<u>MATH 75 Exploring Calculus Applications via Web Based Demos</u>[1]   _____
(name)

The focus of these applications is **word problems**.

The transition from verbal description, to geometric model, to algebraic model with equations is often troublesome. Once the correct algebraic model is obtained the mathematics, be it algebra or calculus, that is required to find the appropriate solution is often well understood or can be performed in a few steps. Thus the exercises below present the verbal description, provide a geometric model, and provide guidance for developing an algebraic model. We do not provide the solution of this model.

For Exercises 1 – 4 go to the following URL

http://astro.temple.edu/~dhill001/wordproblemeqn/wordproblemeqn.html

The demo is entitled "Constructing Equations from Word Problems". While this demo and its description are intended for instructors, it is readily understood by students. Read the parts entitled:

- **Objective**
- **Level**
- **Prerequisites**
- **Instructor's Notes**

Included in the "Instructor's Notes" is an outline of steps for a measurement geometric word problem. This outline is designed to provide tips on how to attack verbal problems of the type included in this collection of demos. You will also find two examples discussed in detail. Following the examples is A Gallery of Visualization DEMOS for Word Problems. The gallery provides a collection of word problem demos with accompanying animations. Exercises 1 – 4 involve these demos.

<u>**EXERCISE #1.**</u> Find the demo in the gallery described "Cylinder formed by rolling a rectangle". Look for the picture shown to the right ➔.
With your mouse click on the phrase "click to see gif animation".
(If your computer supports Quicktime, click on "click to see mov animation" instead. With Quicktime you can stop and start the animation.)
View the animation. You can view it several times if needed. It starts with a description of the problem and ends with a set of questions listed below. Answer these questions on the lines provided.

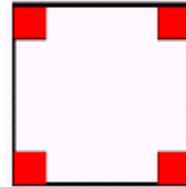What is the circumference of the circular end? _____

What is the radius of the circular end? _____

What is the height of the cylinder? _____

What is the volume of the cylinder? _____

EXERCISE #2. Find the demo in the gallery described "Box formed by cutting out corners". Look for the picture shown to the right ➔. With your mouse click on the phrase "buildabox applet" which is in the last column. This action will start a java applet. (In case your computer is not java enabled, click on "click to see gif animation" instead.) When asked for the size of the square of cardboard enter **16** (inches) and when asked for the size of square to cut from each corner enter **3** (inches). Follow the directions on the screen. View the animation. Restart the applet to view the animation again if needed. It starts with a description of the problem and ends with a set of questions listed below. Answer these questions on the lines provided.
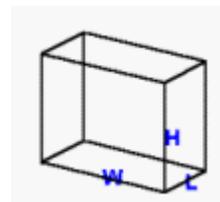
Circle the selection you are using to answer the following questions: java   gif .

Make a list of the dimensions of your box. Length = _____   Width = _____   Height = _____

Volume of your box = _____

If a square x by x were cut from each corner, what is the volume of the box? _____

EXERCISE #3. Find the demo in the gallery described "Surface area of a box". Look for the picture shown to the right ➔. With your mouse click on the phrase "click to see gif animation". (If your computer supports Quicktime, click on "click to see mov animation" instead. With Quicktime you can stop and start the animation.) View the animation. You can view it several times if needed. It starts with a description of the problem and ends with a set of questions listed below. Answer these questions on the lines provided.

What is the area of each of the following: Left side _____   Right side _____   Front _____
                                                Back _____   Top _____   Bottom _____

What is the total area of the sides of the box? _____

Determine the cost of materials for the box if the four sides cost $5 per sq. ft. and the top & bottom cost $8 per sq. ft.   _____

Determine a formula the cost of materials for the box if the four sides cost $x per sq. ft. and the top & bottom cost $y per sq. ft.   _____

EXERCISE #4. Find the demo in the gallery described "Cone formed by cutting out a sector of a circle". Look for the picture shown to the right ➔. With your mouse click on the phrase "click to see gif animation". (If your computer supports Quicktime, click on "click to see mov animation" instead. With Quicktime you can stop and start the animation.) View the animation. You can view it several times if needed. It starts with a description of the problem and ends with a set of questions listed below. Answer these questions on the lines provided

What is the circumference of the top? _____ What is the radius of the cone? _____

What is the height of the cone? _____ What is the volume of the cone? _____

David R. Hill, Mathematics Department, TEMPLE UNIVERSITY; DEMOS with POSITIVE IMPACT