

6-1 Skills Practice**Operations with Polynomials****Simplify. Assume that no variable equals 0.**

1. $b^4 \cdot b^3$

2. $c^5 \cdot c^2 \cdot c^2$

3. $a^{-4} \cdot a^{-3}$

4. $x^5 \cdot x^{-4} \cdot x$

5. $(2x)^2(4y)^2$

6. $-2gh(g^3h^5)$

7. $10x^2y^3(10xy^8)$

8. $\frac{24wz^7}{3w^3z^5}$

9. $\frac{-6a^4bc^8}{36a^7b^2c}$

10. $\frac{-10pt^4r}{-5p^3t^2r}$

11. $(g + 5) + (2g + 7)$

12. $(5d + 5) - (d + 1)$

13. $(x^2 - 3x - 3) + (2x^2 + 7x - 2)$

14. $(-2f^2 - 3f - 5) + (-2f^2 - 3f + 8)$

15. $-5(2c^2 - d^2)$

16. $x^2(2x + 9)$

17. $(a - 5)^2$

18. $(2x - 3)(3x - 5)$

19. $(r - 2t)(r + 2t)$

20. $(3y + 4)(2y - 3)$

21. $(3 - 2b)(3 + 2b)$

22. $(3w + 1)^2$

6-1 Practice**Operations with Polynomials**

Simplify. Assume that no variable equals 0.

1. $n^5 \cdot n^2$

2. $y^7 \cdot y^3 \cdot y^2$

3. $t^9 \cdot t^{-8}$

4. $x^{-4} \cdot x^{-4} \cdot x^4$

5. $(2f^4)^6$

6. $(-2b^{-2}c^3)^3$

7. $(4d^2t^5v^{-4})(-5dt^{-3}v^{-1})$

8. $8u(2z)^3$

9. $\frac{12m^8y^6}{-9my^4}$

10. $\frac{-6s^5x^3}{18sx^7}$

11. $\frac{-27x^3(-x^7)}{16x^4}$

12. $\left(\frac{2}{3r^2s^3z^6}\right)^2$

13. $-(4w^{-3}z^{-5})(8w)^2$

14. $(m^4n^6)^4(m^3n^2p^5)^6$

15. $\left(\frac{3}{2}d-f^4\right)^4\left(-\frac{4}{3}d^5f\right)^3$

16. $\left(\frac{2x^3y^2}{-x^2y^5}\right)^{-2}$

17. $\frac{(3x^{-2}y^3)(5xy^{-8})}{(x^{-3})^4y^{-2}}$

18. $\frac{-20(m^2v)(-v)^3}{5(-v)^2(-m^4)}$

19. $(3n^2 + 1) + (8n^2 - 8)$

20. $(6w - 11w^2) - (4 + 7w^2)$

21. $(w + 2t)(w^2 - 2wt + 4t^2)$

22. $(x + y)(x^2 - 3xy + 2y^2)$

23. BANKING Terry invests \$1500 in two mutual funds. The first year, one fund grows 3.8% and the other grows 6%. Write a polynomial to represent the amount Terry's \$1500 grows to in that year if x represents the amount he invested in the fund with the lesser growth rate.

24. GEOMETRY The area of the base of a rectangular box measures $2x^2 + 4x - 3$ square units. The height of the box measures x units. Find a polynomial expression for the volume of the box.

More Properties of Exponents

Simplify. Your answer should contain only positive exponents.

