8.GM.3 Apply the Pythagorean Theorem to determine unknown side lengths in right triangles in real-world and other mathematical problems in two dimensions. (E)	
Reporting Category: Geometry, Measurement, Data Analysis, Statistics, and Probability	**Subdomain**: Geometry
8.GM.3 Instructional Framework	
Assessed On: ☐ Checkpoint 1 ☐ Checkpoint 2 ☑ Checkpoint 3 ☑ Summative	
Content Limits: ● Answers must be either a perfect square or a decimal approximation to the tenth or hundredth. Students will not simplify radicals.	
Clarifications: ● Grade-level reference sheet with the Pythagorean Theorem will be provided. ● The keypad in the ILEARN testing system does not allow students to enter a comma between each period in a multi-digit number. (Example: 13,323 would be entered as 13323.)	
Calculator Availability: Allowed	
Expected Academic Vocabulary: hypotenuse, leg, Pythagorean Theorem, right triangle, Pythagorean triples, square root, exponents, squaring	
Examples of Context and Varying Difficulty Levels+	
Context: Easy	All given measures are whole numbers. Model and all measurements are provided.
Context: Medium	Measures are given as decimals, fractions, or mixed numbers. Model and some measurements are provided.
Context: Difficult	Required multiple applications of the Pythagorean Theorem. Model is not provided.
Proficiency Level Descriptors and Example Items	
Looking Back: This concept is not specifically addressed in the Indiana Academic Standards prior to this grade level.	**Looking Ahead**: G.T.5 G.T.7
Below Proficiency: Identify or write the Pythagorean Theorem for a given triangle.	
A right triangle is given.	This is a DOK 1 item because students must

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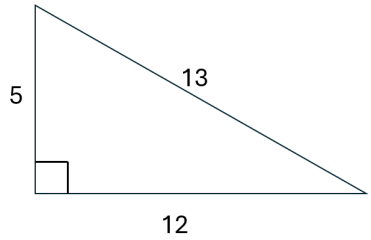
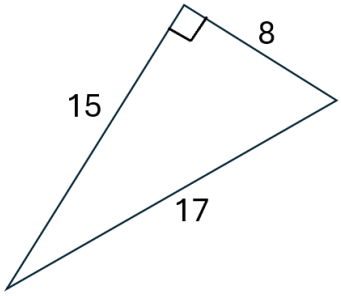
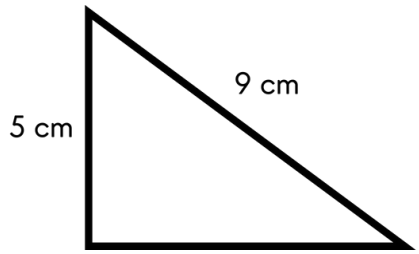
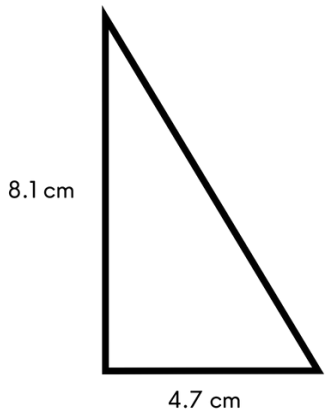
 Click on each blank box and select an option to complete the equation describing the side length relationships using the Pythagorean Theorem. $\square^2 + \square^2 = \square^2$ *[Dropdown Menu One: 5, 12, 13]* *[Dropdown Menu Two: 5, 12, 13]* *[Dropdown Menu Three: 5, 12, 13]* **Answer:** 5, 12, 13 OR 12, 5, 13	use the given measurements to complete the Pythagorean Theorem. This is easy because all given measures are whole and a model is provided.
Given the right triangle below, complete the Pythagorean Theorem.  Click on each blank box and select an option to complete the Pythagorean Theorem. $\square^2 + \square^2 = \square^2$ *[Dropdown Menu One: 8, 15, 17]* *[Dropdown Menu Two: 8, 15, 17]* *[Dropdown Menu Three: 8, 15, 17]* **Answer:** 8, 15, 17 OR 15, 8, 17	This is a DOK 1 item because students must use the given measurements to complete the Pythagorean Theorem. This is easy because all given measures are whole and a model is provide
Approaching Proficiency: Apply the Pythagorean Theorem to calculate an unknown length of a right triangle in real-world or other mathematical problems in two dimensions.	

