

## Bellwork: Algebra

1. Write down your work for the week in your planner.
2. You need your composition book today!
3. Turn in your bellwork sheet from last week if you have not done so already.
4. Any work you were to do last week when I wasn't here (H-11 and the work from the book) I will be checking tomorrow.
5. Answer the following question on your bellwork in the MONDAY box:

$$x^{\frac{3}{4}} = \sqrt[4]{x^3}$$

The diagram illustrates the conversion of the fractional exponent  $x^{\frac{3}{4}}$  to a radical form. A curved arrow points from the denominator 4 to the root symbol of  $\sqrt[4]{x^3}$ . Another arrow points from the numerator 3 to the exponent 3. To the right, the expression  $(\sqrt[4]{x})^3$  is circled.

$$\boxed{\text{n}^{\text{th}} \text{ root}} \sqrt[n]{b} = b^{\frac{1}{n}} \boxed{\text{n}^{\text{th}} \text{ root}}$$

$\sqrt{b} = b^{\frac{1}{2}}$	$\sqrt{49}$	$49^{\frac{1}{2}}$	7
$\sqrt[3]{b} = b^{\frac{1}{3}}$	$\sqrt[3]{64}$	$64^{\frac{1}{3}}$	4
$\sqrt[4]{b} = b^{\frac{1}{4}}$	$\sqrt[4]{81}$	$81^{\frac{1}{4}}$	3
$\sqrt[5]{b} = b^{\frac{1}{5}}$	$\sqrt[5]{32}$	$32^{\frac{1}{5}}$	2
$\sqrt[6]{b} = b^{\frac{1}{6}}$	$\sqrt[6]{64}$	$64^{\frac{1}{6}}$	2



Practice translating expressions in radical and exponential form.

$$14^{\frac{1}{2}} =$$

$$(5x)^{\frac{1}{2}} =$$
$$\sqrt{5x}$$

$$17y^{\frac{1}{3}} =$$

$$x^{\frac{1}{3}} =$$

$$(19ab)^{\frac{1}{2}} =$$
$$\sqrt{19ab}$$

$$\sqrt[4]{y} =$$
$$y^{\frac{1}{4}}$$

$$\sqrt{12n} =$$
$$(12n)^{\frac{1}{2}}$$

$$\sqrt[3]{b} =$$

$$\sqrt{37} =$$

Simplify!

$$49^{\frac{1}{2}} =$$

$$25^{\frac{1}{2}} =$$
$$\sqrt{25} = 5$$

$$27^{\frac{1}{3}} =$$

$$64^{\frac{1}{3}} =$$
$$\sqrt[3]{64} = 4$$

$$100^{\frac{1}{2}} =$$

$$\sqrt[4]{16} =$$

$$\sqrt{144} =$$
$$144^{\frac{1}{2}} = 12$$

$$\sqrt[3]{125} =$$
$$125^{\frac{1}{3}} = 5$$

$$\sqrt{64} =$$

Practice translating expressions in radical and exponential form.

$$14^{\frac{3}{2}} =$$

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

$$17y^{\frac{2}{3}} =$$

$$x^{\frac{4}{3}} =$$
$$(\sqrt[3]{x})^4$$

$$(\sqrt{5x})^3$$

$$19ab^{\frac{5}{2}} =$$

$$(\sqrt[4]{y})^3 =$$

$$(\sqrt{12n})^3 =$$

$$(\sqrt[3]{b})^2 =$$

$$(\sqrt{37})^5 =$$

$$(12n)^{\frac{3}{2}}$$

$$(37)^{\frac{5}{2}}$$

Simplify!

$$49^{\frac{3}{2}} =$$

$$25^{\frac{3}{2}} =$$

$$27^{\frac{2}{3}} =$$

$$(\sqrt{25})^3 = 125$$

$$64^{\frac{2}{3}} =$$

$$100^{\frac{3}{2}} =$$

$$(\sqrt[4]{16})^3 =$$

$$(\sqrt{100})^3 = 1,000$$

$$(\sqrt{144})^2 =$$

$$(\sqrt[3]{125})^2 =$$

$$(\sqrt{64})^2 =$$

$$144^{\frac{2}{2}} = 144$$

$$125^{\frac{2}{3}} = 25$$

**Rewrite the expression using Radical Notation.  
Then simplify if possible.**

$$a^{\frac{m}{n}} = \sqrt[n]{a^m} = (\sqrt[n]{a})^m$$

1)  $9^{\frac{1}{2}} = \sqrt{9}$

$(3)$

2)  $8^{\frac{2}{3}}$

$(\sqrt[3]{8})^2 = 4$

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

$(\sqrt[5]{x})^3$

**Rewrite the expression using Rational Exponent Notation**

$$(\sqrt[n]{a})^m = \sqrt[n]{a^m} = a^{\frac{m}{n}}$$

4)  $\sqrt[5]{13} = 13^{\frac{1}{5}}$

5)  $\sqrt[3]{25} = 25^{\frac{1}{3}}$

6)  $(\sqrt{7})^5 = 7^{\frac{5}{2}}$



### Product Rule with Rational Exponents

$$a^m \cdot a^n = a^{m+n}$$

$$7) x^{\frac{1}{5}} \cdot x^{\frac{3}{5}}$$

$$x^{\frac{4}{5}}$$

$$8) \sqrt[4]{x} \cdot \sqrt[3]{x^2}$$

$$x^{\frac{1}{4}} \cdot x^{\frac{2}{3}}$$

$$x^{\frac{3}{12}} \cdot x^{\frac{8}{12}} = x^{\frac{11}{12}}$$

### Quotient Rule with Rational Exponents

$$\frac{a^m}{a^n} = a^{m-n}$$

$$9) \frac{x^{\frac{7}{10}}}{x^{\frac{6}{10}}}$$

$$x^{\frac{1}{10}}$$

$$10) \frac{\sqrt[6]{x^5}}{\sqrt[6]{x^2}}$$

$$\frac{x^{\frac{5}{6}}}{x^{\frac{2}{6}}} = x^{\frac{3}{6}}$$

$$= x^{\frac{1}{2}}$$

### Power Rule with Rational Exponents

$$(a^m)^n$$

$$11) \left(x^{\frac{3}{5}}\right)^{\frac{1}{2}}$$

$$x^{\frac{3}{10}}$$

$$12) \left(x^{\frac{3}{4}}\right)^{\frac{2}{3}}$$

$$x^{\frac{6}{12}} = x^{\frac{1}{2}}$$

### Negative and Zero Rules with Rational Exponents

$$a^{-n} = \left(\frac{1}{a}\right)^n$$

$$a^0 = 1$$

$$13) \left(\frac{4}{9}\right)^{-\frac{3}{2}}$$

$$\left(\frac{9}{4}\right)^{\frac{3}{2}}$$

$$14) \left(x^{\frac{3}{4}}\right)^0 = 1$$

$$\left(\frac{4}{9}\right)^{-\frac{3}{2}} = \frac{4^{\frac{3}{2}}}{9^{-\frac{3}{2}}} = \frac{9^{\frac{3}{2}}}{4^{\frac{3}{2}}} = \frac{(\sqrt{9})^3}{(\sqrt{4})^3} = \frac{27}{8}$$