Instructions: Read each problem. Write a sentence or two about the approach you might take to solve each problem. Draw a picture to illustrate the scenario. Write a formula that might be needed to help set up or solve the problem. **DO NOT SOLVE THE PROBLEM.**

1. The distance between Cambridge and Wellesley is 10 miles. A person walks part of the way at 5 miles per hour, and then jogs the rest of the way at 8 mph. Write an equation that expresses the total time for the trip in terms of the distance walked.

2. A cylindrical barrel is to hold 1.3 cubic meters. The material for the top costs $7/m^2. The material of the bottom costs $10/m^2 and the material for the side costs $8/m^2. Write the cost as a function of r, the radius of the cylinder.

3. Troops are going to be staged starting 10 miles west and 20 miles north of the airport control tower and eventually reaching a point 70 miles east and 70 miles south of the tower walking the most direct path. You need to leave water and supplies for the troops positioned one third of the way and two thirds of the way along their route.

(A) Where should you position the supplies in reference to the tower?

(B) Find a general formula for the points that are one third and two thirds of the way along the path for general starting and ending positions.

4. You are standing at the edge of a slow-moving river which is one mile wide and wish to return to your campground on the opposite side of the river, downstream. You can swim at 3 mph and walk at 4 mph. You must first swim across the river to any point on the opposite bank. From there walk to the campground, which is two mile alongside the river from the point directly across the river from where you start your swim. Find a formula for the total time it will take to get back to the campground in terms of x, the distance that is walked.