A right triangle has a leg with a length of 5 centimeters, and a hypotenuse with a length of 9 centimeters.  Enter the length, in centimeters, of the other leg of the triangle. Round your answer to the nearest hundredth. _____ cm **Answer:** $\sqrt{56}$ or 7.48 cm or any equivalent value	This is a DOK 1 item because students must apply the Pythagorean Theorem to calculate an unknown length. This is an easy item because the measures given are natural numbers.
The length of the two legs of a right triangle are given.  Enter the length, in centimeters, of the hypotenuse of the triangle. Round your answer to the nearest hundredth. _____ cm **Answer:** 9.36 cm or equivalent	This is a DOK 1 item because students must apply the Pythagorean Theorem to calculate an unknown length. This is a medium-difficulty item because the leg measures are given as decimals.
At Proficiency: Apply the Pythagorean Theorem to determine unknown side lengths of right triangles to solve real-world problems.	

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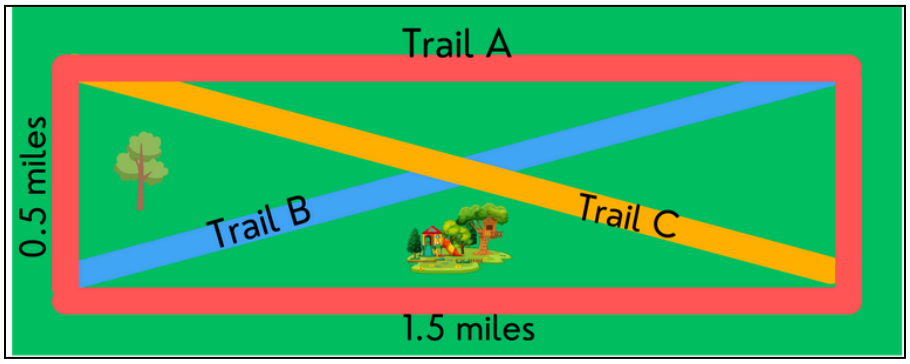
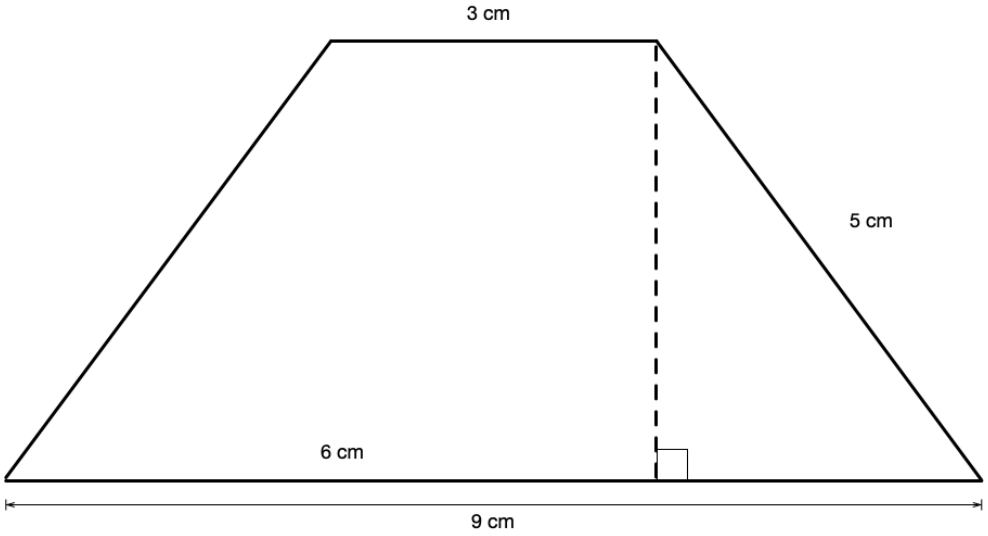
A carpenter is cutting pieces of wood for a project. • He has a square piece of wood with side lengths of 8 inches. • He cuts the square diagonally creating two right triangles. Enter the length, in inches, of the longest side of the resulting right triangle. Round your answer to the nearest tenth. [ ] **Answer:** 11.3 inches	This is a DOK 2 item because students must apply the Pythagorean Theorem to solve a real-world problem This is a difficult item because a model is not given.
An athlete runs the trails in a park. • Trail A forms a rectangle around the perimeter of the park. • The short sides are 0.5 miles long and the long sides are 1.5 miles long. • Trail B and Trails C form diagonals from one corner of the park to another corner.  What is the length of Trail B, in miles? Round your answer to the nearest tenth. [ ] miles **Answer:** 1.6 miles	This is a DOK 2 item because students must apply the Pythagorean Theorem to solve a real-world problem This is a medium-difficulty item because the leg measures are given as decimals.
Above Proficiency: Apply the Pythagorean Theorem to solve real-world and mathematical problems involving two- and three-dimensional shapes composed of at least one right triangle.	
An isosceles trapezoid is given.	This is a DOK 2 item because students must apply the Pythagorean Theorem to solve a



