Name: Date: Period:

Fractional exponents: If you have a fractional exponent, the **numerator** is the **power** to which the number should be taken and the **denominator** is the **root** which should be taken.

For example, $125^{\frac{4}{3}}$ means:

denominator = root → $\left(\sqrt[3]{125}\right)^4$ ← Numerator = power

take the cube root of 125 and then take the result to the fourth power

Special Notes:

- Order does not matter when evaluating exponents--it is usually easier to take the root first, and then take the power, however, you could take 125 to the fourth power and take the cube root of the result as well.
- Since we cannot take the even root of a negative number, we cannot take a negative number to a fractional power if the denominator of the exponent is even.

Example: $(-6)^{\frac{1}{2}} = (\sqrt[2]{-6}\,)^1$ Cannot be computed because can't take the square root of a negative #.

- A negative fractional exponent works just like an ordinary negative exponent. First, we switch the numerator and the denominator of the base number, and then we apply the positive exponent.

Example: $125^{-\frac{2}{3}} = \left(\frac{1}{125}\right)^{\frac{2}{3}} = \left(\sqrt[3]{\frac{1}{125}}\right)^2 = \left(\frac{1}{5}\right)^2 = \frac{1}{25}$

Try These:

1. $343^{\frac{2}{3}}$

2. $81^{\frac{5}{4}}$

3. $256^{\frac{1}{4}}$

4. $36^{\frac{3}{2}}$

5. $(\frac{8}{125})^{\frac{4}{3}}$

6. $(\frac{32}{243})^{-\frac{3}{5}}$