Name:

List the first 15 perfect squares:

1^2	2^2	3^2	4^2	5^2	6^2	7^2	8^2	9^2	10^2	11^2	12^2	13^2	14^2	15^2	16^2
↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓
1	4	9	16	25	36	49	64	81	100	121	144	169	196	225	256

These are the first 16 perfect squares

There are two types of real numbers: rational and irrational numbers. π

a number that can be written as a fraction
- terminates
- never ends, but has a pattern

$\sqrt{\ }$ can NOT be written as a fraction
- never ends with no pattern

Because irrational numbers can be "messy," an equivalent way to write them can be to write them as a radical expression. This is often a "cleaner" way of representing the same quantity, and therefore, easier to work with.

IT IS IMPORTANT THEN TO KNOW HOW TO SIMPLIFY THEM.

Simplifying Radical Expressions

Product Property of Square Roots

$\sqrt{a \cdot b} = \sqrt{a} \cdot \sqrt{b}$

ex: *simplify* $\sqrt{108}$ ← goal is to free any perfect square factors

rewrite 108 as a product in which one of the factors is a perfect square

$\sqrt{4 \cdot 27}$

$\sqrt{4}\ \sqrt{27}$

$2\sqrt{27}$ ← do any perfect squares go into 27?

$\sqrt{9 \cdot 3}$

$\sqrt{9}\ \sqrt{3}$

$\boxed{2 \cdot 3\sqrt{3}} \rightarrow \boxed{6\sqrt{3}}$

Quotient Property of Square Roots

$\sqrt{\frac{a}{b}} = \frac{\sqrt{a}}{\sqrt{b}}$

Simplify $\sqrt{\frac{4x^2}{64}}$ • Simplify if possible

$\div 2$

$\sqrt{\frac{2x^2}{32}}$

$\div 2$

$\sqrt{\frac{x^2}{16}}$ BREAK it Up!

$\frac{\sqrt{x^2}}{\sqrt{16}} = \boxed{\frac{x}{4}}$

Name:

Algebra 1: Unit 3 Notes

Level One:
Simplify the radical expression using the product property of square roots.

a. $\sqrt{75}$

$\sqrt{25}\sqrt{3}$

$\boxed{5\sqrt{3}}$

b. $\sqrt{128}$

$\sqrt{4}\sqrt{32}$

$2 \cdot 2\sqrt{4}\sqrt{8}$

$\cdot 2\sqrt{4}\sqrt{2}$

$\boxed{8\sqrt{2}}$

c. $2\sqrt{75} \cdot 4\sqrt{2}$

MULTIPLY NON-RADICANDS TOGETHER

$8\sqrt{150}$

$8 \cdot \sqrt{25}\sqrt{6}$

$8 \cdot 5\sqrt{6}$

$\boxed{40\sqrt{6}}$

d. $3\sqrt{14} \cdot 5\sqrt{2}$

MULTIPLY RADICANDS TOGETHER AND SIMPLIFY

- FACTOR OUT PERFECT SQUARES

$3 \cdot 5$

$15 \cdot \sqrt{14 \cdot 2}$

$\sqrt{28}$

$\sqrt{4}\sqrt{7}$

$15 \cdot 2\sqrt{7}$

$\boxed{30\sqrt{7}}$

Level two:
Simplify the radical Expression using the quotient property of square roots

e. $\sqrt{\frac{121}{w^2}} \rightarrow \frac{\sqrt{121}}{\sqrt[2]{w^2}} \rightarrow \frac{11}{w^{2/2}} \rightarrow \boxed{\frac{11}{w^1}}$

f. $\sqrt{\frac{7}{12}} \cdot \sqrt{\frac{5}{3}}$ $\quad \sqrt{\frac{7 \cdot 5}{12 \cdot 3}}$ $\quad \sqrt{\frac{35}{36}}$

$\frac{\sqrt{35}}{\sqrt{36}} \rightarrow \boxed{\frac{\sqrt{35}}{6}}$

Simplified form also means no radical remains in the denominator.
After simplifying the quotient, if a radical remains in the denominator, ***MULTIPLY*** *the numerator and denominator by the denominator's radical expression.*

g. $\sqrt{\frac{15}{18n}} \div \frac{3}{3} \rightarrow \sqrt{\frac{5}{6n}} \rightarrow \frac{\sqrt{5}}{\sqrt{6n}}$

$\frac{\sqrt{5}}{\sqrt{6n}} \cdot \frac{\sqrt{6n}}{\sqrt{6n}} = \boxed{\frac{\sqrt{30n}}{6n}}$

h. $\sqrt{\frac{3}{8}} \cdot \sqrt{\frac{4}{5}}$ $\quad \sqrt{\frac{3 \cdot 4}{8 \cdot 5}} \rightarrow \sqrt{\frac{12}{40}} \div \frac{4}{4}$

$\sqrt{\frac{3}{10}} \rightarrow \frac{\sqrt{3}}{\sqrt{10}} \cdot \frac{\sqrt{10}}{\sqrt{10}} = \boxed{\frac{\sqrt{30}}{10}}$