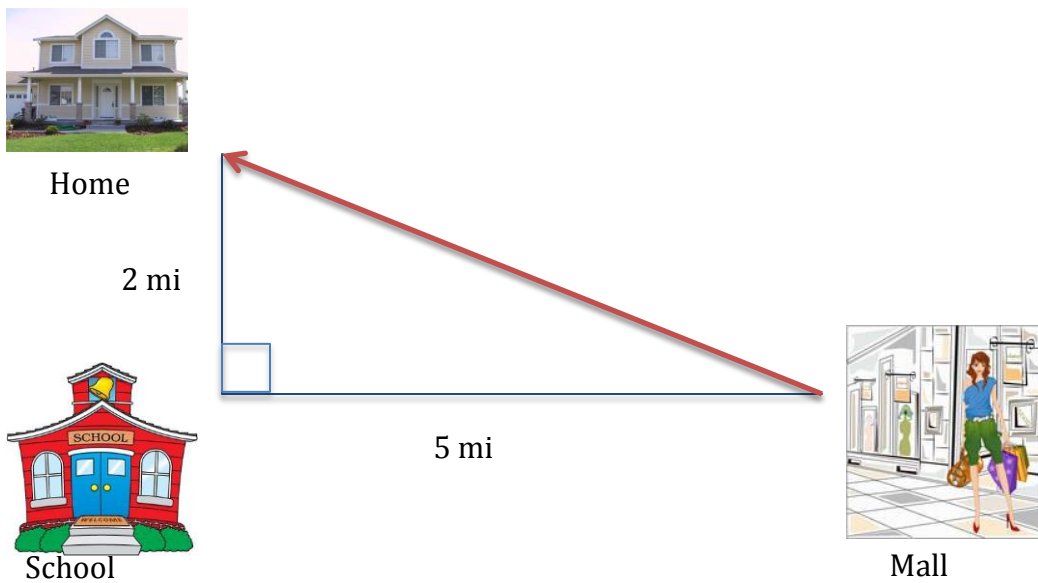


## 8.G Applying the Pythagorean Theorem in Two Dimensional, Real Life Scenario.

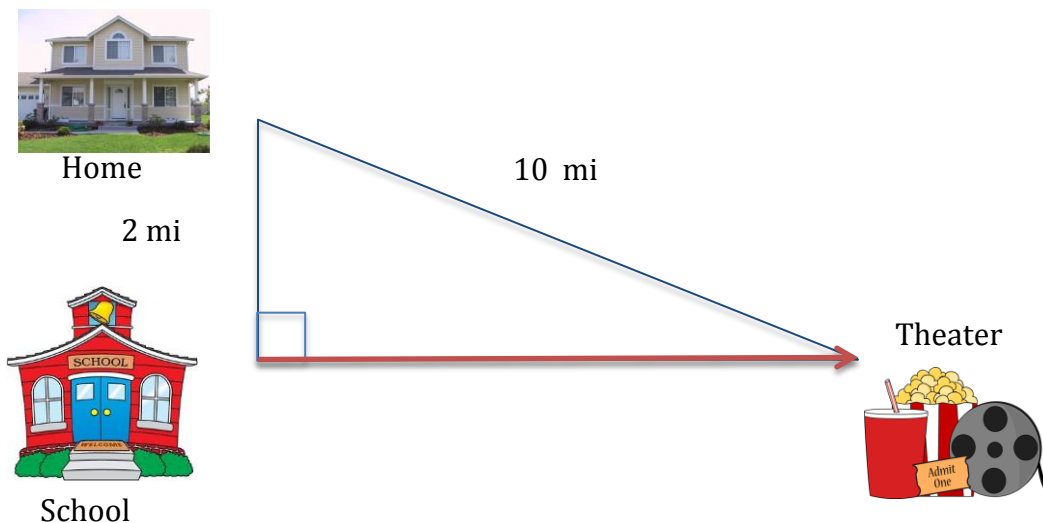
Alignments to Content Standard

- Alignment: 8.G.B.  
8 -Grade 8  
Domain -G: Geometry  
Cluster-Understand and Apply the Pythagorean Theorem.

Monday Sally bikes from her house to school, which is 2 miles. After school Sally and her friends decide to go shopping at the mall, which is 5 miles from the school. After shopping Sally decides it is time to go home and eat some pizza. The locations of Sally's house, the school, and the mall are represented in the diagram below. Use the Pythagorean Theorem to find approximately how many miles Sally will have to travel to get from the mall back to home, provided she takes the fastest route home.



Tuesday Sally walks to school. After school Martha offers to drive Sally to the theater so they can see a movie together. Once the movie is over Martha drives Sally home, which is 10 miles from the theater. Given the diagram below and using the Pythagorean Theorem, approximately how many miles did Martha and Sally have to drive from school to the theater?



**Commentary:**

This assessment gives students real- world mathematical situations that they can relate to. The purpose of this task is to help students understand how they can apply the Pythagorean Theorem to real world situations and why it is an essential concept to learn. There is a Monday and Tuesday scenario, so that students can demonstrate the mathematical procedures of how the Pythagorean Theorem can be used to find the hypotenuses as well as a leg of a given right triangle. Furthermore, the task assesses if the students are able correctly identify the sides of a triangle. In the Monday scenario students must understand that the distance from the mall to home is the hypotenuse, which means in the Pythagorean Theorem they are solving for c. In the Tuesday scenario students must understand that the distance from the school to the theater is a leg of the right triangle, therefore they must solve for a or b, depending on the way they substitute the variables. The given diagram helps clarify common misconceptions by reminding students that the Pythagorean Theorem only applies to right triangles. The diagram also gives students a visual representation, so that they can connect the scenario to a geometric figure. To reach all learning styles the teacher can read the assessment aloud to the class and allow the students to work in pairs so that there is support for visual, aural, social, logical, and verbal learners.

**Solution:**

Monday's scenario:

Since given two legs of the right triangle students can use the Pythagorean Theorem to find the hypotenuse, which is the fastest route from the mall to Sally's house.

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

$$2^2 + 5^2 = c^2 \text{ (substituting variables)}$$

$$\text{so, } c = \sqrt{2^2 + 5^2}$$

$$c = \sqrt{4 + 25}$$

$$\text{which, simplifies to } c = \sqrt{29}$$

$$\text{in decimal form } c = 5.385164807$$

Since the walking distance is in miles we will approximate the square root of 29 to two decimal places.

Therefore, Sally's route home from the mall is 5.39 miles.

Tuesday's scenario:

Using the Pythagorean Theorem we can find the leg of a right triangle given the other leg and the hypotenuse.

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

$$2^2 + b^2 = 10^2 \text{ (substituting variables)}$$

$$b^2 = 10^2 - 2^2$$

$$b^2 = 100 - 4$$

$$b^2 = 96$$

$$b = \sqrt{96}$$

$$\text{in decimal form } b = 9.797958971$$

Since the leg  $b$  represents the distance from school to the theater we will approximate the square root of 96 to two decimal places and add units to our solution.  
Therefore, Martha's and Sally's route from school to the theater is 9.80 miles.