The $\frac{1}{2}$ power is the same as the 2nd (square) root - $\sqrt{\ }$.

The $\frac{1}{3}$ power is the same as the 3rd (cube) root - $\sqrt[3]{\ }$.

Here are some examples (remember that negative exponents make things move across the fraction bar)

$100^{1/2} = \mathbf{10}$ $\quad$ $100^{-1/2} = \frac{1}{100^{1/2}} = \mathbf{\frac{1}{10}}$

$256^{1/2} = \mathbf{16}$ $\quad$ $256^{-1/2} = \frac{1}{256^{1/2}} = \mathbf{\frac{1}{16}}$

$64^{1/3} = \mathbf{4}$ $\quad$ $64^{-1/3} = \frac{1}{64^{1/3}} = \mathbf{\frac{1}{4}}$

What do we do when the exponent is an improper fraction?

$16^{3/2} = 4^3 = \mathbf{64}$

Take the root — Go to the power

We are actually turning this into an expression that is a power to a power.

$16^{3/2} = (16^{1/2})^3 = 4^3 = \mathbf{64}$

You will get the same answer if you go to the power first and then take the root.

$16^{3/2} = 4096^{1/2} = \mathbf{64}$

Go to the power — Take the root

Here are some more examples of exponents that are improper fractions.

$$125^{2/3} = (125^{1/3})^2 = 5^2 = \mathbf{25}$$

$$100^{-3/2} = \frac{1}{100^{3/2}} = \frac{1}{(100^{1/2})^3} = \frac{1}{10^3} = \mathbf{\frac{1}{1000}}$$

A decimal exponent can be changed into an improper fraction.

$$4^{2.5} = 4^{5/2} = (4^{1/2})^5 = 2^5 = \mathbf{32}$$

The same exponent rules apply when one (or all) of the exponents are fractions.

$$(36^2)^{1/4} = 36^{2/4} = 36^{1/2} = \mathbf{6}$$

Multiply the exponents (power to a power)