MeTEOR Performance Task Eighth Grade

Mathematics
Pythagorean Theorem

Performance Task: Pythagorean Theorem

Grade Level: 8th grade

Focus Area: Pythagorean Theorem
Essential Question: What strategies can be used to understand and apply the Pythagorean Theorem?
Core Ideas:

- Understands that there are numbers that are not rational, and approximate them by rational numbers.
- Understands and applies the Pythagorean Theorem.

Learning Targets:

- Students will demonstrate understanding of the concepts of irrational numbers.
- Students will make use of common irrational numbers such as the square root of 2 and pi.
- Students will apply the Pythagorean Theorem to calculate the side of a triangle.

STANDARDS

Domain: **Geometry**
Content Standards:

- Apply the Pythagorean Theorem to determine unknown side lengths in right triangles in real- world and mathematical problems in two and three dimensions.

Supporting Standards:

- Use rational approximations of irrational numbers to compare the size of irrational numbers.

Math Practice Standards:

MP 1: Make sense of problems and persevere in solving them.
MP 2: Reason abstractly and quantitatively.
MP 3: Construct viable arguments and critique the reasoning of others.
MP 4: Model with mathematics.
MP 6: Attend to precision

Materials:

- Performance Task
- Pencil
- Calculator
- ruler

Task/Question 1:

DOK Level 1: Recall & Reproduction

Math Practice Standard:

- MP 6: Attend to precision.

A. What is the Pythagorean Theorem?

B. What type of triangles is the Pythagorean Theorem used for?

C. What is the ***hypotenuse***?

Task/Question 2:

DOK Level 2: Basic Application of Skills and Concepts

Math Practice Standards:

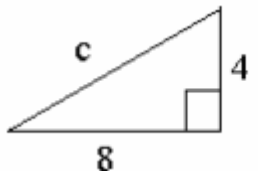
- MP 1: Make sense of problems and persevere in solving them.
- MP 4: Model with mathematics.
- MP 6: Attend to precision.

Find the Length of the hypotenuse for each of the following: (Show your work)

A. $4^2 + 5^2 = c^2$

B. $7^2 + 2^2 = c^2$

C.



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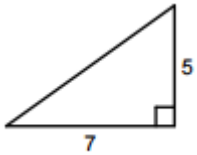


Task/Question 3:

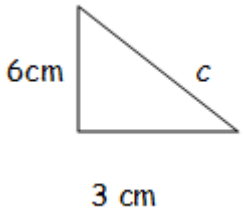
DOK Level 2: Basic Application of Skills and Concepts

Math Practice Standards:

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

Determine the length of the missing side for each right triangle below: (Show your work)

A.



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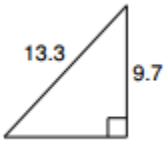
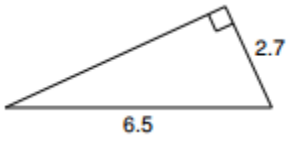


C.



D.

Task/Question 4:

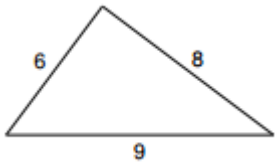
DOK Level 3: Strategic Thinking and Complex Reasoning

Math Practice Standards:

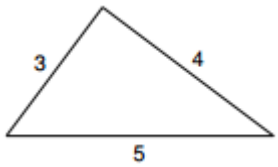
- MP 1: Make sense of problems and persevere in solving them.
- MP 3: Construct viable arguments and critique the reasoning of others.
- MP 4: Model with mathematics.
- MP 7: Look for and make use of structure.

Determine if each of the following creates a right triangle. Justify your answers using mathematical language:

A.



B.



Task/Question 5:

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.
- MP 7: Look for and make use of structure.

A. Jason created a flower bed that is rectangular in shape and measures 4 feet by 5 feet. Draw his flower bed. How can he determine the length of the diagonal? Explain and justify using geometric properties of all shapes involved.

B. A rectangular vacant lot measures 60 yards by 70 yards. John says the shortest way across the lot is straight across. Lucy claims that if you cross the lot diagonally it is actually shorter. Who is correct? Defend your answer using academic vocabulary, calculations and a diagram.

