DRAW A CORNER CABINET USING AUTO CADD

Performance Standard (7A/7C/9B/9D).I

Determine appropriate measurements for a corner television cabinet:

- *Mathematical knowledge*: recognize special triangles, similarity and congruence; know how to measure and solve problems involving scale drawings and special triangles.
- *Strategic knowledge*: design a cabinet within error tolerances for woodworking for a television of given dimensions; use the properties of 45°-45°-90° triangles.
- *Explanation*: explain completely and clearly what was done and why it was done; write a description of the design steps that is detailed and clear enough to be replicated by another person.

Procedures

1. ***In order to measure and compare quantities using appropriate units, instruments and methods (7A); select and use appropriate technology, instruments and formulas to solve problems, interpret results and communicate findings (7C); identify, describe, classify and compare relationships using points, lines, planes and solids (9B); and use trigonometric ratios and circular functions to solve problems (9D),*** students should experience sufficient learning opportunities to develop the following:
   - Calculate by an appropriate method, the length, width, height, perimeter, area, volume, surface area, angle measures or sums of angle measures of common geometric figures, or combinations of common geometric figures.
   - Solve problems involving scale drawings, models, maps or blueprints.
   - Solve problems using indirect measurement by choosing appropriate technology instruments, and/or formulas.
   - Solve problems in and gain insights into other disciplines and other areas of interest such as art and architecture using geometric ideas.
   - Solve problems using triangle congruence and similarity of figures.
   - Solve problems using 45°-45°-90° and 30°-60°-90° triangles.

   Employees performing architectural and mechanical drafting job duties are required to solve problems mathematically and to utilize the information to create the solution graphically by demonstrating their proficiency of fundamental Auto CADD commands. It will require the use of Auto CADD commands such as line, coordinate entries, object snaps and limits and units controls, dimensions and move. In doing so, this assessment aligns with Computer Aided Drafting (CAD) standards within the Architectural Drafting Cluster and Mechanical Drafting Cluster occupational skill standards. It also addresses the International Technology Education Association (ITEA) Standard #3 (Students will develop an understanding of the relationships among technologies and the connections between technology and other fields of study), #9 (Students will develop an understanding of engineering design) and #20 (Students will develop an understanding of and be able to select and use construction technologies.)
2. Provide each student a copy of the "Draw a Corner Cabinet Using Auto CADD" task sheet and the rubric. Have students review and discuss the task to be completed and how the rubric will be used to evaluate it.
3. Have students complete the following task within a classroom setting:

   Charles and his father want to make a corner cabinet for the television in the family room. The new cabinet must be the same length on each side and large enough to hold the television that is 27 inches wide and 24 inches deep. What is the minimum length for each side of the cabinet if it is to hold the television? Show all of your work, and explain in words what you did and why you did each step.

   Using the appropriate Auto CADD commands, draw the television to the dimensions provided. Select the drawing units as per the problem requirements, accuracy to the nearest $1/16^{th}$ of an inch. Set the drawing limits to plot to an 'A' size sheet of paper. What is the minimum length for each side of the cabinet if it is to hold the television? Express the answer in a form that a carpenter would use for measuring; that is, one that could be located on a measuring tape or ruler. Show all of your work and explain in words what you did and why you did each step. After you determine the length of the sides of the corner cabinet mathematically, draw the corner cabinet to the size

using the appropriate CADD commands. Apply dimensions to the cabinet sides to verify your mathematical results.

4. Evaluate each student's work using all three dimensions of the rubric and its guide to determine the performance level. Error tolerance should be appropriate to the situation (i.e., what is possible precision for woodworking) for a score of 4 in mathematical knowledge. The student should utilize the properties of 45°-45°-90° triangles for a score of 4 in strategy. The written description should match the method used and be detailed enough to be replicated by another person reading the description for a score of 4 in explanation. An answer containing a square root should not score above a 3 in mathematical knowledge.

Examples of Student Work

- **Meets**
- **Exceeds**

Time Requirements

- 45 minutes

Resources

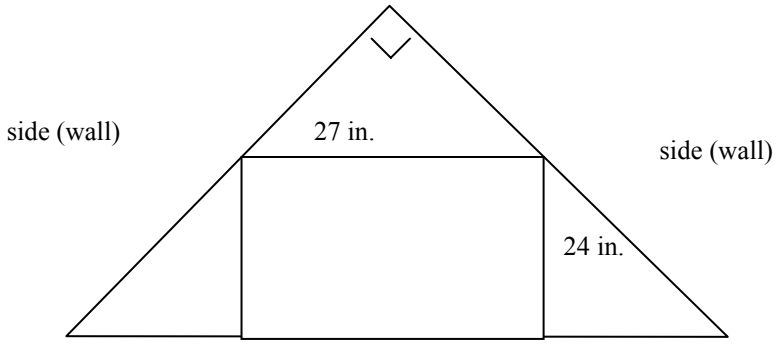
- Copies of the "Draw a Corner Cabinet Using Auto CADD" task sheet
- Calculator with trigonometric functions
- Auto CADD
- Mathematics Rubric

NAME _____ DATE _____

DRAW A CORNER CABINET USING AUTO CADD

Student Task Sheet

Charles and his father want to make a corner cabinet for the television in the family room. The new cabinet must be the same length on each side and large enough to hold the television that is 27 inches wide and 24 inches deep. Below is an overhead view.



Using the appropriate Auto CADD commands, draw the television to the dimensions provided. Select the drawing units as per the problem requirements, accuracy to the nearest $1/16^{th}$ of an inch. Set the drawing limits to plot to an 'A' size sheet of paper. What is the minimum length for each side of the cabinet if it is to hold the television? Express the answer in a form that a carpenter would use for measuring; that is, one that could be located on a measuring tape or ruler. Show all of your work and explain in words what you did and why you did each step. After you determine the length of the sides of the corner cabinet mathematically, draw the corner cabinet to the size using the appropriate CADD commands. Apply dimensions to the cabinet sides to verify your mathematical results.

Adapted from Exemplars, Math 9-12 Sample, "Entertainment Center," www.exemplars.com/math_sample_9-12.html, 2000.

MATHEMATICS RUBRIC

NAME _____ **DATE** _____

- Exceeds standard (must receive a 4 in each area)
- Meets standard (must receive all 3's or a combination of 3's and 4's)
- Approaches standard (must receive all 2's or any combination which may include a 3 or a 4)
- Begins standard (has no 3's or 4's but not all 1's)
- Absent (has all 1's and 0's)

	Mathematical Knowledge	**Strategic Knowledge**	**Explanation**
4	• Wrote the right answer. • Used math words correctly to show understanding of how math works. • Worked it out with no mistakes. • Used the right math words and labeled the answers.	• Identified all the important parts of the problem, and knew how they went together. • Showed all the steps used to solve the problem.	• Wrote what was done and why it was done. • If a drawing was used, all of it was explained in writing.
3	• Knew how to do the problem, but made small mistakes.	• Identified most of the important parts of the problem. • Showed most of the steps used to solve the problem.	• Wrote mostly about what was done. • Wrote a little about why it was done. • If a drawing was used most of it was explained in writing.
2	• Understood a little, but made a lot of big mistakes.	• Identified some of the important parts of the problem. • Showed some of the steps used to solve the problem.	• Wrote some about what was done or why it was done but not both. • If a drawing was used, some of it was explained in writing.
1	• Tried to do the problem, but didn't understand it.	• Identified almost no important parts of the problem. • Showed almost none of the steps used to solve the problem.	• Wrote or drew something that didn't go with the answer. • Wrote an answer that was not clear.
0	• No answer attempted.	• No strategy shown.	• No written explanation.
Score			