

Remember, what we care about is the *reasoning*, **not the final answer!** Explain all your work! Tell a story, let there be no characters (variables, axes in graphs, equations) without an individual introduction!

1. The new *augmented reality* game **Moneypoke Go** is taking the world by storm (have you seen the video of someone who runs into a police car because they were playing the game while driving?). It is available in versions both for the iPhone, where it costs \$17, and Android, where it only costs \$9. Serious players also pay real money for each moneypoke they collect in the game, to upgrade them with new powers. Upgrades cost \$.03 per upgraded moneypoke for iPhone and \$.02 for Android (3 and 2 cents).

Now. Define variables and make a (linear) model of the cost of playing Moneypoke depending upon how many upgrades a player chooses to get. Actually, make *two* such models, one for iPhone and one for Android. Sketch a graph of the two lines you're modelling.

It costs different amounts depending upon whether a player uses an iPhone or Android. Which is more expensive? Is there a number of moneypoke upgrades where the answer to that question ("which is more expensive") changes? What is it? Explain (of course).

2. I claim that if, in the Cartesian plane, you connect the three points $(1, 0)$, $(-1, 0)$, and $(0, \sqrt{3})$, it forms an equilateral triangle. That is, a triangle whose three sides all have the same length. Do you agree?

Use one of the tools we've discussed in class, not some formula (like "the distance formula") that you might know from elsewhere.

Our tools for triangles are *similar triangles* and *The Pythagorean Theorem*. There is only one triangle, so we can't use similar triangles without drawing something new. We also can't use the Pythagorean Theorem unless the triangle we are looking at satisfies the hypothesis of that theorem (which is what?). If not, we need to draw new line segments to make more triangles (for similarity) or at least one triangle which satisfies the hypothesis of the Pythagorean Theorem.

3. An ear of corn has around 500 kernels. Modern, industrially farmed corn produces one ear per plant, but more traditional farming often resulted in more ears – let's say two per plant. Suppose you start with a small, traditionally farmed plot of ten corn plants. After each harvest, separate the kernels and plant them individually the next season.

Write down a formula which tells you how many kernels of corn you will have after n growing seasons.

After how many seasons will you have ten trillion kernels? (Just for your reference, ten trillion is 10,000,000,000,000,000.)