -4(-1) = 4$

47. $6^2 - 3^3 = 36 - 27 = 9$

49. $2 \cdot 3^2 + 4 \cdot 2^3 = 2 \cdot 9 + 4 \cdot 8 = 18 + 32 = 50$

51. $-4b^2 = -4(5)^2 = -4(25) = -100$

53. $(-4b)^2 = (-4 \cdot 5)^2 = (-20)^2 = 400$

55. $(a+b)^2 = [-4+5]^2 = (1)^2 = 1$

57. $a^2 + 2ab + b^2 = (-4)^2 + 2(-4)(5) + 5^2$
 $= 16 + (-40) + 25$
 $= 1$

59. $-10ab^2 = -10(-4)(5^2)$
 $= -10(-4)(25)$
 $= 1000$

61. $-10a^2b = -10(-4)^2(5)$
 $= -10(16)(5) = -800$

63. (a) $x^4 \cdot x^3 = (x \cdot x \cdot x \cdot x)(x \cdot x \cdot x) = x^7$

(b) $5^4 \cdot 5^3 = (5 \cdot 5 \cdot 5 \cdot 5)(5 \cdot 5 \cdot 5) = 5^7$

65. $z^5 z^3 = z^{5+3} = z^8$

67. $a \cdot a^8 = a^{1+8} = a^9$

$$69. 4^5 \cdot 4^9 = 4^{5+9} = 4^{14}$$

$$70. 6^7 \cdot 6^5 = 6^{7+5} = 6^{12}$$

$$71. \left(\frac{2}{3}\right)^3 \left(\frac{2}{3}\right) = \left(\frac{2}{3}\right)^4$$

$$73. c^5 c^2 c^7 = c^{5+2+7} = c^{14}$$

$$75. x \cdot x^4 \cdot x^{10} \cdot x^3 = x^{1+4+10+3} = x^{18}$$

$$77. (a) \frac{p^8}{p^3} = \frac{p \cdot p \cdot p \cdot p \cdot p \cdot p \cdot p \cdot p}{p \cdot p \cdot p} = p^5$$

$$(b) \frac{8^8}{8^3} = \frac{8 \cdot 8 \cdot 8 \cdot 8 \cdot 8 \cdot 8 \cdot 8 \cdot 8}{8 \cdot 8 \cdot 8} = 8^5$$

$$79. \frac{x^8}{x^6} = x^{8-6} = x^2$$

$$81. \frac{a^{10}}{a} = a^{10-1} = a^9$$

$$83. \frac{7^{13}}{7^6} = 7^{13-6} = 7^7$$

$$85. \frac{5^8}{5} = 5^{8-1} = 5^7$$

$$87. \frac{y^{13}}{y^{12}} = y^{13-12} = y$$

$$89. \frac{h^3 h^8}{h^7} = \frac{h^{3+8}}{h^7} = h^{11-7} = h^4$$

$$91. \frac{7^2 \cdot 7^6}{7} = \frac{7^{2+6}}{7} = 7^{8-1} = 7^7$$

$$93. \frac{10^{20}}{10^3 \cdot 10^8} = \frac{10^{20}}{10^{3+8}} = 10^{20-11} = 10^9$$

$$95. (2x^3)(3x^4) = 2 \cdot 3 \cdot x^3 x^4 = 6x^{3+4} = 6x^7$$

$$97. (5a^2b)(8a^3b^4) = 8 \cdot 5 \cdot a^2 a^3 b b^4 = 40a^5 b^5$$

$$99. s^3 \cdot t^5 \cdot t \cdot t^{10} \cdot s^6 = s^3 \cdot s^6 \cdot t^5 \cdot t \cdot t^{10} = s^9 t^{16}$$

$$101. (-2v^2)(3v)(5v^5) = -2 \cdot 3 \cdot 5 v^2 v v^5 = -30v^8$$

$$103. \left(\frac{2}{3} m^{13} n^8\right)(24m^7 n^2) = \frac{2}{3} \cdot 24 m^{13} m^7 n^8 n^2 = 16m^{20} n^{10}$$

$$105. \frac{14c^4 d^5}{7c^3 d} = 2c^{4-3} d^{5-1} = 2cd^4$$

$$107. \frac{z^3 z^{11}}{z^4 z^6} = \frac{z^{3+11}}{z^{4+6}} = \frac{z^{14}}{z^{10}} = z^{14-10} = z^4$$

$$109. \frac{25h^3 j k^5}{12h^2 k} = \frac{25}{12} \cdot \frac{h^3}{h^2} \cdot j \cdot \frac{k^5}{k} = \frac{25h^{3-2} j k^{5-1}}{12} = \frac{25hjk^4}{12}$$

$$111. (-4p^6 q^8 r^4)(2pqr^2) = -4 \cdot 2 p^6 p q^8 q r^4 r^2 = -8p^{6+1} q^{8+1} r^{4+2} = -8p^7 q^9 r^6$$

$$113. \frac{-12s^2 t u^3}{4s u^2} = \frac{-12}{4} \cdot \frac{s^2}{s} \cdot t \cdot \frac{u^3}{u^2} = -3s^{2-1} t u^{3-2} = -3stu$$

115. Substitute $P = 5000$, $t = 2$, and $r = 7\%$ $= 0.07$ into the formula.

$$A = P(1+r)^t = \$5000(1+0.07)^2 = 5000(1.07)^2 = \$5724.50$$

117. Substitute $P = 4000$, $t = 3$, and $r = 6\%$ $= 0.06$ into the formula.

$$A = P(1+r)^t = \$4000(1+0.06)^3 = 4000(1.06)^3 = \$4764.06$$

119. Substitute $r = 16$ and $\pi = 3.14$ into the formula.

$$A = \pi r^2 = (3.14)(8 \text{ in.})^2 = 3.14(64) = 200.96 \approx 201 \text{ in.}^2$$

Round to the nearest in.²

121. Since the radius of a sphere is half of its diameter, $r = \frac{d}{2} = \frac{8}{2} = 4$ in. Substitute $r = 4$ and $\pi = 3.14$ into the formula.

$$\begin{aligned} V &= \frac{4}{3}\pi r^3 \\ &= \frac{4}{3}(3.14)(4)^3 \\ &= 267.9466667 \\ &\approx 268 \text{ in.}^3 \text{ Round to the nearest in}^3 \end{aligned}$$

$$\begin{aligned} \mathbf{123.} \quad x^n x^{n+1} &= x^{n+n+1} \\ &= x^{2n+1} \end{aligned}$$

$$\begin{aligned} \mathbf{125.} \quad p^{3m+5} p^{-m-2} &= p^{3m+5-m-2} \\ &= p^{2m+3} \end{aligned}$$

$$\begin{aligned} \mathbf{127.} \quad \frac{z^{b+1}}{z^b} &= z^{b+1-b} \\ &= z \end{aligned}$$

$$\begin{aligned} \mathbf{129.} \quad \frac{r^{3a+3}}{r^{3a}} &= r^{3a+3-3a} \\ &= r^3 \end{aligned}$$