# Exponents and Radicals

A. Evaluate each of the following: Show all your work

a) $81^{\frac{1}{2}} = 9 = 0$

b) $\left(\dfrac{81}{196}\right)^{\frac{1}{2}} =$

c) $\left(\dfrac{1000}{27}\right)^{-\frac{2}{3}}$

b) $(-243)^{-\frac{6}{5}}$

e) $\left(\dfrac{1}{128}\right)^{\frac{4}{7}}$

B. Simplify each of the following:

a) $x^{\frac{3}{7}} x^{\frac{9}{7}}$

b) $x^{\frac{2}{3}} x^{\frac{3}{5}}$

c) $\left(x^{\frac{3}{5}}\right)^{\frac{4}{7}}$

d) $\dfrac{x^{\frac{4}{5}}}{x^{\frac{2}{3}}}$

e) $\dfrac{x \cdot x^{\frac{2}{3}} \cdot x^{\frac{5}{6}}}{x^{-4} \cdot x^{\frac{1}{2}}}$

f) $3x^{-\frac{1}{3}}\left(2x^{\frac{1}{2}} - 3x\right)$

g) $\dfrac{x^{5a} \cdot x^{7a}}{x^{4a}}$

h) $\left(a^{2x-y}\right)\left(a^{2x+y}\right)$

C. Write each of the following in simpliest form:

a) $\sqrt{162}$

b) $\sqrt[5]{32}$

c) $\sqrt[4]{2^6 x^{12} y^{15}}$

b) $\sqrt[3]{81y^4 y^{11}}$

e) $\sqrt[3]{\dfrac{x^7}{243y^6}}$

D. Simplify each of the following radicals:

a) $3\sqrt{5} - 2\sqrt{5} + 7\sqrt{5}$

b) $-4\sqrt{6} + 3\sqrt{2} - 5\sqrt{6} + 9\sqrt{2}$

c) $\sqrt{27} + 2\sqrt{75}$

d) $3\sqrt[4]{80} + 6\sqrt[4]{405}$

e) $\sqrt{12} + 3\sqrt[3]{24}$

f) $\sqrt{15} \cdot \sqrt{5}$

g) $\sqrt{3x} \cdot \sqrt[3]{3}$

h) $2\sqrt[5]{8} \cdot -2\sqrt[5]{20}$

I) $\dfrac{\sqrt{60}}{\sqrt{15}}$

j) $\dfrac{\sqrt[3]{6}}{\sqrt[3]{15}}$

k) $\left(3 - \sqrt{5}\right)\left(3 + \sqrt{5}\right)$

l) $\left(\sqrt[3]{7} - 3\right)\left(\sqrt[3]{7} + 2\right)$

m) $\dfrac{3\sqrt{2}}{2\sqrt{5}}$

n) $\dfrac{2}{3 + \sqrt{5}}$