

Pythagorean Theorem

Grade Level/Course: 8th Grade Math

Concepts: Using the Pythagorean Theorem to determine the length of the sides of a triangle.

Performance Objectives:

Objectives	Evaluation Questions
Eighth-grade Math students will be able to calculate the missing sides of a right triangle using the Pythagorean Theorem with little to no assistance.	What is the length of the hypotenuse of a triangle with side lengths 3" and 4"?' What is the second side of a triangle with a hypotenuse of 13" and a side length of 12"?

Applicable Standards

CCSS.MATH.CONTENT.8.G.B.7

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

Materials List

Construction paper, markers, scissors, small fruit candies, evaluation page

Engagement: 5 minutes		
What the teacher will do:	Probing/Eliciting Questions	Student responses and/or misconceptions:
Show Pythagorean Theorem Rap video. https://www.youtube.com/watch?v=nbopLhP4kpo	What are some of the things he says about the Pythagorean Theorem in the video? What type of triangle can you use the P.Thm on? Can you use it on an acute or obtuse triangle? What are the parts of a right triangle? Which of these sides is the hypotenuse?	They'll probably think it's a little goofy.
Exploration: 10 minutes		

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What the teacher will do:	Probing/Eliciting Questions	Student responses and/or misconceptions:
<p>Demonstrate how the Pythagorean theorem works using fruit candies. https://www.youtube.com/watch?v=uaj0XcLtN5c Teacher will do what is done in this video, using candies (or other small object) in place of the unit squares.</p>	<p>What other integers would make up a right triangle? Will the side lengths always be integers? What would you do if you came up with a non-integer answer?</p>	<p>Misconception: Students may think all right triangles have side lengths that are integers. Students may be familiar with a few other Pythagorean triples.</p>

Explanation: 20 minutes		
What the teacher will do:	Probing/Eliciting Questions	Student responses and/or misconceptions:
<p>Hand out paper and pencils to students. Each group (cluster) gets a different color of paper. Show students how to fold paper in half hotdog style and cut half way 3 times (paper will have four flaps).</p> <p>Flap 1: Pythagorean Theorem Inside: $a^2 + b^2 = c^2$ Flap 2: How to find the hypotenuse Inside: An example of how to find the hypotenuse Flap 3: How to find a missing leg Inside: an example of how to find the missing leg Flap 4: Pythagorean Triples</p>	<p>What are you drawing underneath each flap? What pictures could you use to help you remember the P.Thm?</p>	<p>Fold, cut, and decorate foldable as directed by teacher. As a group, discuss what goes under each flap of the foldable and solve for the missing values of the triples given for the last flap.</p> <p>Misconception: A, B and C are interchangeable. In reality, A and B are, but C is always the hypotenuse.</p> <p>Students can share what they've written under each flap with their neighbors.</p>

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<p>Inside: A list of triples to remember</p> <p><u>Give list of unfinished triples for the last flap</u></p> <p>Write down what students are telling you on the flaps of the example foldable you are making.</p>		
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Elaboration: 20 minutes	
What the teacher will do:	Student responses and/or misconceptions:
<p>If there is extra time, give practice problems as a game. Each group is a team. Give two parts of a Pythagorean triple, and have students solve for the third part.</p> <p>Do not only use perfect triples.</p> <p>Call on the group who raised their hands first to tell the class the answer.</p> <p>Give candies to group who does each problem the fastest.</p>	<p>As a group, find the third part of a given triple.</p> <p>Everybody in the group will raise their hands when the group has the answer.</p>

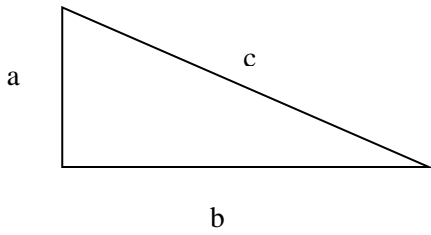
Evaluation: 15 minutes	
What the teacher will do:	Student responses and/or misconceptions:
<p>Hand out Pythagorean Theorem evaluation page.</p>	<p>Students will complete evaluation.</p>

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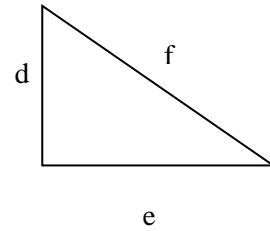
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Calculate the length of the missing side of each figure using the Pythagorean Theorem.

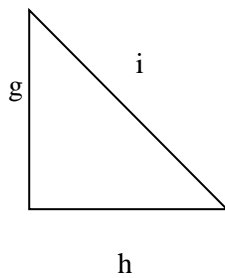
1. $a = 7$,
 $b = 24$
 $c = \underline{\hspace{2cm}}$



2. $d = 8$
 $e = \underline{\hspace{2cm}}$
 $f = 17$



3. $g = 1$
 $h = 1$
 $i = \underline{\hspace{2cm}}$



4. $j = \underline{\hspace{2cm}}$
 $k = 21$
 $l = 29$

