Why:
This activity is provided so that you practice and improve the computer and sketching skills introduced in Hands-On 3. These skills are necessary to the practicing design engineer.

Learning Objectives:
- Begin to develop visualization skills.
- Proper placement of views, dimensions and use of dimension lines and arrows.

Performance Criteria:
- Properly fill out a modeling strategy form.
- Obtain correct size and shape information from solid model using view and measure functions.
- The sketch is done in a neat and professional manner using the proper border and lettering.
- Sketched views are properly oriented and lined up.
- Sketched views and 3-D model are the proper shape and size.
- Appropriate number of dimensions are used and spaced and located properly.
- The sketch model is done in a neat and professional manner using the tools provided by the instructor.

Resources besides Class Notes, Other Students, Instructor, and Previous Hands-Ons:
- Textbook reading assignment.
- SI (Supplemental Instructor).
- Visualization study session.

Plan:
1. Preparation: Work in teams of 4. (Decide on team roles: reader, sketcher, modeler, inspector)
   a. Reader:
      i. Access the Pro_E courseware datadisk. (Use Courseware Data Disk web link.)
      ii. Start Pro/ENGINEER. (Use Starting Pro/ENGINEER web link.)
      iii. Set your working directory to: PRO_E on 'PSBDFILES\METBD_110\Orthographic' (Use Setting the Working Directory web page.)
      iv. Open the part file named ‘Ortho_01’. (Use Opening Pre-Existing Files web link)
      v. Verbally describe overall size of object in Ortho_01 to rest of team members.
      vi. Print it, but do NOT show it to the sketcher or modeler.
      vii. Make sure you have all the necessary dimensions. (Use Obtaining Part Sizes web link.)
      viii. Fill out a modeling strategy form. Design Intent: the important dimensions are the ones given.
   b. Inspector:
      i. Stake claim to white board space.
      ii. Make sure you have 4 different colored white board markers.
      iii. Using the red marker, lightly sketch the overall sizes of all six views on the white board.
      iv. When finished, help the reader complete the modeling strategy form.
   c. Sketcher:
      i. Sketch the border and title block on engineering calculation paper. (Use Penn State Erie Standards web link.)
         General tolerance is ±.01.
      ii. Center the six views between the borders. Lightly block in each view. For spacing between the views use 1.4” between the front and right side views, 1.6” between the front and top views, 0.9” between the front and left side views, and ½” between the front and bottom views and the left side and back view. The views should be properly arranged and aligned and centered on the page.
      iii. Sketch one for each team member.
2. Read the following steps. If you need any steps clarified, please ask questions. When all team members are ready begin.
   a. Inspector: Correct any mistakes made along the way.
   b. Reader: Verbally describe the 2-dimensional (2-D) shape and size of the most descriptive feature to the sketcher. I, E, U, H, I, L, T, etc.. In other words read your modeling strategy, but do not show it to the other team members.
   c. Sketcher: Lightly sketch this 2-D shape in all six views on the white board in a color other than red. Write in dimensions.
   d. Reader: Verbally describe the 3rd dimension to the most descriptive shape.
   e. Sketcher: Add the 3rd dimension, shape and size, in all six views.
f. Repeat for additional features, using a different colored white board marker for each feature.
3. Inspector: Make sure the sketch is dimensioned with design intent in mind.
4. Inspector: Check 3D model to see if it is within tolerance, remember design intent. General tolerance will be ±.01.
5. Everyone is to lightly sketch and dimension the six principal planes on engineering paper for the next class. Make sure the dimensions are very light, because you will be erasing them.
6. After the dimensioning lecture, darken appropriately and completely dimension the parts using 2-place decimal, unidirectional chain dimensions.
7. Below each view, neatly print the name of the view.
8. Exit Pro/E without saving ‘Ortho_02’.

Critical Thinking Questions:
1. In inches, how big is the smallest box on the engineering calculation paper?
2. Which views are projected onto the horizontal planes?
3. Why is the arrangement of views in an orthographic sketch important?
4. The size of ‘Ortho_02’ is such that its FULL SIZE can be represented on an 8.5 x 11 sheet. How would you represent the part on the same size page if it were three times larger?