Formulas HW 3: Raising Grades

This homework is all about figuring out how to improve your grade, at least in a class where the grade is based purely on points. Here's what I mean: let's make up a fictitious student who, at this point in the term, has a 75% average. Making up that 75% average are 225 points out of a possible 300 so far:

$$\textbf{Student's average} = \frac{\textbf{225 points}}{\textbf{300 points}} = \textbf{0.75, or 75\%}$$

Suppose this student emails their teacher and says, "I really want to raise my grade."

1. **(1 point)** What would your response be to this student, if you were their teacher?

Now, let's analyze! Let's suppose that they have one more test coming up, and that test is worth 100 points. The student really wants to get a 100% on that test, and boost their average.

2. **(1 point)** Without doing any math, put down your best guess as to what their new course average would be *if* they got that 100% on the test (assuming their only grades are the ones that made up the original 75%, and the possible 100% on the test).

As it turns out, you can't just combine the 100% with the 75% and divide by 2 – because the 75% is "worth" more points! Remember that the 75% was based out of 300 points, and the 100% is based out of 100 points (You may remember this issue from our Turtle Survival lab). But fear not: there's a pretty straightforward formula you can use to figure this out.

Average Future Percentage in Course $= \dfrac{\textbf{points you've earned in the past + points you will earn in the future}}{\textbf{total past points available + total future points available}}$

So, for this student:

Average Future Percentage in Course $= \dfrac{\textbf{points you've earned in the past + points you will earn in the future}}{\textbf{total past points available + total future points available}}$

$$= \frac{\textbf{225 points + 100 points}}{\textbf{300 points + 100 points}}$$

$$= \frac{\textbf{325 points}}{\textbf{400 points}}$$

$$= \textbf{0.8125}$$

$$= \textbf{81.25\%}$$

Notice that it's not halfway between 75% and 100%, and that's because the 75% is "worth more" (out of 300 points…not just 100), so the average is going to be *closer* to the 75% than it is to the 100%. In fact, it's *3 times closer* to the 75% than the 100%:
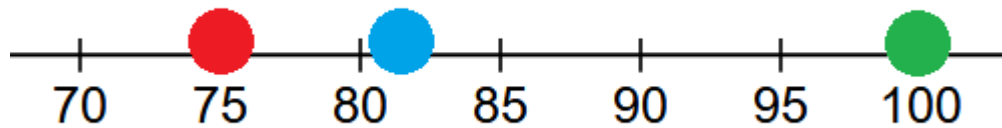
Now, the student's average *did* go up. That **100%** is great – it helped their overall average rise a little over 6 points, from the **75%** to **81.25%**. What you'll do in the next few problems is run that formula again for various scenarios to see what happens if this student doesn't do *quite* so well on that exam. Assume in each that they've already gotten a 75% in the course (which was that 225 points of 300), but assume they get the following exam scores instead of the 100% they got above (and the exam is still out of 100 points).

And even better – we'll learn how to create a formula in Sheets that'll help us do it! Watch this video to see how, and then answer the rest of the questions!

3. **(1 point)** 60%.

4. **(1 point)** 80%.

5. **(1 point)** 75%.

6. **(1 point)** 95%.

7. **(1 point)** Based on the work you just did, what would you tell this student if they want to raise their grade to a B (80%)? What % grade *must* they get higher than?

8. **(2 points)** Now suppose this same student still has the 75% (225 points out of 300), but is planning for the end of the course. They want to get *at least* a 90% (to get an "A" in the course). They also know that there are *exactly* 200 points left in the course to be earned (above the 300 that were already available…no extra credit). Can they get to that 90%? If so, tell them what they have to do! If not, tell them why they can't!