

## Show your work

— Dan Styer

The syllabus for MODERN PHYSICS says “In writing your solutions, do *not* just write down the final answer. Show your reasoning and your intermediate steps. Describe (in words) the thought that went into your work as well as describing (in equations) the mathematical manipulations involved.” Let me amplify this statement.

If I assign you a problem and you write down the correct answer without showing how you found it, your answer earns only partial credit, because you might have uncovered the right answer by mistake. For example, it is true that  $64/16 = 4$ . But if you got this answer by canceling the 6s,

$$\frac{64}{16} = \frac{\cancel{6}4}{1\cancel{6}} = \frac{4}{1} = 4$$

then your answer is correct but your solution is wrong!

I will sometimes assign you an incorrect candidate answer and ask you to find what’s wrong with it. (An example is this week’s problem 1.10: *Flushing out an error*.) You must say what’s wrong with the candidate answer, not just that it *is* wrong. How do you know that it’s wrong?

If you don’t show the evidence to support your assertions, then you’re in the same camp as Mary Fanning, who claims that the U.S. Presidential election of 2012 was stolen from Romney and given to Obama, and that the election of 2020 was stolen from Trump and given to Biden, using a supercomputer called “the Hammer”. Yet Ms. Fanning can’t say where “the Hammer” is located, who manufactured it, what its IP address is, or who owns it (the Democratic National Committee, the College Democrats of America, the Democratic Governors Association, the Democratic Senatorial Campaign Committee, the Democratic Congressional Campaign Committee, the Democratic Legislative Campaign Committee, the Association of State Democratic Committees, the Democratic Attorneys General Association?). And Ms. Fanning can’t say why this mysterious owner did *not* use it to steal the 2016 Presidential election, nor the 2020 Senate election in Kentucky. Ms. Fanning states her conclusion, but she cannot support it with facts, argument, or reasoning.

Don’t fall into Ms. Fanning’s camp of conspiracy theorists. Show your work!