What is GRESS?

G – Givens

R – Required

E – Equation

S – Substitution and Solve

S – Statement

GRESS is a method of solving that is often used in the sciences. One challenge students often face is figuring out how to solve and dissect physics questions, especially word questions. Let's look at an example following the principles of GRESS:

Gurdeep is riding his bike forward along a straight path at an initial speed of 4 meters per second but upon seeing his friend catching up to him, he accelerates at a constant rate of 2 meters per second squared, reaching a final speed of 10 meters per second. How long did it take Gurdeep to reach his final speed?

GIVENS: First, let's identify what information we are being given in the question itself:

Initial Velocity ($\bar{v}_i$) = 4 $\frac{m}{s}$ [forward]

Acceleration ($\bar{a}$) = 2 $\frac{m}{s^2}$ [forward] and we know this is a constant acceleration

Final Velocity ($\bar{v}_f$) = 10 $\frac{m}{s}$ [forward]

REQUIRED: What's required? What are we being asked to solve for?

Time (t) = ?

EQUATIONS: Next, list any equations that you think might be useful if you're unsure of which one equation you should use. Since we know we're dealing with a constant acceleration equation, we could list the 4 constant acceleration equations:

$\overline{v_f} = \overline{v_i} + \overline{a}t$

$\Delta\overline{d} = \overline{v_i}t + \frac{1}{2}\overline{a}t^2$

$\Delta\overline{d} = \frac{(\overline{v_f}+\overline{v_i})}{2}t$

$\overline{v_f}^2 = \overline{v_i}^2 + 2\overline{a}\Delta\overline{d}$

It's critical that we understand what each term in the equations represent:

$\overline{v_f}$= final velocity

$\Delta\overline{d}$ = the change in displacement

$\overline{v_i}$= initial velocity

$\overline{a}$ = constant acceleration

t = time

Based on our givens $\overline{v_i}$, $\overline{a}$, $\overline{v_f}$, and our required variable *t*, we are hoping to use an equation that has all of those terms (and no additional terms). Thankfully, the first equation has all four of our terms!

Therefore, the equation we'll use is: $\overline{v_f} = \overline{v_i} + \overline{a}t$

However, we're trying to solve for *t*. Let's rearrange the equation for *t* so that we only need to substitute our given values into one side of the equation.

$\overline{v_f} = \overline{v_i} + \overline{a}t$

$\overline{v_f} - \overline{v_i} = \overline{v_i} + \overline{a}t - \overline{v_i}$ subtract $\overline{v_i}$ from both sides

$\overline{v_f} - \overline{v_i} = \overline{a}t$

$\frac{(\overline{v_f}-\overline{v_i})}{\overline{a}} = \frac{\overline{a}t}{\overline{a}}$ divide both sides by $\overline{a}$

$\frac{(\overline{v_f}-\overline{v_i})}{\overline{a}} = t$

$t = \frac{(\overline{v_f}-\overline{v_i})}{\overline{a}}$ now we have an equation in terms of *t*

SUBSTITUTION AND SOLVE: now substitute in the values given in the question to solve for *t*:

$$t = \frac{(\overline{v_f} - \overline{v_i})}{\overline{a}}$$

$$t = \frac{\left(10\,\frac{m}{s}\,[fwd] - 4\,\frac{m}{s}\,[fwd]\right)}{2\,\frac{m}{s^2}\,[fwd]}$$

$$t = \frac{6\,\frac{m}{s}\,[fwd]}{2\,\frac{m}{s^2}\,[fwd]}$$

= 3 seconds

STATEMENT: Lastly, write a concluding statement.

Therefore, we can conclude that it took Gurdeep 3 seconds to go from his initial velocity to his final velocity when he accelerated at a rate of 2 $\frac{m}{s^2}$ forward.