ACCUPLACER PREP

Elementary Algebra

SECTION 3

- *Radicals*

General Information

- About 12 questions
- Calculator for some problems
  → will pop up on screen when allowed
- Untimed

Radicals

$\sqrt{1} \cdot \sqrt{1} = \sqrt{1} = 1$
$\sqrt{2} \cdot \sqrt{2} = \sqrt{4} = 2$
$\sqrt{3} \cdot \sqrt{3} = \sqrt{9} = 3$
$\sqrt{4} \cdot \sqrt{4} = \sqrt{16} = 4$
$\sqrt{5} \cdot \sqrt{5} = \sqrt{25} = 5$
$\sqrt{6} \cdot \sqrt{6} = \sqrt{36} = 6$
$\sqrt{151} \cdot \sqrt{151} = 151$

Do you see the pattern?

FACTS:

$\sqrt{a} \cdot \sqrt{a} = (\sqrt{a})^2 = a$

$-\sqrt{a} \cdot -\sqrt{a} = (-\sqrt{a})^2 = a$

$\sqrt{0} = 0$

Product Rule for Radicals

For nonnegative real numbers a and b,

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

Examples

$\sqrt{2} \cdot \sqrt{7} = \sqrt{14}$
$\sqrt{5} \cdot \sqrt{11} = \sqrt{55}$
$\sqrt{6} \cdot \sqrt{x} = \sqrt{6x}$

More Examples

$\sqrt{5} \cdot \sqrt{5} = 5$

$\sqrt{3} \cdot \sqrt{12} = \sqrt{36} = 6$

$\sqrt{27} \cdot \sqrt{3} = \sqrt{81} = 9$

$3\sqrt{2} \cdot 7\sqrt{3} = 21\sqrt{6}$

Quotient Rule for Radicals

If a and b are nonnegative real numbers and $b \neq 0$, then

$$\sqrt{\frac{a}{b}} = \frac{\sqrt{a}}{\sqrt{b}} \quad \text{and} \quad \frac{\sqrt{a}}{\sqrt{b}} = \sqrt{\frac{a}{b}}$$

Examples

$$\sqrt{\frac{3}{4}} = \frac{\sqrt{3}}{\sqrt{4}} = \frac{\sqrt{3}}{2} \qquad \frac{\sqrt{50}}{\sqrt{5}} = \sqrt{\frac{50}{5}} = \sqrt{10}$$

Squaring a Radical Expression

Find the square of each radical expression.

Can be written as:
$\sqrt{\#} \cdot \sqrt{\#} = \#$ *or as* $(\sqrt{\#})^2 = \#$

$\sqrt{6} \longrightarrow (\sqrt{6})^2 \longrightarrow 6$

$\sqrt{a+b} \longrightarrow (\sqrt{a+b})^2 \longrightarrow a+b$

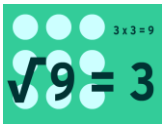
Simplifying Radicals

Radicals are considered to be simplified when there are no "perfect square" factors left under the radical sign

What are perfect squares?

Perfect Square

The result you get when you square a number



Perfect Square	How to get it...
4	2 · 2
9	3 · 3
16	4 · 4
25	5 · 5
36	6 · 6
49	7 · 7
64	8 · 8
81	9 · 9
100	10 · 10
121	11 · 11
144	12 · 12
169	13 · 13

Simplify.

$\sqrt{12}$

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

$2 \cdot \sqrt{3}$

$2\sqrt{3}$

Notice that you don't need a dot—multiplication is implied when the terms are smushed ☺

12 can be written as 4 x 3 (and 4 is a perfect square!)

Re-write—listing the perfect factor first.

Underline the perfect factor.

Replace the underlined part with its value.

Simplify.

Break 32 into two factors: a perfect square and a "leftover".

Re-write—listing the perfect factor first.

Underline the perfect factor.

Replace the underlined part with its value.

$\sqrt{32}$

$\sqrt{16}\sqrt{2}$

$4\sqrt{2}$

Let's take a LOOK

Simplify.

Let's say you chose to use 4 x 8 (since 4 is a perfect square)

Notice: the 8 under the radical still has a perfect square factor (another 4)

Just do to process again.

Finally, multiply the two numbers that are in front of the radical sign.

$\sqrt{32}$

$\sqrt{4}\sqrt{8}$

$2\sqrt{8}$

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

$2 \cdot 2\sqrt{2}$

$4\sqrt{2}$

This is the same result we got before!

Simplify.

$\sqrt{75x^6y^3z}$

Simplify term by term.

Any perfect square factors of 75?

25 x 3

x^6 is perfect because the exponent is even.

So we don't break it up.

y^3 is not perfect because the exponent is odd.

Break it into a perfect and a leftover.

z cannot be broken down.

$\sqrt{25}\sqrt{3}\sqrt{x^6}\sqrt{y^2}\sqrt{y}\sqrt{z}$

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

Underline the perfect terms

Simplify those terms.

Re-write the "leftovers," keeping them under the radical sign.

How would you do this?

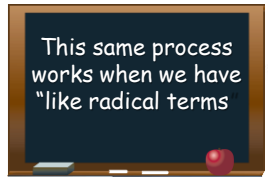
Perform the indicated operation.

$3x + 7x$

$10x$

$6y - 11y$

$-5y$



Perform the indicated operation.

$5\sqrt{2} + 4\sqrt{2} \longrightarrow 9\sqrt{2}$

$-8\sqrt{5} - 9\sqrt{5} \longrightarrow -17\sqrt{5}$

$\sqrt{x} + 8\sqrt{x} \longrightarrow 9\sqrt{x}$

$-\sqrt{6} + 7\sqrt{5} \longrightarrow can't\ be\ simplified$

What about this one?

Start by simplifying each term to see if they are "like"

$\sqrt{27} + \sqrt{12}$

$\sqrt{9}\sqrt{3} + \sqrt{4}\sqrt{3}$

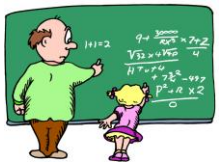
$3\sqrt{3} + 2\sqrt{3}$

$5\sqrt{3}$

Now they are "like" terms

RESOURCES:

Go to your nearest Academic Services Lab and you can get a packet of practice problems. You can also work with an instructor!



ONLINE RESOURCES:

http://www.purplemath.com/
"Accuplacer Math" can be found on the right side of the screen

http://accuplacerpractice.collegeboard.org/
need to create an account but appears to be free