

# 5.6

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

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

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

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

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

Evaluate each expression.

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

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

Simplify each expression.

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

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

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

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

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

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

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

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

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

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

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

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

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

34. **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.

35. **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.

# 5.6

## Rational Exponents

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

1.  $5^{\frac{1}{3}}$   $\sqrt[3]{5}$

2.  $6^{\frac{2}{5}}$   $\sqrt[5]{6^2}$  or  $(\sqrt[5]{6})^2$

3.  $m^{\frac{4}{7}}$   $\sqrt[7]{m^4}$  or  $(\sqrt[7]{m})^4$

4.  $(n^3)^{\frac{2}{5}}$   $n^{\frac{6}{5}}$  or  $n\sqrt[5]{n}$

6.  $\sqrt[4]{153}$   $153^{\frac{1}{4}}$

7.  $\sqrt[3]{27m^6n^4}$   $3m^2n^{\frac{4}{3}}$

8.  $\sqrt[5]{2a^{10}b}$   $5 \cdot 2^{\frac{1}{5}} \cdot a^2 \cdot b^{\frac{1}{5}}$

9.  $\sqrt[3]{6xy^2}$   $6^{\frac{1}{3}} \times x^{\frac{1}{3}} y^{\frac{2}{3}}$

Evaluate each expression.

10.  $1024^{\frac{1}{5}}$   $\frac{1}{4}$

11.  $8^{\frac{5}{3}}$   $32$

12.  $-256^{\frac{3}{4}}$   $-64$

13.  $(-64)^{\frac{2}{3}}$   $16$

14.  $27^{\frac{1}{3}} \cdot 27^{\frac{4}{3}}$   $243$

15.  $(\frac{125}{216})^{\frac{2}{3}}$   $\frac{25}{36}$

16.  $\frac{64^{\frac{2}{3}}}{343^{\frac{2}{3}}}$   $\frac{16}{49}$

17.  $(25^{\frac{1}{2}})(-64^{-\frac{1}{3}})$   $-\frac{5}{4}$

18.  $(-243)^{\frac{4}{5}}$   $81$

Simplify each expression.

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

20.  $(u^{\frac{1}{3}})^{\frac{4}{5}}$   $u^{\frac{4}{15}}$

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

22.  $b^{\frac{3}{5}}$   $\frac{1}{b^{\frac{2}{5}}}$  or  $\frac{b^{\frac{2}{5}}}{b}$

23.  $\frac{q^{\frac{3}{5}}}{q^{\frac{2}{5}}}$   $q^{\frac{1}{5}}$

24.  $\frac{t^{\frac{2}{3}}}{5t^{\frac{1}{2}} \cdot t^{-\frac{3}{4}}}$   $\frac{t^{\frac{11}{12}}}{5}$

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

$$\frac{2z + 2z^{\frac{1}{2}}}{z - 1}$$

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

$$2\sqrt{2}$$

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

$$12^{\frac{10}{5}}\sqrt{12}$$

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

$$3\sqrt[4]{6}$$

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

$$\frac{a\sqrt[3]{3b}}{3b}$$

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

$$x^{\frac{5}{3}}$$
 or  $\sqrt[3]{x^{12}}$

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

$$y^{\frac{1}{4}}$$
 or  $\sqrt[4]{y}$

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

$$\frac{1}{n^{\frac{1}{3}}} \text{ or } \frac{n^{\frac{2}{3}}}{n}$$
 or  $\frac{\sqrt[3]{n^2}}{n}$

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

$$a\sqrt[4]{7b}$$
 or  $a(7b)^{\frac{1}{4}}$

34. **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.

7.1 amps

35. **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.

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