Put away your cell phones

Take out your Unit 2 Notes

Take out your HW

SQUARE ROOT EXPRESSION

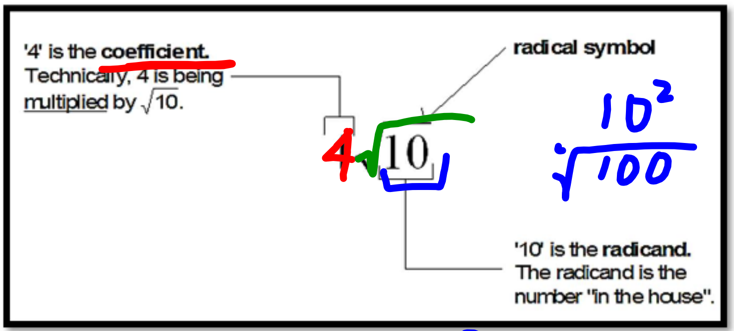
Directions: Use the digits 1 to 9, at most one time each, to fill in the boxes to make the following expression as close to 0 as possible.

$$\sqrt{\square\square\square} - \sqrt{\square\square} - \sqrt{\square}$$

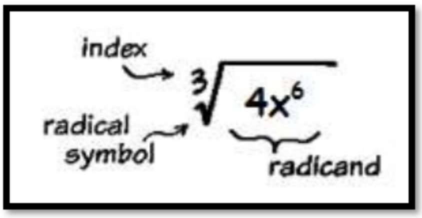
Hint

What are all the perfect square three digit numbers? Several of these can't be used since they contain a repeated digit (e.g. 121 uses the digit 1 twice and 144 uses the digit 4 twice) https://whenmathhappens.com/2014/09/26/98-pizzas/

Day 2: Multiplying & Simplifying Radicals



A **radical** is any number with a radical symbol (√).
A **radical expression** is an expression (coefficients and/or variables) with radical.



inverse : $\#^2 \rightarrow \sqrt{\#}$

Square Root Table

Complete the table below.

	1	2	3	4	5	6	7	8	9	10	x
Square each of the following numbers. **Perfect Squares**	1^2	2^2 4	9	16	25	36	49	64	81	100	x^2
Take the square root of each of your perfect squares. **Square Roots**	$\sqrt{1}$	$\sqrt{4}$	$\sqrt{9}$	$\sqrt{16}$	$\sqrt{25}$	$\sqrt{36}$	$\sqrt{49}$	$\sqrt{64}$	$\sqrt{81}$	$\sqrt{100}$	$\sqrt{x^2}$
	1	2	3	4	5	6	7	8	9	10	x

Perfect Squares are the product of a number multiplied by itself ($4 \cdot 4 = 16$; 16 is the perfect square).

Think about the process we just performed: **Number → Squared It → Took Square Root → Same Number**

A root and an exponent are **inverses** of each other (they undo each other). Therefore, square roots and squaring a number are **inverses** or they undo each other, just like adding and subtracting undo each other.

When are Radical Expressions in Simplest Form?

A radical expression is in **simplest form** if:

- No perfect square factors other than 1 are in the radicand (ex. $\sqrt{20} = \sqrt{4 \cdot 5}$)

$\sqrt{20}$

20 → 10, 2; 10 → 2, 5

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

$2\sqrt{5}$

$\sqrt{4 \cdot 5} = \sqrt{4} \cdot \sqrt{5}$

$2\sqrt{5}$

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Simplifying Radicals

Guided Example: Simplify $\sqrt{108}$.

Step 1: Find the prime factorization of the number inside the radical.	$\sqrt{2\cdot2\cdot3\cdot3\cdot3}$
Step 2: Determine the index of the radical. Since we are only talking about square roots, the index will be 2, which means we will circle all of our two of a kind.	$\sqrt{2\cdot2\cdot3\cdot3\cdot3}$
Step 3: Move each circled pair of numbers or variables from inside the radical to outside the radical. List your circled pair as just one factor outside the radical.	$2\cdot3\sqrt{3}$
Step 4: Simplify the expressions both inside and outside the radical by multiplying.	$6\sqrt{3}$

Practice:

a. $\sqrt{16}$ $\sqrt{2\cdot2\cdot2\cdot2}$ → $2\cdot2$ → 4

b. $\sqrt{48}$ $\sqrt{2\cdot2\cdot2\cdot2\cdot3}$ → $2\cdot2\sqrt{3}$ → $4\sqrt{3}$

c. $\sqrt{28}$

d. $\sqrt{14}$ $\sqrt{7\cdot2}$ → $\sqrt{14}$

e. $3\sqrt{96}$

f. $4\sqrt{20}$ $4\sqrt{2\cdot2\cdot5}$ → $2\cdot4\sqrt{5}$ → $8\sqrt{5}$

g. $6\sqrt{120}$

h. $2\sqrt{36}$ $2\cdot6$ → 12

Multiplying Radicals

The product property of radicals states the square root of a product equals the product of the square roots of the factors.

$\sqrt{ab} = \sqrt{a} \cdot \sqrt{b}$ where $a \geq 0$ and $b \geq 0$

$\sqrt{4 \cdot 5} = \sqrt{4} \cdot \sqrt{5}$

When multiplying radicals, follow the following rules:

Multiplying Radicals – RULE

1. Multiply the outside coefficients together.
2. Multiply the inside # together.
3. Simplify the radical.

Practice: Multiply the following radicals. Make sure they are in simplest form.

a. $\sqrt{2} \cdot \sqrt{18}$

$\sqrt{2 \cdot 18}$

$\sqrt{36}$

6

b. $\sqrt{5} \cdot \sqrt{10}$

c. $\sqrt{8} \cdot \sqrt{32}$

d. $4\sqrt{6} \cdot 4\sqrt{6}$

$4 \cdot 4\sqrt{6 \cdot 6}$

$16\sqrt{36}$

$16 \cdot 6$

96

$16 \cdot 6 = 96$

e. $-\sqrt{6} \cdot 3\sqrt{8}$

$-1 \cdot 3\sqrt{6 \cdot 8}$

$-3\sqrt{48}$

48: 4, 12; 2, 2, 2, 2, 3

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

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

$-12\sqrt{3}$

f. $6\sqrt{15} \cdot \sqrt{10}$

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