

MeTEOR Performance Task

Geometry

Mathematics
Right Triangles

Performance Task Item: Right Triangle Side Lengths

Grade Level: High School Geometry

Focus Area: The Pythagorean Theorem

Essential Question: How do you find a side length in a right triangle?

Core Ideas:

- Understands the sum of the squares of the lengths of the legs is equal to the square of the length of the hypotenuse in a right triangle.
- Understands if the sum of the squares of the lengths of two sides of a triangle is equal to the square of the third side, then the triangle is a right triangle.

Learning Targets:

- Students will analyze the relationship between sides in a right triangle.
- Students will use the Pythagorean Theorem and its converse to calculate the third side of a right triangle when given the lengths of two sides.
- Students will explain their reasoning.

STANDARDS

Domain: Geometry-Similarity, Right Triangles and Trigonometry

Content Standards:

- Prove theorems involving the Pythagorean Theorem using triangle similarity.
- Use trigonometric ratios and the Pythagorean Theorem to solve right triangles in applied problems.

Supporting Standards:

- Know precise definitions.
- Know the Distance Formula.

Math Practice Standards:

MP 1: Make sense of problems and persevere in solving them.

MP 3: Construct viable arguments and critique the reasoning of others.

MP 4: Model with mathematics.

MP 6: Attend to precision.

MP 7: Look for and make use of structure

Materials:

- Performance Task
- Pencil
- Paper
- Calculator

Task/Question 1:

DOK Level 1: Recall & Reproduction

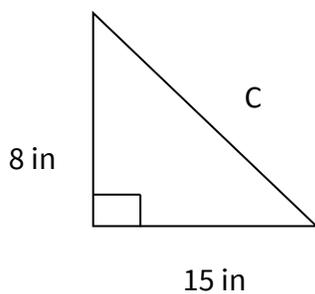
Math Practice Standard:

- MP 6: Attend to precision

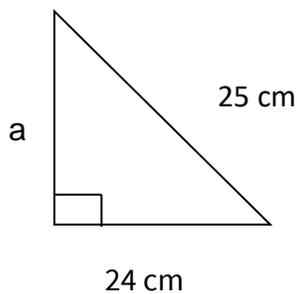
A. Using only words, write the Pythagorean Theorem:

B. Write the Pythagorean Theorem as an equation:

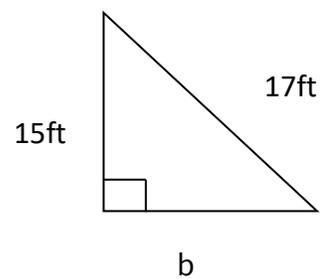
C. Find the missing side length for each right triangle:



C = _____



a = _____



b = _____

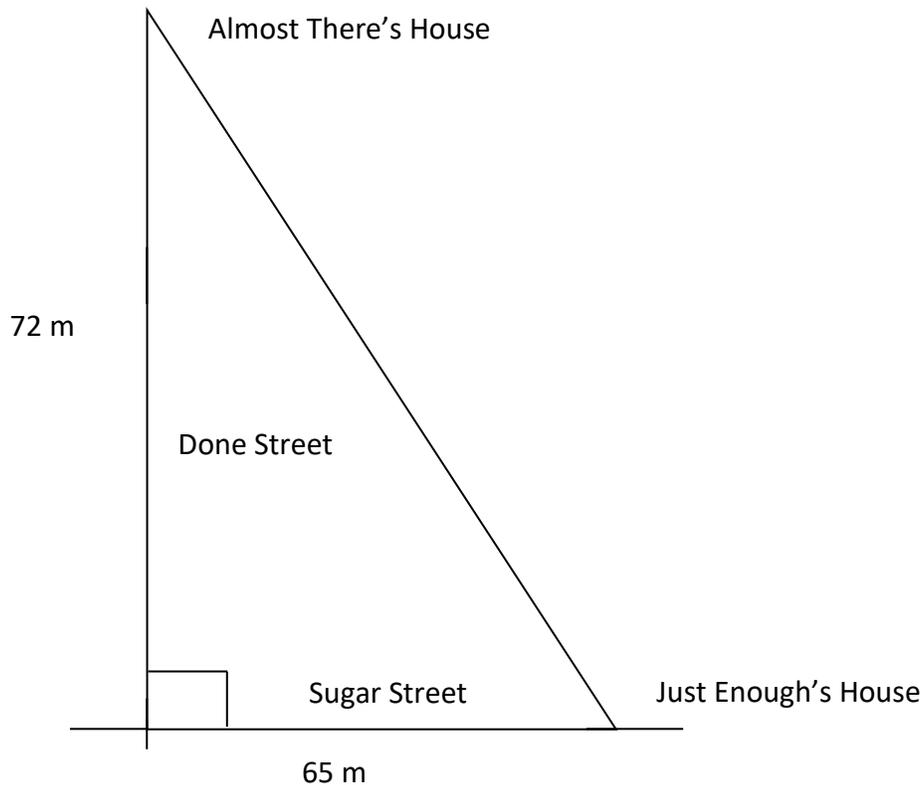
Task/Question 2:

