

## COMMON PITFALLS IN MATH 121

### 1. DISTRIBUTIVE PROPERTY

Did you know that other than multiplication nothing distributes over addition?

The Distributive property says:  $c(a + b) = ca + cb$

That is  $c(a + b) = ca + cb$  and  $c(a - b) = ca - cb$  since subtraction is really addition of opposites.

- **Roots Do Not Distribute over addition:**  $\sqrt{a+b} \neq \sqrt{a} + \sqrt{b}$
- **Powers Do Not Distribute over addition:**  $(a+b)^n \neq a^n + b^n, n \neq 1$
- **Reciprocals Do Not distribute over addition:**  $\frac{1}{a+b} \neq \frac{1}{a} + \frac{1}{b}$
- **Logs Do Not Distribute over addition:**  $\log(a+b) \neq \log a + \log b$

### 2. MAIN PRINCIPLE OF ADDITION

This principle says that the only things you can add are **SAME THINGS**.

That is,  $a$  of something +  $b$  of something =  $(a + b)$  of something.

For example  $3x + 4x = 7x$ , or  $3 \text{ dogs} + 4 \text{ dogs} = 7 \text{ dogs}$ .

Can you add  $3x + 4y$ ? The answer is no, they are not same things.

Can you answer the following questions?

When can I add fractions?

When can I add polynomials?

When can I add radicals?

When can I add anything? When I understand what **SAME THINGS** means for anything. You get the picture.

### 3. MAIN PRINCIPLE OF MULTIPLICATION

It says that you can multiply anything by anything.

### 4. SIMPLIFYING FRACTIONS

What does it mean to simplify a fraction?

Is  $\frac{x^2 - 4}{x + 4} = x$ ? What did I do? I canceled the  $x$ 's and the 4's.

When it comes to simplifying fractions canceling is **Bad Language**. We do not cancel things to simplify fractions.

To simplify a fraction we factorize a **1**.

That is, given a fraction, factor the numerator and the denominator and remove any unnecessary **1**'s.

For example:

$$\frac{x^2 - 4}{x + 2} = \frac{(x+2)(x-2)}{x+2} = \frac{(x+2)}{x+2} \frac{(x-2)}{1} = 1 \cdot (x-2) = x-2$$

Can I simplify  $\frac{x^2 - 4}{x + 4}$ ? That is, can I factorize a **1**? Let us see.

$$\frac{x^2 - 4}{x + 4} = \frac{(x-2)(x+2)}{x+4} \quad \text{So the answer is no.}$$