1) $(x^{-2}x^{-3})^4$

2) $(x^4)^{-3} \cdot 2x^4$

3) $(n^3)^3 \cdot 2n^{-1}$

4) $(2v)^2 \cdot 2v^2$

5) $\frac{2x^2y^4 \cdot 4x^2y^4 \cdot 3x}{3x^{-3}y^2}$

6) $\frac{2y^3 \cdot 3xy^3}{3x^2y^4}$

7) $\frac{x^3y^3 \cdot x^3}{4x^2}$

8) $\frac{3x^2y^2}{2x^{-1} \cdot 4yx^2}$

9) $\frac{x}{(2x^0)^2}$

10) $\frac{2m^{-4}}{(2m^{-4})^3}$

11) $\frac{(2m^2)^{-1}}{m^2}$

12) $\frac{2x^3}{(x^{-1})^3}$

13) $(a^{-3}b^{-3})^0$

14) $x^4y^3 \cdot (2y^2)^0$

15) $ba^4 \cdot (2ba^4)^{-3}$

16) $(2x^0y^2)^{-3} \cdot 2yx^3$

17) $\frac{2k^3 \cdot k^2}{k^{-3}}$

18) $\frac{(x^{-3})^4 x^4}{2x^{-3}}$

19) $\frac{(2x)^{-4}}{x^{-1} \cdot x}$

20) $\frac{(2x^3z^2)^3}{x^3y^4z^2 \cdot x^{-4}z^3}$

21) $\frac{(2pm^{-1}q^0)^{-4} \cdot 2m^{-1}p^3}{2pq^2}$

22) $\frac{(2hj^2k^{-2} \cdot h^4j^{-1}k^4)^0}{2h^{-3}j^{-4}k^{-2}}$

7-5 Skills Practice**Operations with Radical Expressions****Simplify.**

1. $\sqrt{24}$

2. $\sqrt{75}$

3. $\sqrt[3]{16}$

4. $-\sqrt[4]{48}$

5. $4\sqrt{50x^5}$

6. $\sqrt[4]{64a^4b^4}$

7. $\sqrt[3]{-8d^2f^5}$

8. $\sqrt{\frac{25}{36}r^2t}$

9. $-\sqrt{\frac{3}{7}}$

10. $\sqrt[3]{\frac{2}{9}}$

11. $\sqrt{\frac{2g^3}{5z}}$

12. $(3\sqrt{3})(5\sqrt{3})$

13. $(4\sqrt{12})(3\sqrt{20})$

14. $\sqrt{2} + \sqrt{8} + \sqrt{50}$

15. $\sqrt{12} - 2\sqrt{3} + \sqrt{108}$

16. $8\sqrt{5} - \sqrt{45} - \sqrt{80}$

17. $2\sqrt{48} - \sqrt{75} - \sqrt{12}$

18. $(2 + \sqrt{3})(6 - \sqrt{2})$

19. $(1 - \sqrt{5})(1 + \sqrt{5})$

20. $(3 - \sqrt{7})(5 + \sqrt{2})$

21. $(\sqrt{2} - \sqrt{6})^2$

22. $\frac{3}{7 - \sqrt{2}}$

23. $\frac{4}{3 + \sqrt{2}}$

24. $\frac{5}{8 - \sqrt{6}}$

7-5 Practice**Operations with Radical Expressions****Simplify.**

1. $\sqrt{540}$

2. $\sqrt[3]{-432}$

3. $\sqrt[3]{128}$

4. $-\sqrt[4]{405}$

5. $\sqrt[3]{-5000}$

6. $\sqrt[5]{-1215}$

7. $\sqrt[3]{125t^6w^2}$

8. $\sqrt[4]{48v^8z^{13}}$

9. $\sqrt[3]{8g^3k^8}$

10. $\sqrt{45x^3y^8}$

11. $\sqrt{\frac{11}{9}}$

12. $\sqrt[3]{\frac{216}{24}}$

13. $\sqrt{\frac{1}{128}c^4d^7}$

14. $\sqrt{\frac{9a^5}{64b^4}}$

15. $\sqrt[4]{\frac{8}{9a^3}}$

16. $(3\sqrt{15})(-4\sqrt{45})$

17. $(2\sqrt{24})(7\sqrt{18})$

18. $\sqrt{810} + \sqrt{240} - \sqrt{250}$

19. $6\sqrt{20} + 8\sqrt{5} - 5\sqrt{45}$

20. $8\sqrt{48} - 6\sqrt{75} + 7\sqrt{80}$

21. $(3\sqrt{2} + 2\sqrt{3})^2$

22. $(3 - \sqrt{7})^2$

23. $(\sqrt{5} - \sqrt{6})(\sqrt{5} + \sqrt{2})$

24. $(\sqrt{2} + \sqrt{10})(\sqrt{2} - \sqrt{10})$

25. $(1 + \sqrt{6})(5 - \sqrt{7})$

26. $(\sqrt{3} + 4\sqrt{7})^2$

27. $(\sqrt{108} - 6\sqrt{3})^2$

28. $\frac{\sqrt{3}}{\sqrt{5} - 2}$

29. $\frac{6}{\sqrt{2} - 1}$

30. $\frac{5 + \sqrt{3}}{4 + \sqrt{3}}$

31. $\frac{3 + \sqrt{2}}{2 - \sqrt{2}}$

32. $\frac{3 + \sqrt{6}}{5 - \sqrt{24}}$

33. $\frac{3 + \sqrt{x}}{2 - \sqrt{x}}$

34. BRAKING The formula $s = 2\sqrt{5\ell}$ estimates the speed s in miles per hour of a car when it leaves skid marks ℓ feet long. Use the formula to write a simplified expression for s if $\ell = 85$. Then evaluate s to the nearest mile per hour.