Enter the height of the trapezoid, in centimeters, using the Pythagorean Theorem.

_____ cm

Answer: 4 cm

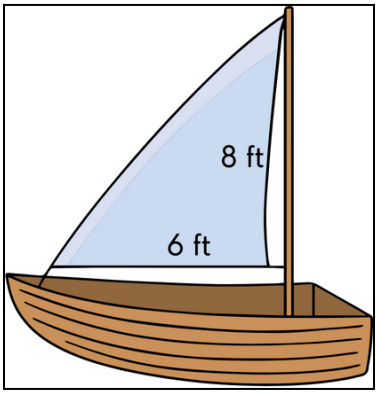
mathematical problem involving a two-dimensional shape composed of at least one right triangle.

This is easy because the measurements are given as whole numbers and a model is provided.

Part A:

A triangular sail on the boat in Figure A is shaped like a right triangle. The base of the sail is 6 feet and the height from the base to the top corner is 8 feet.

Figure A: First Boat



This is a DOK 2 item because students must apply the Pythagorean Theorem to solve a mathematical problem involving a two-dimensional shape composed of at least one right triangle.

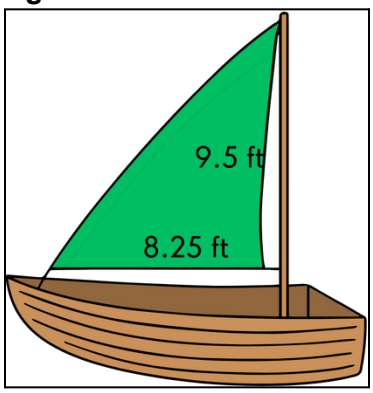
This is a medium-difficulty item because it provides a model for one part but not the second party. Additionally, it uses whole numbers in Part A and decimals in Part B.

Enter the length, in feet, of the longest side of the sail.

_____ feet

Part B: The boat owner purchases a different-sized sail with a height of 9.5 feet and a base of 8.25 ft, shown in Figure B.

Figure B: Second Boat



How much longer, in feet, will the longest side of the sail in Figure B be than the sail in Figure A? Round your answer to the nearest whole number.

_____ feet

Answer:
Part A: 10 feet
Part B: 3.0 ft.