

* = complete

Simplifying Radicals

Fill in the table to get a list of Perfect Squares:

$1^2 =$

$6^2 =$

$2^2 =$

$7^2 =$

$3^2 =$

$8^2 =$

$4^2 =$

$9^2 =$

$5^2 =$

$10^2 =$

Property

Multiplication Property of Square Roots

For every number $a \geq 0$ and $b \geq 0$, $\sqrt{ab} = \sqrt{a} \cdot \sqrt{b}$.

Example $\sqrt{54} = \sqrt{9} \cdot \sqrt{6} = 3 \cdot \sqrt{6} = 3\sqrt{6}$

To Simplify a Radical:

1. Find 2 numbers that multiply to get the number under the square root. One of the numbers MUST be a perfect square
2. Use the multiplication property to break apart the square root into 2 square roots
3. Take the square root of the perfect square
4. Double check to make sure the number under the square root does not have any perfect square factors

Examples:

* $\sqrt{63}$

$3\sqrt{7}$

* $\sqrt{180}$

$6\sqrt{5}$

* $\sqrt{98}$

$7\sqrt{2}$

* $\sqrt{675}$

$15\sqrt{3}$

$\sqrt{13} * \sqrt{52}$

$\sqrt{12} * \sqrt{32}$

You Try...Simplify

$$\sqrt{32}$$

$$* \sqrt{22} * \sqrt{8}$$

$$4\sqrt{11}$$

$$\sqrt{147}$$

$$\sqrt{80}$$

$$4\sqrt{5}$$

$$* \sqrt{18} * \sqrt{8}$$

$$12$$

$$\sqrt{200}$$

$$* \sqrt{15} * \sqrt{6}$$

$$3\sqrt{10}$$

$$\sqrt{120}$$

Day 2:

Square Roots With Variables:

$$\sqrt{x^2} =$$

$$\sqrt{x^8} =$$

$$\sqrt{x^4} =$$

$$\sqrt{x^{10}} =$$

$$\sqrt{x^6} =$$

$$\sqrt{x^{12}} =$$

If a radical has a variable with an odd exponent, break apart the variable so that you have a variable to an even # power times the variable to the first power.

Examples: $b^5 = b^4 * b$
 $m^9 = m^8 * m$

The square root of the variable to the even exponent is the variable raised to half of the exponent.

Examples: $\sqrt{b^5} = \sqrt{b^4 * b} = b^2 \sqrt{b}$
 $\sqrt{m^9} = \sqrt{m^8 * m} = m^4 \sqrt{m}$

Example: Simplify

$$* \sqrt{54t^2}$$

$$3t\sqrt{6}$$

$$* \sqrt{176a^3}$$

$$4a\sqrt{11a}$$

$$* \sqrt{75x^2y}$$

$$5x\sqrt{3y}$$

$$* \sqrt{7200m^5n^6}$$

$$60m^2n^3\sqrt{2m}$$

$$* 5\sqrt{3c} * \sqrt{6c}$$

$$15c\sqrt{2}$$

$$* 2\sqrt{5a^2} * 6\sqrt{10a^3}$$

$$60a^2\sqrt{2a}$$

You Try...Simplify

$$\sqrt{a^2b^5}$$

$$\sqrt{12x^4}$$

$$\sqrt{48x^3}$$

$$\sqrt{45x^2y^3}$$

$$12\sqrt{60x^2}$$

$$\sqrt{8x^6y^7}$$

$$\sqrt{16a^3} * \sqrt{5a^2}$$

$$\sqrt{3x} * \sqrt{5x}$$

Dividing Radicals

Property

Division Property of Square Roots

For every number $a \geq 0$ and $b > 0$, $\sqrt{\frac{a}{b}} = \frac{\sqrt{a}}{\sqrt{b}}$.

Example $\sqrt{\frac{16}{25}} = \frac{\sqrt{16}}{\sqrt{25}} = \frac{4}{5}$

To Simplify Radicals with fractions:

- If possible, simplify the fraction
- Break up the square root to have a square root of the top and square root of the bottom
- Simplify both square roots

Simplifying using the Division Property

$$\sqrt{\frac{13}{64}}$$

$$\sqrt{\frac{15}{16}}$$

$$\sqrt{\frac{35}{144}}$$

$$\sqrt{\frac{49}{x^4}}$$

$$\sqrt{\frac{120}{10}}$$

$$* \sqrt{\frac{90}{5}}$$

$$* \sqrt{\frac{48}{75}}$$

$$* \sqrt{\frac{75x^5}{48x}}$$

$$3\sqrt{2}$$

$$\frac{4}{5}$$

$$\frac{5x^2}{4}$$

$$* \sqrt{\frac{15}{49}}$$

$$* \sqrt{\frac{48n^6}{6n^3}}$$

$$* \sqrt{\frac{44x^3}{9x}}$$

$$\frac{\sqrt{15}}{7}$$

$$2n\sqrt{2n}$$

$$\frac{2x\sqrt{11}}{3}$$