Working with Radicals

When I was a kid 'radical' meant something different:

In the news I often hear radical used differently:

And Math has yet another definition:

Any function with a root in it. The root is a radical. That's pretty radical, right?

These are radicals:

$$\sqrt[2]{4},\ \sqrt{2x},\ \sqrt{4x-7},\ \sqrt[3]{7}$$

Let's define the parts of a radical:

$$a\sqrt[n]{x}$$

a=coefficient

n=index or root

x=radicand

We group like terms with radicals the same way we do with x, x^2. Ie:

$$x + 2x + 3x^2 + 4x^2$$

Radicals work the same way:

$$\sqrt{x} + 2\sqrt{x} + 3\sqrt[3]{x} + 4\sqrt[3]{x}$$

$3\sqrt{x}$ $\quad$ $7\sqrt[3]{x}$

Simplifying Radicals:

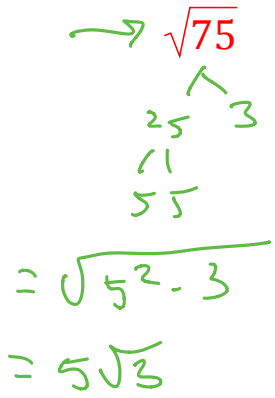
In order to simplify a radical, you want to break down the radicand to its prime factors. Look for pieces that can come out. First let's look at how we can put a number into a radical:

Convert the following to an entire radical:

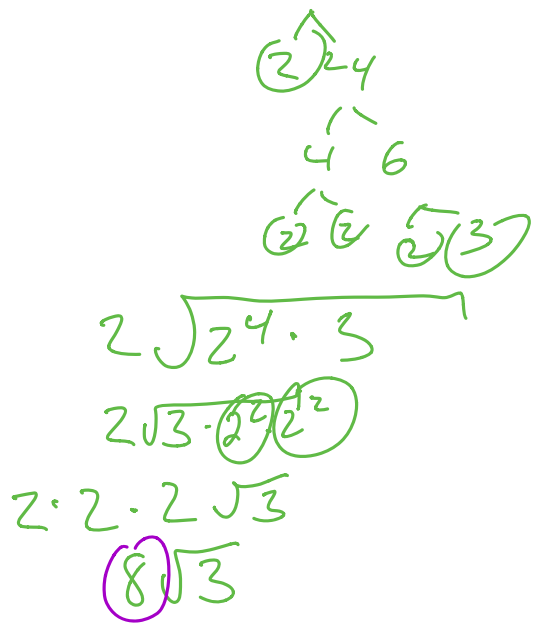
$4\sqrt{3}$ $\sqrt{3 \cdot 16}$ $\sqrt{48}$	$5\sqrt{10}$ $= \sqrt{10 \cdot 5^2}$ $= \sqrt{10 \cdot 25}$ $= \sqrt{250}$
$2\sqrt[3]{3}$ $= \sqrt[3]{3 \cdot 2^3}$ $= \sqrt[3]{3 \cdot 8}$ $= \sqrt[3]{24}$	$x^2\sqrt[4]{x}$ $\sqrt[4]{x \cdot (x^2)^4}$ $\sqrt[4]{x \cdot x^8}$ $\sqrt[4]{x^9}$

Now let's take a radical expression and simplify it. You will be expected to do this for every radical question you come across for the rest of your life. You cannot leave a fraction as $\frac{2}{4}$. Same thing here!

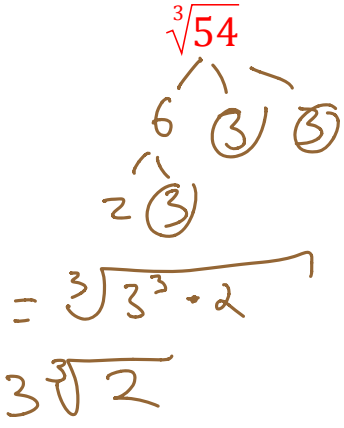
$\sqrt{75}$



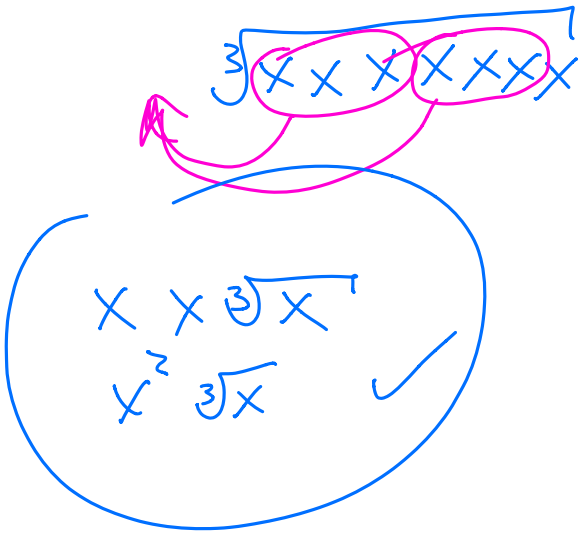
$2\sqrt{48}$



$\sqrt[3]{54}$



$\sqrt[3]{x^7}$



List the following from least to greatest. Hint: put everything under the radical so that you can easily compare numbers.

