Frank Dean   Connellsville Area Career & Technical Center

Technical Science I – Grades 10, 11

Activity: Using GIS tools to measure buildings for construction estimates or insurance claims.

Goals: 1) Introduce student to GIS technology.

2) Reinforce calculations necessary for estimating construction projects.

3) Encourage students to evaluate new technology methods using scientific methods.

State Standards:

S11.A.2.2   Evaluate appropriate technologies for a specific purpose, or describe the information the instrument can provide.

G.2.3.1 Use and or develop procedures to determine or describe measures of surface area and/or volume.

Procedures:

1) Open Pictometry On-line. You will see Carnegie Science Center.
2) Click on search in upper left hand toolbar. Enter Career Center Address – 720 Locust Street. You will see in the center of the image, the intersection in front of the High School on the Junior High East side by the tennis courts. Navigate up the hill following the driveway until you have the Career Center Building in the center of your image.
3) Note in the lower right hand corner that the Image level is "Neighborhood". To the left of this notice the date the image was taken. What is the date? _____ Was this before the new academic wing was added? _____ Confirm this by observing the image.
4) Recall when we were studying Graphic Communications, we discussed using pictorial drawings to share design information. One type of pictorial drawing was oblique. Oblique drawings allowed a three-dimensional view of the object. One side of the object is undistorted. The other sides are shown in an angle. Notice the image you are observing is oblique – images are about a 45 degree perspective.
5) One of the advantages of this software program is the availability of measurement tools. Our hypothesis for this activity: Are these measurement tools accurate enough to be used in the place of direct measurements to prepare construction estimates?
6) Make sure the end of the building where the new academic wing has been added is facing to the north.
7) Starting at the southwest corner of the Career Center Building, use the Distance tool to measure the length of the building. _____ Then measure the width._____
8) Calculate area and perimeter from the online results. Surface Area (lentgh x width) _____ Perimeter [(length + width) x 2] _____.
9) Use the Area tool to measure the surface area of the roof. _____ How close was this result to your calculated measurement?

10) Using the Height tool measure the height of the building at the southwest corner._____. Calculate the volume of the building (length x width x height) _____.

11) Each team will take turns making direct measurements of the building. There are specific points marked at the southwest corner, northwest corner, and north east corner. Using the 100 ft tape, measure the length of the building from the southwest corner mark to the northwest corner mark. Measure the width from the northwest corner to the northeast corner. Measure the height of the building at the southwest corner using the 25 ft tape. Do not climb the ladder without Mr. Dean or Mrs. Starr.

12) List your results on the front board. As a group we will calculate the average value for each, length, width and height. (Add all five results and divide by five).

13) Compare length and width and height results with those obtained online. Use the following formula to determine % error. Theoretical value (POL) – Actual value (measured average) divided by the actual average.

14) Could this tool be used to measure a project for construction estimates or insurance claims?

15) Calculate surface area using the measured average. Calculate the % error for the area.

16) Calculate volume using your measured averages. Calculate the % error for volume.

Use what you have learned to measure the other buildings behind the school building. What about the outside classroom located on the hill side above the school to the east?

What others ways could you use this technology?