Algebra G
Unit 9
Notes

key

Unit 9
Simplify Radicals

Radical – the generic name for square roots, cube roots, 4th roots, etc.

The process of simplifying radicals is a hold-over from before handheld calculators. It does help to organize us a bit, but also to know where on a number line a number falls (number sense). This topic still shows up on standardized tests and so we will need to show you.

Let's get started:

Discuss: Between what two integers does $\sqrt{56}$ fall?

Question: What does it mean for a radical to be in simplest form?

Can you guess which ones are simplified?

$\sqrt{50}$ $\sqrt{2}$ $3\sqrt{10}$ $\sqrt{\frac{81}{16}}$ $\sqrt{\frac{5}{4}}$ $\frac{1}{2}\sqrt{3}$ $-\sqrt{5}$

Simplest Form of a Radical includes…

1. No perfect squares inside the square root.
2. No Fractions inside square root
3. No square root in denominator.

Circle the expressions written in simplest form:

$\frac{\sqrt{8}}{\sqrt{25}}$ $3\sqrt{2}$ $\sqrt{9}$ $\frac{\sqrt{2}}{5}$ $\frac{\sqrt{2}}{\sqrt{3}}$ $-\sqrt{5}$

Now, why is the $\sqrt{9}=3$?

Because $\sqrt{9}=\sqrt{3\cdot 3}=3$, right? And what about $\sqrt{16}$? $\sqrt{16}=\sqrt{4\cdot 4}=4$.

So, for every PAIR under the square root, you get ONE outside.

Product Property of Radicals: $\sqrt{a}\cdot\sqrt{b}=\sqrt{ab}$

* you can split the square root when multiplying

Examples:

1. $\sqrt{2}\cdot\sqrt{4}$. $= \sqrt{8} = 2\sqrt{2}$

2. $\sqrt{7}\cdot\sqrt{3}$

3. $\sqrt{3}\cdot 4\sqrt{2}$ $= 4\sqrt{6}$

4. $3\sqrt{6}\cdot 7\sqrt{7}$ $= 21\sqrt{42}$

<u>The Factor Tree Method to "Simplify Radicals"</u>

$\sqrt{24}$

6 4

2 3 2 2

$2\sqrt{6}$

$\sqrt{75}$

5 15

5 3

$5\sqrt{3}$

$\sqrt{18}$

6 3

3 2

$3\sqrt{2}$

$\sqrt{32}$

4 8

2 2 2 4

2 2

$4\sqrt{2}$

$2\sqrt{75}$

5 15

5 3

$2\cdot 5\sqrt{3}$

$10\sqrt{3}$

$3\sqrt{200}$

2 100

10 10

2 5 2 5

$3\cdot 2\cdot 5\sqrt{2} = 30\sqrt{2}$

$2\sqrt{3}\cdot 4\sqrt{2}$

$8\sqrt{6}$

$3\sqrt{11}\cdot\sqrt{2}$

$3\sqrt{22}$

$2\sqrt{10}\cdot 3\sqrt{2}$

$6\sqrt{20}$

4 5

2 2

$2\cdot 6\sqrt{5}$

$12\sqrt{5}$

$\sqrt{8}\cdot 5\sqrt{2}$

$5\sqrt{16}$

8 2

4 2

2 2

$5\cdot 2\cdot 2 = 20$