Unit 1 – Mathematical Relationships

Square Roots and Simplifying Radicals

Radical Sign (square root sign)

Radicand

Numbers or variables under the radical sign

Prime Numbers

2 3 5 7 11 13...

Radicals are in SIMPLEST form when:

1. No perfect square factors other than 1 are under the radical.
2. No fractions are under the radical.
3. No radicals are in the denominator.

You'll need to know how to prime factor to simplify square roots.

- If a radicand isn't a perfect square, you'll prime factor.

- List some prime factors.

Factor Trees to Prime Factorization

45

Factor Trees to Prime Factorization

54

Factor Trees to Prime Factorization

98

EX:1 Simplify.

$$\sqrt{45} = \sqrt{3 \bullet 3 \bullet 5} = 3\sqrt{5}$$

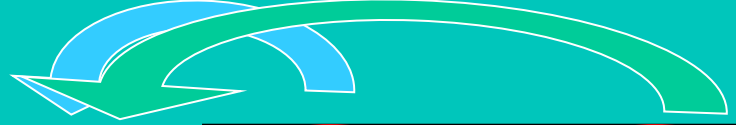
When you have a pair, bring the number out.

EX:2 Simplify

$$-\sqrt{98} = -\sqrt{2 \bullet 7 \bullet 7} = -7\sqrt{2}$$

When you have a pair, bring the number out.

EX:3



$$\sqrt{48} = \sqrt{2 \bullet 2 \bullet 2 \bullet 2 \bullet 3}$$

$$= 2 \bullet 2\sqrt{3}$$

$$= 4\sqrt{3}$$

EX:4 Simplify.

$$2\sqrt{45} = 2\sqrt{3 \bullet 3 \bullet 5}$$

$$= 2 \bullet 3\sqrt{5}$$

$$= 6\sqrt{5}$$

You try!

5. $\sqrt{20}$

$2\sqrt{5}$

6. $4\sqrt{40}$

$8\sqrt{10}$

7. $-\sqrt{99}$

$-3\sqrt{11}$

8. $\sqrt{108}$

$6\sqrt{3}$

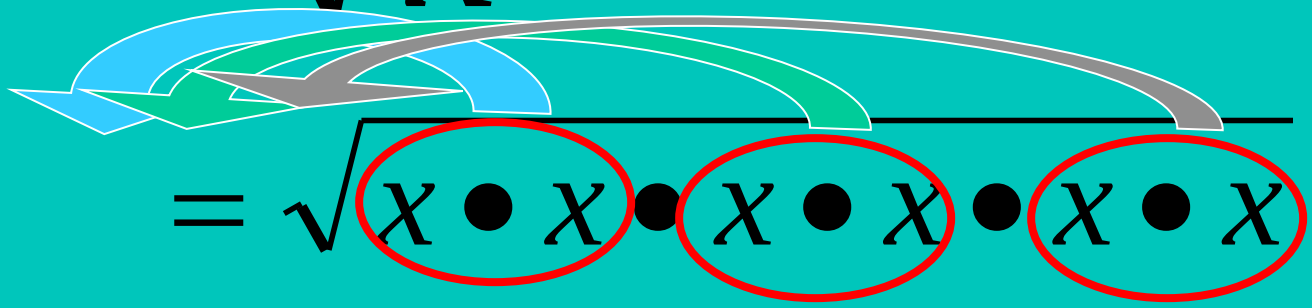
Variables as Radicands

Even Exponent – Take HALF out (nothing left under the radical)

ODD Exponent – Leave ONE under the radical and take HALF of the rest out

EX:9 VARIABLES

$$\sqrt{x^6}$$



$$= \sqrt{x \bullet x \bullet x \bullet x \bullet x \bullet x}$$

When you have a pair, bring that term out.

$$= x \bullet x \bullet x \qquad = x^3$$

EX:10 VARIABLES

$$\sqrt{a^3b^4}$$

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

When you have a pair, bring that term out.

$$= a \bullet b \bullet b\sqrt{a} = ab^2\sqrt{a}$$

EX:11 VARIABLES

$$\sqrt{18c^5d^4}$$

Prime Factor

2	18
3	9
3	

$$= \sqrt{2 \bullet 3 \bullet 3 \bullet c \bullet c \bullet c \bullet c \bullet c \bullet d \bullet d \bullet d \bullet d}$$

When you have a pair, bring that term out.

$$= 3 \bullet c \bullet c \bullet d \bullet d\sqrt{2c}$$

$$= 3c^2d^2\sqrt{2c}$$

What needs to be done before class on Thursday?

1. Discussion Post
2. Finish Notes Sheet and come with questions