Common Algebra Mistakes
Example: Solving a Linear Equation

The Goal

Solve the following equation for x:

$$2(x-4)+3x=0$$

The Mistake

Find the algebra mistake:

$$2(x-4)+3x=0 \implies 2(x-4)=-3x \implies x-4=-\frac{3}{2}x$$
$$\implies -\frac{3}{2}x+x-4=0 \implies -\frac{1}{2}x=-4 \implies x=-8$$

Need a hint? Look carefully at the red part of the algebra:

$$2(x-4)+3x=0 \implies 2(x-4)=-3x \implies x-4=-\frac{3}{2}x$$
$$\implies -\frac{3}{2}x+x-4=0 \implies -\frac{1}{2}x=-4 \implies x=-8$$

The Correction

$$2(x-4)+3x=0 \implies 2x-8+3x=0 \implies 5x=8 \implies x=\frac{8}{5}$$

An Explanation

As "The Correction" shows, the attempted solution takes the long route to solving the equation, in addition to including three signs errors. First, *adding* (3/2)x to both sides is the way to remove the -(3/2)x from the right side. Second, *add* 4 to both sides to remove the -4 from the left side. Third, multiply by *-2* to remove the factor -(1/2) on the left side.

To solve the equation more directly (and correctly), multiply out the 2(x-4) term and then combine x terms, while moving the non-x term to the right side. It does not help to move any of the x terms to the right!