$5,\ 2\sqrt{6},\ 3\sqrt{3},\ \sqrt{23}$

$\sqrt{25},\ \sqrt{24},\ \sqrt{27},\ \sqrt{23}$

$\sqrt{27},\ \sqrt{23},\ \sqrt{24},\ \sqrt{25}$

Adding and subtracting:

We can do it, if the things are the same. Ie: $\sqrt{x} + 2\sqrt{x} = 3\sqrt{x}$

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

$3\sqrt{3}$

$7\sqrt{2} + 4\sqrt{3} - 5\sqrt{2} + 6\sqrt{3} =$

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

$\sqrt{24} + \sqrt{54} =$

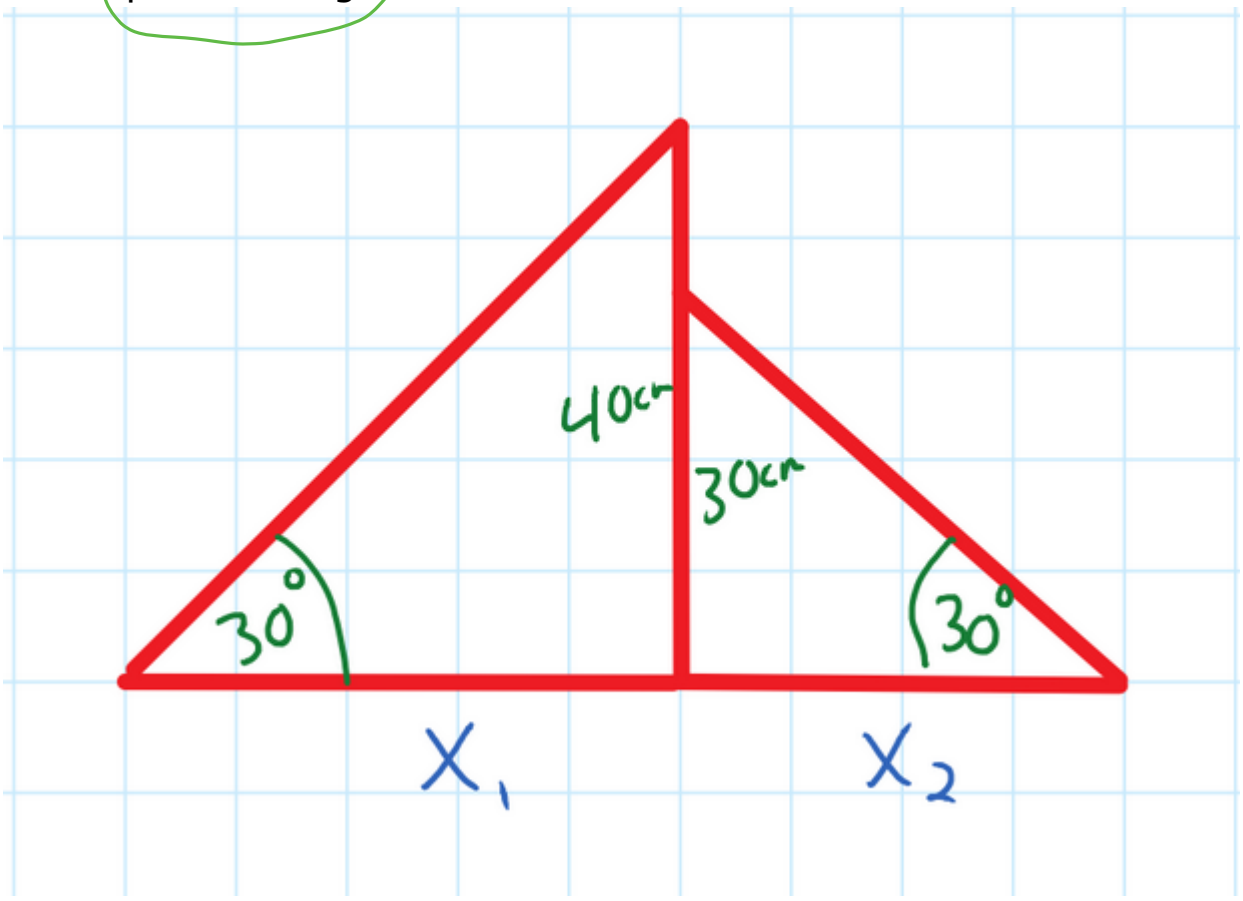
$= \sqrt{2^3 \cdot 3} + \sqrt{3^3 \cdot 2}$

$= 2\sqrt{6} + 3\sqrt{6}$

$= 5\sqrt{6}$

$$2\sqrt[3]{3} - \sqrt[3]{81} =$$

A skateboard ramp is shown. What is the total length? X_1+x_2?
Hint: special triangles.



$$d = x_1 + x_2$$

$$= 40\sqrt{3} + 30\sqrt{3}$$

$$= 70\sqrt{3}$$

HW: 278 #1,2,3ab,
6,8,9,10ab,
11,12,25