

## Section 5.2 More Properties of Exponents

### Section 5.2 Practice Exercises

1.  $4^2 \cdot 4^7 = 4^{2+7} = 4^9$

3.  $a^{13} \cdot a \cdot a^6 = a^{13+1+6} = a^{20}$

5.  $\frac{d^{13}d}{d^5} = d^{14-5} = d^9$

7.  $\frac{7^{11}}{7^5} = 7^{11-5} = 7^6$

9. When multiplying expressions with the same base, add the exponents. When raising an expression with an exponent to a power, multiply the exponents.

11.  $(5^3)^4 = 5^{3 \cdot 4} = 5^{12}$

13.  $(12^3)^2 = 12^{3 \cdot 2} = 12^6$

15.  $(y^7)^2 = y^{7 \cdot 2} = y^{14}$

17.  $(w^5)^5 = w^{5 \cdot 5} = w^{25}$

19.  $(a^2a^4)^6 = (a^6)^6$   
 $= a^{6 \cdot 6} = a^{36}$

21.  $(y^3y^4)^2 = (y^7)^2 = y^{7 \cdot 2} = y^{14}$

23.  $(2^2)^3 = 2^6$ ;  $(2^3)^2 = 2^6$ , they are both equal to  $2^6$ .

25.  $4^{(3^2)} = 4^9$  and  $(4^3)^2 = 4^6$ ; the expression  $4^{(3^2)}$  is greater than  $(4^3)^2$ .

27.  $(5w)^2 = 5^2w^2 = 25w^2$

29.  $(srt)^4 = s^4r^4t^4$

31.  $\left(\frac{2}{r}\right)^4 = \frac{2^4}{r^4} = \frac{16}{r^4}$

33.  $\left(\frac{x}{y}\right)^5 = \frac{x^5}{y^5}$

35.  $(-3a)^4 = (-3)^4a^4 = 81a^4$

37.  $(-3abc)^3 = (-3)^3a^3b^3c^3$   
 $= -27a^3b^3c^3$

39.  $\left(-\frac{4}{x}\right)^3 = (-1)^3\frac{4^3}{x^3}$   
 $= -\frac{64}{x^3}$

41.  $\left(-\frac{a}{b}\right)^2 = (-1)^2\frac{a^2}{b^2}$   
 $= \frac{a^2}{b^2}$

43.  $(6u^2v^4)^3 = 6^3(u^2)^3(v^4)^3$   
 $= 6^3u^6v^{12}$  or  $216u^6v^{12}$

45.  $5(x^2y)^4 = 5(x^2)^4(y)^4 = 5x^8y^4$

47.  $(-h^4)^7 = (-1)^7h^{28} = -h^{28}$

49.  $(-m^2)^6 = (-1)^6m^{12} = m^{12}$

$$51. \left(\frac{4}{rs^4}\right)^5 = \frac{4^5}{(rs^4)^5}$$

$$= \frac{4^5}{(r^5)(s^4)^5}$$

$$= \frac{4^5}{r^5 s^{20}} \text{ or } \frac{1024}{r^5 s^{20}}$$

$$53. \left(\frac{3p}{q^3}\right)^5 = \frac{(3p)^5}{(q^3)^5}$$

$$= \frac{3^5 p^5}{q^{3 \cdot 5}}$$

$$= \frac{3^5 p^5}{q^{15}} \text{ or } \frac{243p^5}{q^{15}}$$

$$55. \frac{y^8(y^3)^4}{(y^2)^3} = \frac{y^8 y^{12}}{y^6} = \frac{y^{20}}{y^6} = y^{14}$$

$$57. (x^2)^5(x^3)^7 = x^{10}x^{21} = x^{31}$$

$$59. (2a^2b)^3(5a^4b^3)^2$$

$$= 2^3(a^2)^3b^3 \cdot 5^2(a^4)^2(b^3)^2$$

$$= 8a^6b^3 \cdot 25a^8b^6$$

$$= 8 \cdot 25a^{6+8}b^{3+6}$$

$$= 200a^{14}b^9$$

$$61. (-2p^2q^4)^4 = (-2)^4(p^2)^4(q^4)^4$$

$$= 16p^8q^{16}$$

$$63. (-m^7n^3)^5 = (-1)^5(m^7)^5(n^3)^5 = -m^{35}n^{15}$$

$$65. \frac{(5a^3b)^4(a^2b)^4}{(5ab)^2} = \frac{5^4 a^{12} b^4 a^8 b^4}{5^2 a^2 b^2}$$

$$= \frac{5^4 a^{20} b^8}{5^2 a^2 b^2}$$

$$= 5^2 a^{18} b^6$$

$$= 25a^{18}b^6$$

$$67. \left(\frac{2c^3d^4}{3c^2d}\right)^2 = \frac{2^2 c^6 d^8}{3^2 c^4 d^2} = \frac{4}{9}c^2d^6$$

$$69. (2c^3d^2)^5 \left(\frac{c^6d^8}{4c^2d}\right)^3 = (2^5 c^{15} d^{10}) \left(\frac{c^{18}d^{24}}{64c^6d^3}\right)$$

$$= \frac{32c^{15}d^{10} \cdot c^{18}d^{24}}{64c^6d^3}$$

$$= \frac{32c^{33}d^{34}}{64c^6d^3}$$

$$= \frac{c^{27}d^{31}}{2}$$

$$71. \left(\frac{-3a^3b}{c^2}\right)^3 = \frac{(-3)^3 a^9 b^3}{c^6}$$

$$= -\frac{27a^9b^3}{c^6}$$

$$73. \frac{(-8b^6)^2(b^3)^5}{4b} = \frac{(-8)^2 b^{12} b^{15}}{4b}$$

$$= \frac{64b^{27}}{4b}$$

$$= 16b^{27-1}$$

$$= 16b^{26}$$

$$75. (x^m)^2 = x^{2m}$$

$$77. (5a^{2n})^3 = 5^3(a^{2n})^3$$

$$= 125a^{6n}$$

$$79. \left(\frac{m^2}{n^3}\right)^b = \frac{(m^2)^b}{(n^3)^b} = \frac{m^{2b}}{n^{3b}}$$

$$81. \left(\frac{3a^3}{5b^4}\right)^n = \frac{3^n (a^3)^n}{5^n (b^4)^n}$$

$$= \frac{3^n a^{3n}}{5^n b^{4n}}$$