

HOW TALL IS THE BUILDING?

Performance Standard (7A/7C).G

Determine the height of a building using similar triangles and proportional reasoning:

- *Mathematical knowledge*: know how to solve problems involving mixed units of the same attribute; know how to make simple measurements using indirect techniques,
- *Strategic knowledge*: use similar triangles and proportional reasoning, and
- *Explanation*: explain completely and clearly what was done and why it was done.

Procedures

1. Provide students with sufficient learning opportunities to develop the following skills in order to (7A) measure and compare quantities using appropriate units, instruments and methods and (7C) select and use appropriate technology, instruments, and formulas to solve problems, interpret results, and communicate findings:
 - Make simple measurements using indirect techniques, and
 - Solve problems involving mixed units of the same attribute, including time, money, length, and area.
2. Provide each student a copy of the "How Tall Is the Building" 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 the students work individually to solve the following problem. Do not help the students or guide their thinking as they solve the problem.

A girl who is 5'4" stands 72 inches from the base of a pole, and looks up at the top of a pole. She finds she is looking up at an angle of elevation of 48° . The pole is known to be exactly 12 feet tall. She then turns around and looks at the building that was behind her. She discovers that if she continues to look up at the same angle of elevation, she sees the exact top of the building. If she is 27 feet away from the building, what is the height of the building?

4. Evaluate each student's work using the rubric and its guide to determine the performance level. Give each student a score in each of the three categories. One strategy that should be present is drawing a picture to represent the situation. Minor errors in computation include making errors in the actual addition, subtraction, multiplication, or division that result in wrong answers. Major errors include not recognizing differences in units of measurement before or after computation. The students should find that the building is $35 \frac{1}{4}$ feet tall. (If they forgot to add back in the height of the girl, they may get an answer of 30 feet.)

Examples of Student Work not available

Time Requirements

- 20-30 minutes

Resources

- Copies of the "How Tall Is the Building" task sheet
- Students should be familiar with angles of elevation before attempting this task.
- Mathematics Rubric

ASSESSMENT (7A/7C).G

NAME _____ DATE _____

HOW TALL IS THE BUILDING?

Student Task Sheet

Directions: Solve the following problem, showing all your work, and provide a written explanation of your procedures and reasoning.

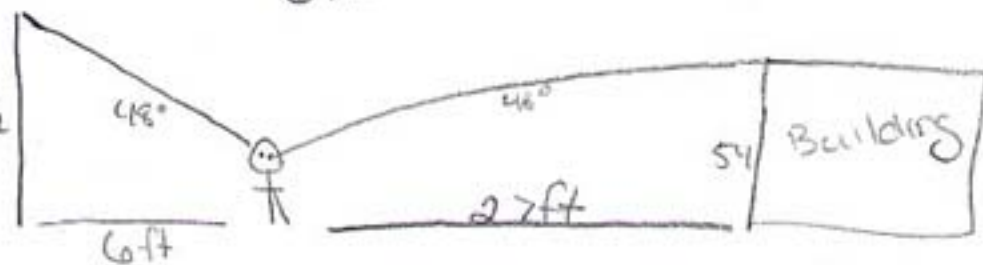
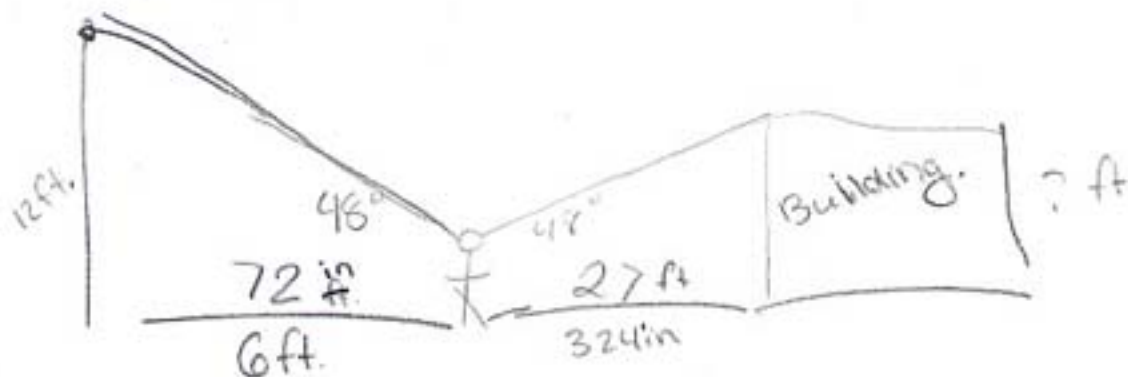
A girl who is 5'4" stands 72 inches from the base of a pole, and looks up at the top of a pole. She finds she is looking up at an angle of elevation of 48° . The pole is known to be exactly 12 feet tall. She then turns around and looks at the building that was behind her. She discovers that if she continues to look up at the same angle of elevation, she sees the exact top of the building. If she is 27 feet away from the building, what is the height of the building?

Name _____

Date 4/6/01**How Tall?**

Solve the following problem, showing all your work, and provide a written explanation of your procedures and reasoning.

A girl who is 5'4" stands 72 inches from the base of a pole, and looks up at the top of a pole. She finds she is looking up at an angle of elevation of 48° . The pole is known to be exactly 12 feet tall. She then turns around and looks at the building that was behind her. She discovers that if she continues to look up at the same angle of elevation, she sees the exact top of the building. If she is 27 feet away from the building, what is the height of the building?



$$\frac{12 \text{ ft}}{6 \text{ ft}} = \frac{?}{27 \text{ ft}}$$

$$6x = 12 \times 27$$

$$6x = \frac{324}{6} = 54 \text{ ft}$$

First I changed 72 in to 6 ft.

Then I made a ratio using the ht + how tall the pole was. Then I made an equation ($6x = 12 \times 27$) and found that $12 \times 27 = 324$. Then I divided 324 by 6 to get what the ? was. It equalled 54. The building was 54 ft tall. The length she is away from each object is half of the height. $\frac{1}{2}$ of 12 = 6 $\frac{1}{2}$ of 54 = 27