

U2D1_T Radicals MCR 3UI

November 30, 2017 3:31 PM



U2D1_T
Radicals ...

U2D1 MCR 3UI

$\sqrt{\quad}$ Radicals

Warm Up: Simplify.

a) $(x)(y)$

$$= xy$$

b) $(2x)(5xy)$

$$= 10x^2y$$

c) $14x + 8x - x$

$$= 21x$$

d) $2x + 3y$

Does not
simplify

e) $3x(2x - 1)$

$$= 6x^2 - 3x$$

f) $(4x - 5y)(7x + 4y)$

$$= 28x^2 + 16xy - 35xy - 20y^2$$
$$= 28x^2 - 19xy - 20y^2$$

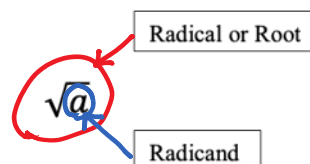
g) $(3x)^2$

$$= (3)^2(x)^2$$
$$= 9x^2$$

h) $(3 + x)^2$

$$= x^2 + 6x + 9$$

Definitions:



Properties:

1. Product Property \sqrt{ab}

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

2. Quotient Property $\sqrt{\frac{a}{b}}$

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

Simplest Form

A radical is in simplest form when:

1. The radicand has no perfect square factors other than 1.
2. The radicand does not contain a ~~factor~~ fractions.
3. No radical appears in the denominator of a fraction.

To eliminate, we rationalize the denominator.

(next year)

Compare these numbers:

A.	$\frac{12}{7}$	versus	$1\frac{5}{7}$
	Improper fraction		Mixed Fraction

B.	$\sqrt{24}$	versus	$2\sqrt{6}$
	Entire Radical		Mixed Radical

1. Simplify the following.

a) $\sqrt{18}$ *entire radical*
 $= \sqrt{9 \times 2}$
 $= \sqrt{9} \times \sqrt{2}$
 $= 3\sqrt{2}$

b) $\sqrt{27}$
 $= \sqrt{9 \times 3}$
 $= 3\sqrt{3}$

c) $\sqrt{100 - 36}$
 $= \sqrt{64}$
 $= 8$

d) $\sqrt{\frac{25}{16}}$
 $= \frac{\sqrt{25}}{\sqrt{16}}$
 $= \frac{5}{4}$

Perfect Squares
1
4
9
16
25
36
49
64
81
100
121
144

mixed radical.

2. Multiply the following:

a) $\sqrt{3} \times \sqrt{5}$
 $= \sqrt{3 \times 5}$
 $= \sqrt{15}$

b) $(2\sqrt{3})(5\sqrt{6})$ $(2x)(5y)$
 $= 10\sqrt{3 \times 6}$ $= 10xy$
 $= 10\sqrt{18}$
 $= 10\sqrt{9}(\sqrt{2})$
 $= 10(3)\sqrt{2}$
 $= 30\sqrt{2}$

*10\sqrt{3 \times 3 \times 2} **
 $= 10(3\sqrt{2})$
 $= 30\sqrt{2} *$

3. Divide the following:

a) $\frac{\sqrt{10}}{\sqrt{2}}$
 $= \sqrt{\frac{10}{2}}$
 $= \sqrt{5}$

b) $\frac{6\sqrt{18}}{12\sqrt{2}}$
 $= \left(\frac{6}{12}\right)\sqrt{\frac{18}{2}}$
 $= \frac{1}{2}\sqrt{9}$
 $= \frac{3}{2}$

Adding and Subtracting

- First change all radicals to simplest form
- Then only add/subtract terms with "Like Radicals"

4. Add or subtract the following:

Like $14x + 8x - x$ where x is $\sqrt{7}$

a) $14\sqrt{7} + 8\sqrt{7} - \sqrt{7}$
 $= 21\sqrt{7}$

b) $2\sqrt{5} + 3\sqrt{6}$
does not simplify.
 $\sqrt{5}, \sqrt{6}$ are not
"LIKE" radicals

c) $\sqrt{3} + \sqrt{27} - 2\sqrt{75}$
 $= \sqrt{3} + \sqrt{9 \times 3} - 2\sqrt{25 \times 3}$
 $= \sqrt{3} + 3\sqrt{3} - 2(5\sqrt{3})$
 $= \sqrt{3} + 3\sqrt{3} - 10\sqrt{3}$
 $= -6\sqrt{3}$

d) $\frac{-8 + \sqrt{32}}{4}$
 $= \frac{-8 + \sqrt{16 \times 2}}{4}$
 $= \frac{-8 + 4\sqrt{2}}{4}$
 $= \frac{4(-2 + \sqrt{2})}{4} *$
 $= \sqrt{2} - 2$

$$\sqrt{3} \times \sqrt{3} = 3$$

$$\sqrt{12} \times \sqrt{12} = 12$$

$$\sqrt{197} \times \sqrt{197} = 197$$

5. Multiply the following:

a) $3\sqrt{7}(2\sqrt{7}-1)$

$$= 6(7) - 3\sqrt{7}$$

$$= 42 - 3\sqrt{7}$$

b) $(4\sqrt{2}-5\sqrt{3})(7\sqrt{2}+4\sqrt{3})$

$$= 28(2) + 16\sqrt{6} - 35\sqrt{6} - 20(3)$$

$$= \underline{56} - 19\sqrt{6} - \underline{60}$$

$$= -4 - 19\sqrt{6}$$

c) $(\sqrt{3975})^2$

$$= 3975$$

d) $(3\sqrt{5})^2$

$$= (3)^2(\sqrt{5})^2$$

$$= 9(5)$$

$$= 45$$

e) $(3+\sqrt{5})^2$

$$= (3+\sqrt{5})(3+\sqrt{5})$$

$$= 9 + 6\sqrt{5} + 5$$

$$= 14 + 6\sqrt{5}$$