

## MAT.08.ER.3.0000G.B.433 Claim 3

Sample Item ID:	MAT.08.ER.3.0000G.B.433
Grade:	08
Primary Claim:	<b>Claim 3: Communicating Reasoning</b> Students can clearly and precisely construct viable arguments to support their own reasoning and to critique the reasoning of others.
Secondary Claim(s):	Claim 1: Concepts and Procedures Students can explain and apply mathematical concepts and carry out mathematical procedures with precision and fluency.
Primary Content Domain:	Geometry
Secondary Content Domain(s):	
Assessment Target(s):	3 B: Construct, autonomously, chains of reasoning that will justify or refute propositions or conjectures.  1 H: Understand and apply the Pythagorean theorem.  3 F: Base arguments on concrete referents such as objects, drawings, diagrams, and actions.
Standard(s):	8.G.7
Mathematical Practice(s):	2, 3, 6, 7
DOK:	2
Item Type:	ER
Score Points:	2
Difficulty:	H
Key:	See Sample Top-Score Response.
Stimulus/Source:	
Target-Specific Attributes (e.g., accessibility issues):	
Notes:	Part of PT set; drawing tools are turned off for this item.

Students in a class are using their knowledge of the Pythagorean theorem to make conjectures about triangles. A student makes the conjecture shown below.

A triangle has side lengths  $x$ ,  $y$ , and  $z$ . If  $x < y < z$  and  $x^2 + y^2 < z^2$ , the triangle is an obtuse triangle.

Use the Pythagorean theorem to develop a chain of reasoning to justify or refute the conjecture. You must demonstrate that the conjecture is always true or that there is at least one example in which the conjecture is not true.

*Sample Top-Score Response:*

Picture the triangle with the side of length  $x$  on the bottom, the side of length  $y$  on the left, and the side of length  $z$  on the top. If  $x^2 + y^2 = z^2$  the triangle is a right triangle. Since  $x^2 + y^2 < z^2$  if the sides of length  $x$  and  $y$  were left so they made a right angle and the side of length  $z$  started at the other end of the side of length  $x$ , it would extend past the other end of the side of length  $y$ . So the end of the side of length  $y$  has to swing out to the left so the ends of all the segments can connect to form a triangle. When the side of length  $y$  swings out to the left, the measure of the angle between that side and the side of length  $x$  increases, so the triangle is an obtuse triangle. The conjecture is true.

*Scoring Rubric:*

Responses to this item will receive 0-2 points, based on the following:

**2 points:** The student shows a thorough understanding of how to use the Pythagorean theorem to construct a chain of reasoning to justify a statement about a triangle. The student justifies the conjecture and makes use of the Pythagorean theorem while doing so.

**1 point:** The student shows a partial understanding of how to use the Pythagorean theorem to construct a chain of reasoning to justify a statement about a triangle. The student either demonstrates knowledge of the Pythagorean theorem but does not provide a clear justification of the conjecture OR the student provides a justification of the conjecture without making use of the Pythagorean theorem.

**0 points:** The student shows inconsistent or no understanding of how to use the Pythagorean theorem to construct a chain of reasoning to justify a statement about a triangle. Merely stating that the conjecture is true is not enough to earn any points.