35. PYTHAGOREAN THEOREM The measures of the legs of a right triangle can be represented by the expressions $6x^2y$ and $9x^2y$. Use the Pythagorean Theorem to find a simplified expression for the measure of the hypotenuse.

7-6 Skills Practice**Rational Exponents**

Write each expression in radical form, or write each radical in exponential form.

1. $3^{\frac{1}{6}}$

2. $8^{\frac{1}{5}}$

3. $\sqrt{51}$

4. $\sqrt[4]{15^3}$

5. $12^{\frac{2}{3}}$

6. $\sqrt[3]{37}$

7. $(c^3)^{\frac{3}{5}}$

8. $\sqrt[3]{6xy^2}$

Evaluate each expression.

9. $32^{\frac{1}{5}}$

10. $81^{\frac{1}{4}}$

11. $27^{\frac{1}{3}}$

12. $4^{\frac{1}{2}}$

13. $16^{\frac{3}{2}}$

14. $(-243)^{\frac{4}{5}}$

15. $27^{\frac{1}{3}} \cdot 27^{\frac{5}{3}}$

16. $\left(\frac{4}{9}\right)^{\frac{3}{2}}$

Simplify each expression.

17. $c^{\frac{12}{5}} \cdot c^{\frac{3}{5}}$

18. $m^{\frac{2}{9}} \cdot m^{\frac{16}{9}}$

19. $\left(q^{\frac{1}{2}}\right)^3$

20. $p^{\frac{1}{5}} \cdot p^{\frac{1}{2}}$

21. $x^{\frac{6}{11}} \cdot x^{\frac{4}{11}}$

22. $\frac{x^{\frac{2}{3}}}{x^{\frac{1}{4}}}$

23. $\frac{y^{\frac{1}{2}}}{y^{\frac{1}{4}}}$

24. $\frac{n^{\frac{1}{3}}}{n^{\frac{1}{6}} \cdot n^{\frac{1}{2}}}$

25. $\sqrt[12]{64}$

26. $\sqrt[8]{49a^8b^2}$

7-6 Practice**Rational Exponents**

Write each expression in radical form, or write each radical in exponential form.

1. $5^{\frac{1}{3}}$

2. $6^{\frac{2}{5}}$

3. $m^{\frac{4}{7}}$

4. $(n^3)^{\frac{2}{5}}$

5. $\sqrt{79}$

6. $\sqrt[4]{153}$

7. $\sqrt[3]{27m^6n^4}$

8. $\sqrt[5]{2a^{10}b}$

Evaluate each expression.

9. $81^{\frac{1}{4}}$

10. $1024^{\frac{1}{5}}$

11. $8^{\frac{5}{3}}$

12. $-256^{\frac{3}{4}}$

13. $(-64)^{\frac{2}{3}}$

14. $27^{\frac{1}{3}} \cdot 27^{\frac{4}{3}}$

15. $\left(\frac{125}{216}\right)^{\frac{2}{3}}$

16. $\frac{64^{\frac{2}{3}}}{343^{\frac{2}{3}}}$

17. $(25^{\frac{1}{2}})(-64^{\frac{1}{3}})$

Simplify each expression.

18. $g^{\frac{4}{7}} \cdot g^{\frac{3}{7}}$

19. $s^{\frac{3}{4}} \cdot s^{\frac{13}{4}}$

20. $(u^{\frac{1}{3}})^{\frac{4}{5}}$

21. $y^{\frac{1}{2}}$

22. $b^{\frac{3}{5}}$

23. $\frac{q^{\frac{3}{5}}}{q^{\frac{2}{5}}}$

24. $\frac{t^{\frac{2}{3}}}{5t^{\frac{1}{2}} \cdot t^{-\frac{3}{4}}}$

25. $\frac{2z^{\frac{1}{2}}}{z^{\frac{1}{2}} - 1}$

26. $10\sqrt[5]{8^5}$

27. $\sqrt{12} \cdot \sqrt[5]{12^3}$

28. $\sqrt[4]{6} \cdot 3\sqrt[4]{6}$

29. $\frac{a}{\sqrt{3b}}$

30. ELECTRICITY The amount of current in amps I that an appliance uses can be calculated using the formula $I = \left(\frac{P}{R}\right)^{\frac{1}{2}}$, where P is the power in watts and R is the resistance in ohms. How much current does an appliance use if $P = 500$ watts and $R = 10$ ohms? Round your answer to the nearest tenth.

