Smarter Balanced Assessment Item Illustrating 8.G.B.6

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The Pythagorean Theorem states that if a right triangle has legs of length a and b and hypotenuse of length c, then $a^2 + b^2 = c^2$.

Figures 1 and 2 represent the key ideas in a proof of the Pythagorean Theorem.

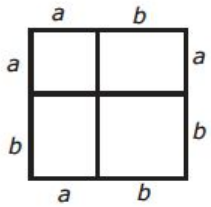

Figure 1

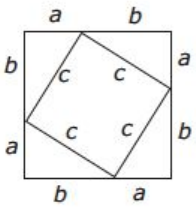

Figure 2

Create an outline a proof for the Pythagorean Theorem based on Figures 1 and 2, by dragging the seven statements shown into a logical sequence.

A right triangle has legs of length a and b and hypotenuse of length c.

1.

2.

3.

4.

5.

6.

7.

Thus, $a^2 + b^2 = c^2$

Subdivide the large square in Figure 1 into a square with side-length a, a square with side-length b, and two rectangles with side-lengths a and b.

Subdivide the large square in Figure 2 into four right triangles with legs a and b and a square with side-length c.

The total area of the large square in Figure 1 is $a^2 + b^2 + ab + ab$.

The total area of the large square in Figure 2 is $c^2 + 4(\frac{1}{2}ab)$.

Start with two large squares with sides of length $a + b$.

$a^2 + b^2 + ab + ab = c^2 + 4(\frac{1}{2}ab)$

The two large squares have the same area because they are congruent.

Answer Key

The student drags the steps of the proof into a logical order. Note that 1 must be first and 7 must be last and 2 must precede 5 and 3 must precede 6, but any other permutations are allowed as long as they are consistent with these constraints).

Elaboration on Alignment

Standard 8.G.B.6 requires students to explain a proof of the Pythagorean Theorem. This item requires students to create a logical sequence in which to structure the statements based on given figures supporting a proof of the Pythagorean Theorem. Since assessments often have limited real estate dedicated to open-ended constructed response item types, developers must be thoughtful in creating items that still measure the demands of standards that ask students to “explain.”

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