

Algebra RH

Essential Question: How do we simplify fractional exponents?

DO NOW:

a) Simplify: $\left(x^{\frac{1}{2}}\right)\left(x^{\frac{1}{2}}\right) =$

b) Simplify: $\left(z^{\frac{1}{3}}\right)\left(z^{\frac{1}{3}}\right)\left(z^{\frac{1}{3}}\right) =$

Apply “power over root”. Calculators will not be permitted!

MAIN POINT: $x^{\frac{p}{r}}$ means take the r th root of x , and then raise that to the p power.

$$\sqrt{81} \longrightarrow 81^{\frac{1}{2}} \qquad \sqrt[3]{27} \longrightarrow 27^{\frac{1}{3}} \qquad 4^{\frac{5}{2}} \longrightarrow (\sqrt{4})^5$$

Practice

1) Evaluate and simplify each of the following:

a) $64^{\frac{1}{3}}$

b) $125^{\frac{4}{3}}$

c) $27^{\frac{2}{3}}$

d) $4^{\frac{3}{2}}$

e) $\left(\frac{81}{9}\right)^{-\frac{1}{2}}$

f) $\left(\frac{a^2}{b^2}\right)^{-\frac{1}{2}}$

2) Solve (only positive solutions will be accepted) each of the following equations for the indicated variable.

a) $x = 81^{\frac{1}{4}}$

b) $x = \left(\frac{27}{8}\right)^{-\frac{1}{3}}$

c) $x^2 = 49$

d) $k^3 = 27$

e) $x^{\frac{1}{2}} = 8$

f) $x^{\frac{1}{2}} = 7$

g) $4k^{\frac{1}{4}} = 2$

3) TRUE or FALSE : If $x \geq 0$, then $x^{\frac{a}{b}} = \left(\sqrt[b]{x}\right)^a = \sqrt[b]{x^a}$

1) Evaluate and simplify each of the following:

a) $100^{\frac{1}{2}}$

b) $(-125)^{\frac{1}{3}}$

c) $-4^{\frac{3}{2}}$

d) $4^{\frac{3}{2}}$

e) $\left(\frac{100}{9}\right)^{\frac{1}{2}}$

f) $\left(\frac{8}{27}\right)^{\frac{1}{3}}$

g) $\left(\frac{64}{9}\right)^{\frac{1}{2}}$

h) $\left(\frac{16}{25}\right)^{\frac{3}{2}}$

i) $\left(\frac{81}{16}\right)^{\frac{1}{4}}$

j) $\left(\frac{125x^3}{8y^3}\right)^{\frac{1}{3}}$

k) $\left(\frac{1000x^3}{27y^3}\right)^{\frac{1}{3}}$

2) Solve each of the following equations for the indicated variable. Show all work!

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

b) $81x^{\frac{1}{3}} = 81$

c) $50 = 5x^{\frac{1}{2}}$

d) $4b^{\frac{2}{3}} = 81$

e) $100h^{\frac{2}{3}} = 9$

f) $2x^{-4} = 162$