31. BUSINESS A company that produces DVDs uses the formula $C = 88n^{\frac{1}{3}} + 330$ to calculate the cost C in dollars of producing n DVDs per day. What is the company's cost to produce 150 DVDs per day? Round your answer to the nearest dollar.

7-7 Skills Practice**Solving Radical Equations and Inequalities**

Solve each equation.

1. $\sqrt{x} = 5$

2. $\sqrt{x} + 3 = 7$

3. $5\sqrt{j} = 1$

4. $v^{\frac{1}{2}} + 1 = 0$

5. $18 - 3y^{\frac{1}{2}} = 25$

6. $\sqrt[3]{2w} = 4$

7. $\sqrt{b - 5} = 4$

8. $\sqrt{3n + 1} = 5$

9. $\sqrt[3]{3r - 6} = 3$

10. $2 + \sqrt{3p + 7} = 6$

11. $\sqrt{k - 4} - 1 = 5$

12. $(2d + 3)^{\frac{1}{3}} = 2$

13. $(t - 3)^{\frac{1}{3}} = 2$

14. $4 - (1 - 7u)^{\frac{1}{3}} = 0$

15. $\sqrt{3z - 2} = \sqrt{z - 4}$

16. $\sqrt{g + 1} = \sqrt{2g - 7}$

Solve each inequality.

17. $4\sqrt{x + 1} \geq 12$

18. $5 + \sqrt{c - 3} \leq 6$

19. $-2 + \sqrt{3x + 3} < 7$

20. $-\sqrt{2a + 4} \geq -6$

21. $2\sqrt{4r - 3} > 10$

22. $4 - \sqrt{3x + 1} > 3$

23. $\sqrt{y + 4} - 3 \geq 3$

24. $-3\sqrt{11r + 3} \geq -15$

7-7 Practice**Solving Radical Equations and Inequalities**

Solve each equation.

1. $\sqrt{x} = 8$

2. $4 - \sqrt{x} = 3$

3. $\sqrt{2p} + 3 = 10$

4. $4\sqrt{3h} - 2 = 0$

5. $c^{\frac{1}{2}} + 6 = 9$

6. $18 + 7h^{\frac{1}{2}} = 12$

7. $\sqrt[3]{d+2} = 7$

8. $\sqrt[5]{w-7} = 1$

9. $6 + \sqrt[3]{q-4} = 9$

10. $\sqrt[4]{y-9} + 4 = 0$

11. $\sqrt{2m-6} - 16 = 0$

12. $\sqrt[3]{4m+1} - 2 = 2$

13. $\sqrt{8n-5} - 1 = 2$

14. $\sqrt{1-4t} - 8 = -6$

15. $\sqrt{2t-5} - 3 = 3$

16. $(7v-2)^{\frac{1}{4}} + 12 = 7$

17. $(3g+1)^{\frac{1}{2}} - 6 = 4$

18. $(6u-5)^{\frac{1}{3}} + 2 = -3$

19. $\sqrt{2d-5} = \sqrt{d-1}$

20. $\sqrt{4r-6} = \sqrt{r}$

21. $\sqrt{6x-4} = \sqrt{2x+10}$

22. $\sqrt{2x+5} = \sqrt{2x+1}$

Solve each inequality.

23. $3\sqrt{a} \geq 12$

24. $\sqrt{z+5} + 4 \leq 13$

25. $8 + \sqrt{2q} \leq 5$

26. $\sqrt{2a-3} < 5$

27. $9 - \sqrt{c+4} \leq 6$

28. $\sqrt{x-1} < 2$

29. STATISTICS Statisticians use the formula $\sigma = \sqrt{v}$ to calculate a standard deviation σ , where v is the variance of a data set. Find the variance when the standard deviation is 15.

30. GRAVITATION Helena drops a ball from 25 feet above a lake. The formula $t = \frac{1}{4}\sqrt{25-h}$ describes the time t in seconds that the ball is h feet above the water. How many feet above the water will the ball be after 1 second?