DOK Level 2: Basic Application of Skills and Concepts

Math Practice Standards:

- MP 1: Make sense of problems and persevere in solving them.
- MP 4: Model with mathematics.
- MP 6: Attend to precision.

“Just Enough” lives on Sugar Street 65 meters from its intersection with Done Street.
 “Almost There” lives on Done Street, 72 meters from its intersection with Sugar Street.



A. How many meters of walking could “Just Enough” save by walking directly to “Almost There’s” home instead of walking along the streets?

B. Explain how you figured out Part A:

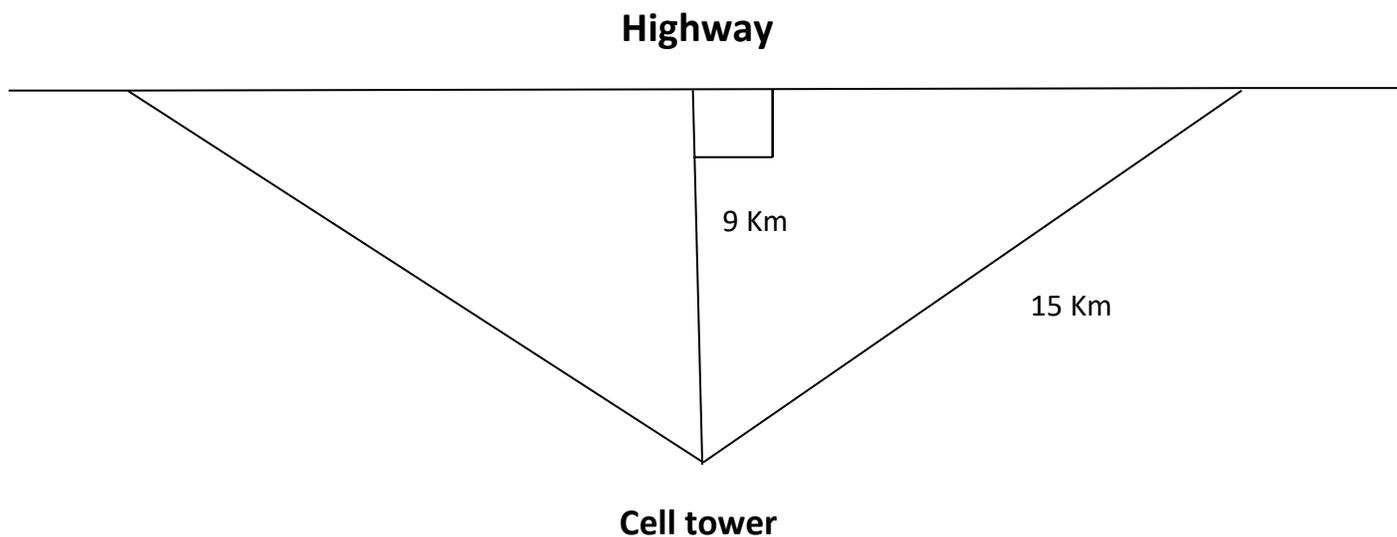
Task/Question 3:

DOK Level 2: Basic Application of Skills and Concepts

Math Practice Standards:

- MP 1: Make sense of problems and persevere in solving them.
- MP 4: Model with mathematics.
- MP 6: Attend to precision.