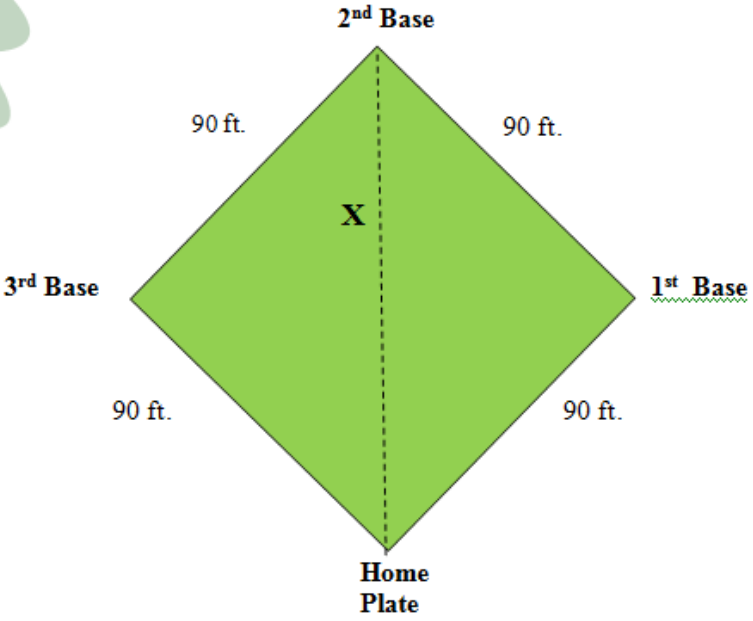
Task/Question 6:

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.
- MP 7: Look for and make use of structure

Real World Application: Play Ball!



Use the drawing above to answer the following questions:

A. If the 2nd baseman must throw a ball from 2nd base to home, what is the length of that throw?

B. Explain how you solved Part A using Pythagorean Theorem:

C. If the 3rd baseman must throw the ball to 1st base, how far would he/she have to throw the ball? Defend how your process for solving this task is ***most efficient***. (As you defend your answer, identify the triangle, legs and hypotenuse of the throw.)

Complete Performance Task Scoring Rubric
Pythagorean Theorem

17-22 Proficient 12-16 Good 8-11 Satisfactory 4-7 Poor 0-3 Unsatisfactory

	Depth of Knowledge Level	Points	Total Possible Points for Task	Total Points Earned by Student
Task 1:	**1**		**3**	
A. $a^2 + b^2 = c^2$		**1**		
B. Right Triangles		**1**		
C. Longest side diagonal from the right angle.		**1**		
Task 2:	**2**		**4**	
A. 6.4		**1**		
B. 7.3		**1**		
C. 8.9		**1**		
D. 8.6		**1**		
Task 3:	**2**		**4**	
A. 6.7 cm		**1**		
B. 9.1		**1**		
C. 5.9		**1**		
D. 4.9		**1**		
Task 4:	**3**		**2**	
A. No; Student justification should include information that the Pythagorean Theorem doesn't apply accurately.		**1**		
B. Yes; Student justification should include information that the Pythagorean Theorem was used to determine their answer.		**1**		

Task 5: A. Answers will vary. Rectangles contain right angles. A diagonal will create a right triangle. Pythagorean Theorem can be applied. Diagonal length is 6.4 feet. B. Answers will vary. John is correct. 60 yards across is shorter than the diagonal which is 92.2 yards when Pythagorean Theorem is applied.	**3**	**2** **2**	**4**	
Task 6: A. 127.3 feet B. 127.3 feet 8100 x 8100 = x^2 Answers will vary, however students must explain how a baseball field is rectangular in shape and includes right angles and right triangles, therefore the Pythagorean Theorem may be applied. C. 127.3 feet. Answers will vary, however students must explain how a baseball field is rectangular in shape and includes right angles and right triangles, therefore the Pythagorean Theorem may be applied. Legs are home plate to first base and home plate to third base. The hypotenuse is from third base to first base.	**3**	**1** **2** **2**	**5**	
			TOTAL POINTS: