CORNER CABINET

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.
2. Provide each student a copy of the "Corner Cabinet" 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? Express the answer in a form that a carpenter would use for measuring. Show all of your work and explain in words what you did and why you did each step.

4. Evaluate each student's work using all 3 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 follow

Resources

- Copies of the "Corner Cabinet" task sheet
- Calculator with trigonometric functions
- Mathematics Rubric

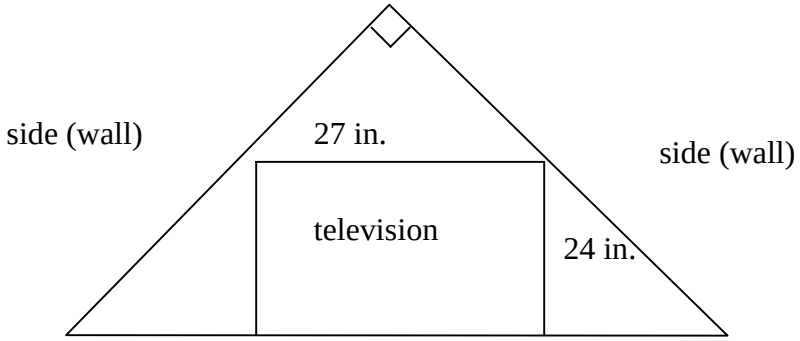
Time Requirements

- 25 minutes

NAME _____ DATE _____

CORNER CABINET

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.



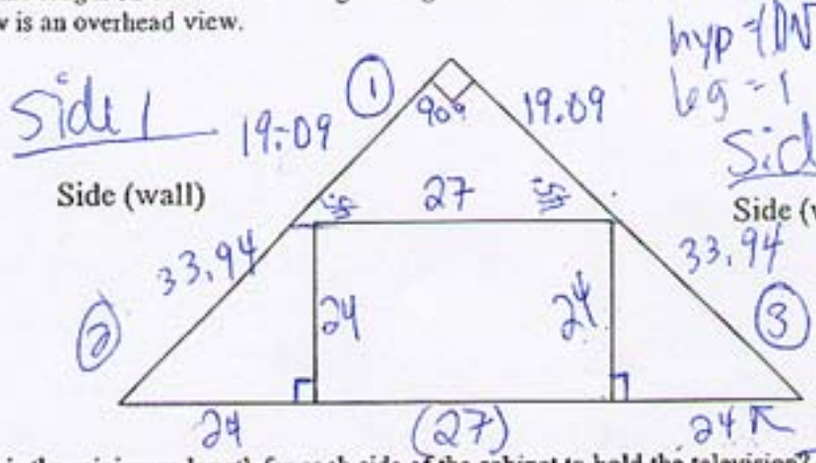
What is the minimum length for each side of the cabinet if it is to hold the television? Express the answer in a form that a carpenter would use for measuring; that is, one that could be located on a measuring tape or ruler. Show all of your work and explain in words what you did and why you did each step.

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

"Meets"

NAME _____ DATE 5-9-01

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.



hyp = leg $\sqrt{2}$
leg = 1

What is the minimum length for each side of the cabinet to hold the television? Show all of your work and explain in words what you did and why you did each step.

Triangle (1) L = 27 ÷ $\sqrt{2}$ = 19.09 (for both sides)

Triangle (2) hyp = Leg ($\sqrt{2}$) = 33.94 (Other leg is 24)

Triangle (3) hyp = Leg ($\sqrt{2}$) = 33.94 (Other Leg is 24)

Add all lengths together

side 1	Side 2	side 3
19.09 in	19.09 in	24 in
+ 33.94 in	+ 33.94 in	+ 24 in
		+ 27 in
53.03 in	53.03 in	75 in

Find the side lengths of all little triangles by using these two formulas
hyp = Leg ($\sqrt{2}$)
Leg = Leg
Then add the lengths of different sides.

Answer = 53.03 in x 53.03 in x 75 in

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

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