A cell tower is located 9 Kilometers off the highway. It has a range of 15 Kilometers.



A. What length of highway is within the cell tower's range to receive calls and other forms of data?

B. Explain how you figured out Part A:

Task/Question 4:

DOK Level 3: Strategic Thinking and Complex Reasoning

Math Practice Standards:

- MP 1: Make sense of problems and persevere in solving them.
- MP 3: Construct viable arguments and critique the reasoning of others.
- MP 4: Model with mathematics.

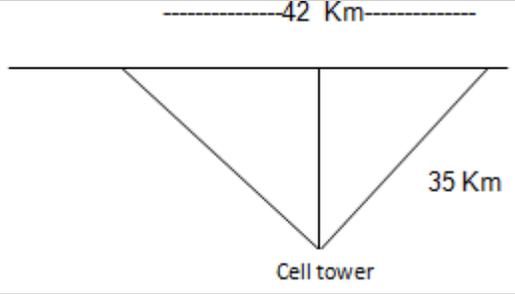
The phone company decided to broaden its cell tower range (from Task 3). The new signal covers a highway that is 42 Kilometers long and the signal from the cell tower is at a range of 35 Kilometers.

- A.** Draw a picture that is described in this new problem. Label each part.
- B.** Calculate how far off the road the cell tower is located:
- C.** Justify how your process is the **most efficient** for deciding how far off the road the cell tower is located:

Complete Performance Task Scoring Rubric *Right Triangle Side Lengths*

13-14 Proficient 11-12 Good 9-10 Satisfactory 8 Poor 0-7 Unsatisfactory

	Depth of Knowledge Level	Points	Total Possible Points for Task	Total Points Earned by Student
<p>Task 1:</p> <p>A. In a right triangle, the square of the hypotenuse equals the sum of the squares of the two legs.</p> <p>B. $a^2 + b^2 = c^2$</p> <p>C. $c = 17$ $a = 7$ $b = 8$</p>	1	<p>1</p> <p>1</p> <p>1</p>	3	
<p>Task 2:</p> <p>A. 40 meters saved</p> <p>B. Answers will vary. Possible Explanation: “The distance from “Just Enough’s” house to “Almost There’s” house is a distance of 137 meters if you add the two street distances together. When I use the Pythagorean Theorem to find the shortest distance between their houses I get 97 meters. However, the question asked for the distance saved by walking directly, so I then need to subtract the distance of the hypotenuse from the total leg distance- which is 40 meters.”</p>	2	<p>1</p> <p>2</p>	3	
<p>Task 3:</p> <p>A. The length of highway is 24 Kilometers.</p> <p>B. Answers will vary. Possible Explanation: “To find the length of the highway within the range of the cell tower I used the Converse of the Pythagorean Theorem to find the</p>	3	<p>1</p> <p>2</p>	3	

<p>missing leg which is 12. Then, I doubled the answer because the range goes in a circle and allows the signal to go in the opposite direction on the highway.”</p>				
<p>Task 4: A.</p>  <p>B. 28 Kilometers</p> <p>C. Answers will vary. Possible Justification: “My process is the most efficient. This is how I solved it: Since the highway shows the total length the signal can reach, I have to cut it in half to get the distance of the base of one triangle which is 21 Kilometers. Then, to find the distance the cell tower is from the highway I use the Converse of the Pythagorean Theorem to find the missing leg which is 28”.</p>	<p>3</p>	<p>1</p> <p>1</p> <p>3</p>	<p>5</p>	
TOTAL POINTS:				



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