

Radicals as Exponents

Let's look at the powers of 2

2^{-3}	2^{-2}	2^{-1}	2^0	2^1	2^2	2^3
$\frac{1}{8}$	$\frac{1}{4}$	$\frac{1}{2}$	1	2	4	8

$\sqrt{2} = 1.414..$ fits

$\sqrt[3]{2} = 1.2599..$ fits in this region too

So, these roots must be some kind of exponent too ... but **not a whole #**, and **not negative** ...
Which leaves rationals (fractions)

$2^{\frac{1}{2}} = 1.414$ and $2^{\frac{1}{3}} = 1.2599$ (which match above ...)

→ this means that radicals can be written as fractional exponents

1) Change the following to radical form

a) $x^{\frac{1}{5}}$

$\sqrt[5]{x}$

b) $x^{\frac{2}{7}}$

$\sqrt[7]{x^2}$

c) $12^{\frac{3}{4}}$

$\sqrt[4]{12^3}$ or $\sqrt[4]{1728}$

2) Change to exponential form

a) $\sqrt[5]{x^9}$

$x^{\frac{9}{5}}$

b) $\sqrt[4]{x}$

$x^{\frac{1}{4}}$

c) $\sqrt[3]{91}$

$91^{\frac{1}{3}}$

Which means we can apply these rules to our exponent laws

3) Simplify the following using exponent laws – ensure that NO negative exponents remain

a) $(x^{\frac{3}{2}})(x^{\frac{5}{4}})$

add expo $(x)^{\frac{11}{4}}$ or $\sqrt[4]{x^{11}}$

b) $(x)^{-\frac{1}{5}}(x)^{\frac{1}{3}}$

add expo $(x)^{\frac{2}{15}}$ or $\sqrt[15]{x^2}$

c) $(8x^{\frac{-1}{3}})(3x^{\frac{5}{7}})$

add expo $24(x)^{\frac{8}{21}}$ or $24\sqrt[21]{x^8}$

d) $\frac{(25x^{\frac{-1}{2}})}{(5x^{\frac{2}{3}})}$

subtract expo $5(x)^{-\frac{7}{6}}$ or $\frac{5}{\sqrt[6]{x^7}}$

e) $(27x^{\frac{3}{5}})^{\frac{1}{3}}$

x expo $27^{\frac{1}{3}}$ $3(x)^{\frac{1}{5}}$ or $3\sqrt[5]{x}$

Assignment = worksheet

d) $8(x)^{-\frac{1}{3}} \cdot 12(x)^{\frac{3}{4}}$

e) $(12x^{\frac{-1}{4}})(5x^{\frac{2}{3}})$

f) $(6x^{\frac{-1}{4}}) \div (3x^{\frac{2}{3}})$

Now write your answers in radical form

d)

e)

f)

g) $(8x^{\frac{3}{8}})(2x^{\frac{6}{5}})$

h) $(6x^{\frac{-1}{4}}) \div (3x^{\frac{2}{3}})$

i) $(-6x^8)(7x^{\frac{-2}{5}})$

Now write your answers in radical form

g)

h)

i)

j) $\frac{(x)^{\frac{8}{3}}}{(x)^{\frac{1}{5}}}$

k) $\frac{8(x)^{\frac{9}{7}}}{10(x)^{\frac{-1}{5}}}$

l) $\frac{14(x)^{\frac{-3}{2}}}{7(x)^{\frac{1}{8}}}$

Now write your answers in radical form

j)

k)

l)

m) $(8x^{\frac{3}{8}})^{\frac{1}{3}}$

n) $(16x^{\frac{2}{7}})^{\frac{1}{4}}$

o) $(125x^{\frac{5}{2}})^{\frac{-1}{3}}$

Now write your answers in radical form

m)

n)

o)