

- This assignment is worth 5 percentage points, to be added to your final course average.
- You should turn it in by Monday, 22 July, 2013 at 5 pm.

Name: _____

Optimizing Surface Area

The goal of this assignment is to apply your skills in maximizing and minimizing to find the optimal way to package food. Since the metal used in making a can is proportional to its surface area, we will find a way to minimize the surface area of a cylinder with fixed volume.

1. First, buy a can of food from the grocery store. (If you are going to work with another person or a group on this assignment, please use different shapes and sizes of cans so you can do your own calculations.) Attach your name to the can in some way that will not get lost. What is in your can?

2. Circle one:

- A. Please return my can of food with my paper.
- B. Please donate my can of food to the hungry.

3. Measure your can. Find the height and diameter and calculate the radius. You may use whatever units you like.

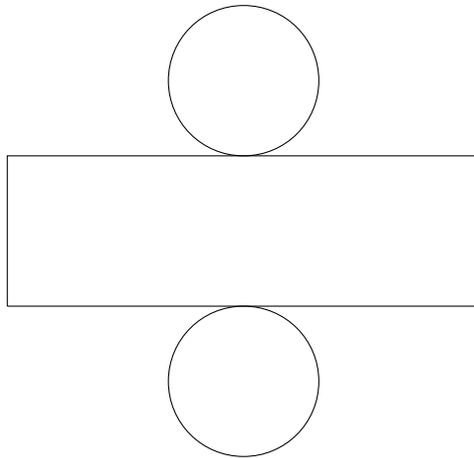
$$h =$$

$$d =$$

$$r =$$

4. The volume of a cylinder is given by $V = \pi r^2 h$. What is the volume of your can? (Here and throughout, you should round to two decimal places.)

5. A cylinder can be cut into two circles and a rectangle as shown below.



In terms of r and h compute the following:

(a) The area of each circle

(b) The length of the long side of the rectangle

(c) The area of the rectangle

(d) The area of the whole figure (i.e. the surface area of the can).

6. What is the surface area of your can?

7. You have already computed the volume of your can. Use this number and the equation $V = \pi r^2 h$ to solve for h in terms of r .

8. Use this to write the surface area of a can of this volume in terms of the radius.

9. Find the radius that produces minimal surface area.

