

TROUBLESHOOTING COMMON ERRORS IN ALGEBRA

There are some common mathematical errors that are made by some beginner students. Here is a partial list:

1) Incorrect canceling: $\frac{x}{x+6} \neq \frac{1}{6}$ Think: If x were 1 (or any number) then this could not possibly be true!

If instead all terms were multiplied, you can cancel out the x : $\frac{x}{6x} = \frac{1}{6}$.

2) Forgetting the middle term when squaring: $(x+4)^2 = x^2 + 16$

When you are squaring a binomial, there is a middle term:

$$(x+4)^2 = (x+4)(x+4) = x^2 + 4x + 4x + 16 = x^2 + 8x + 16.$$

It is best to simply remember the formula $(a+b)^2 = a + 2ab + b^2$.

Notice again if the terms were multiplied, the procedure would work: $(4x)^2 = 16x^2$.

3) Splitting terms under the radical sign: $\sqrt{a^2 + 9} \neq a + 3$. Think: If $a = 4$ then $\sqrt{4^2 + 9} \neq 7$

Instead, it's true that $\sqrt{9a^2} = 3a$.

4) Forgetting parenthesis: $(x-2)(x+4) - (x+2)(x+4) \neq x^2 + 4x - 2x - 8 - x^2 + 4x + 2x + 8$.

Instead, it should be $(x-2)(x+4) - (x+2)(x+4) = x^2 + 4x - 2x - 8 - (x^2 + 4x + 2x + 8)$, and then proceed to simplify further.

Practice Exercises:

1. You are probably familiar with the quadratic formula: the solution(s) to a general quadratic equation

$ax^2 + bx + c = 0$ is given by $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$. Find the solutions to the equation

$$x^2 - 2x - 4 = 0.$$

2. Solve the following equation: $\frac{2}{3} - \frac{x+1}{4} = \frac{1}{6}$

3. Simplify: $(2x+1)^2 - 2(x+1)^2$.

Answers:

1. $1 \pm \sqrt{5}$

2. $x = 1$

3. $2x^2 - 1$