MTH 1210, FALL 2013
DR. GRAHAM-SQUIRE

SECTION 1.6: MODELING WITH EQUATIONS
IN-CLASS ACTIVITY

1. Names

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2. Instructions

Read the modeling problem given below, then work on it with the other members of your group. You should give a complete answer with all of your work shown for each question. It is fine for different people to work on different parts of the question, but you should check each other's work since everyone in the group will receive the same grade for the assignment. If you have any questions, ask the other members of your group first. If all of you are stuck, everyone in the group must raise their hand in order to get help from the professor. Attach this as a cover sheet to the work you turn in.

3. Modeling Problem

In the introduction for Section 1.6, you were presented with the following scenario:

You are out hiking in a remote part of the country. Standing on the bank of a stream, you look back at your campsite and realize that a small fire has started right next to your tent. Luckily, you have an empty bucket next to you that you can fill with water from the stream, then take back to your campsite to douse the fire. You want to do this as fast as possible, not only to preserve your camping equipment but also to not burn down the entire forest and force you to get a stern talking-to from Smokey the Bear. Here are the important facts: From where you are standing, the campsite lies 1000 feet down the straight river, then 400 feet perpendicular from the river's bank. You can either (a) run down the bank of the river, fill up your bucket and go to the fire, (b) fill up your bucket right away and run diagonally to the campsite, or (c) run part of the way down the bank, fill the bucket, and then go diagonally to the campsite. You can run 14 feet/second with an empty bucket, but only 5 feet/second with the bucket full, and you want to get to the fire as fast as possible. What route should you take? You can assume that it takes no time to dip the bucket into the stream, and you can round off all answers to the nearest second.

(1) Draw a diagram to represent the situation.
(2) Calculate the amount of time it would take to run the whole 1000 feet along the stream, then dip the bucket and run the 400 feet to the campsite.
(3) Calculate the amount of time it would take to dip the bucket straightaway and head diagonally to the campsite.
(4) Calculate the amount of time it would take to run 600 feet along the stream, dip the bucket and then head diagonally to the campsite.
(5) Calculate the amount of time it would take to run 700 feet along the stream, dip the bucket and then head diagonally to the campsite.
(6) Based on your calculations above, how far do you think you should run along the stream before you dip the bucket and head to the campsite? Explain your reasoning.
(7) Let x be the distance you run along the stream before you fill the bucket and head to the campsite. Write an expression, in terms of x, that represents the total amount of time it takes to get to the campsite. Hint: do the same kind of calculation you did in question (4), but replace the 600 with x.