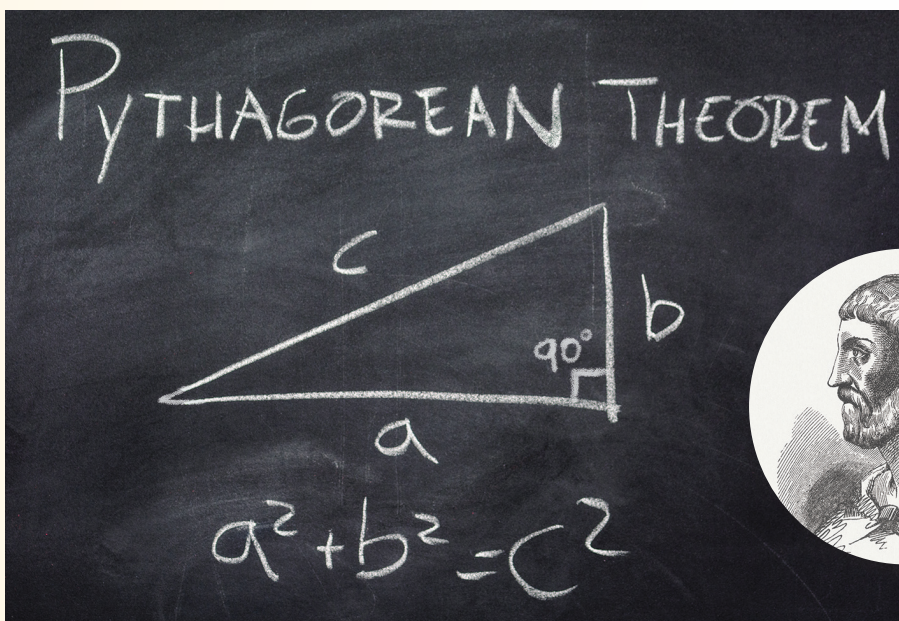


## What You Need to Know

In 570 BC, a man named Pythagoras was born in Ancient Greece and became a well-known philosopher and mathematician. He discovered the famous **Pythagorean theorem**, which all students encounter in their math classes. The formula states that in a **right triangle**, the square of the **hypotenuse** is equal to the sum of the squares of the two sides. You have probably seen this as  $a^2 + b^2 = c^2$ .

It is also sometimes written as  $c = \sqrt{a^2 + b^2}$ .

A right triangle is a specific type of triangle that has one of its angles equal to  $90^\circ$ . The sum of the three interior angles in a triangle always equals  $180^\circ$ . In an **isosceles right triangle**, the two sides are equal in length, so the interior angles are  $90^\circ$ ,  $45^\circ$ , and  $45^\circ$ .



You might think geometry and measurement will never be useful anywhere but in a classroom, but contractors, architects, engineers, and construction workers use them often! Understanding **proportions** is also an important part of real-life situations, such as when reading a blueprint or a map. A proportion is when two **ratios** are equal to each other, and you can solve for an unknown number.

*Example:* An architect's blueprint has a scale of 1 inch = 3 feet. If a room on the blueprint has a length of 4 inches, what will the actual length of the room be when it is constructed?

cross multiply

$$\frac{1 \text{ inch}}{3 \text{ feet}} = \frac{4 \text{ inches}}{x \text{ feet}}$$
$$1x = 12$$
$$x = \frac{12}{1}$$
$$x = 12 \text{ feet}$$



Architects and builders also need to know how to calculate **surface area** and **volume** of different shapes. The area of a triangle is  $\frac{1}{2} \times \text{base} \times \text{height}$ , but the area of a rectangular prism is  $2(wl + hl + hw)$ . However, calculating the volume of that same rectangular prism is found by multiplying length by width by height. Middle-school math formulas matter!





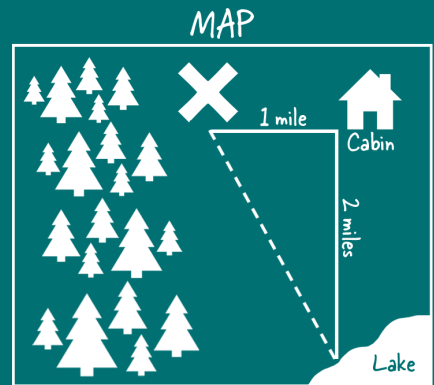
Ezekiel and Jamal made their purchases and carried the construction materials out to the truck. On the ride back to his grandparents' cabin, Jamal stared out the window at the unfamiliar landscape. He realized that he didn't know the area very well and decided to draw a map of their new neighborhood.

“Will we build our house closer to grandma and grandpa's cabin, or will it be closer to the lake?” Jamal asked later that afternoon as he sat at his grandpa's desk and worked on sketching his map.



## Work It Out

Help Jamal calculate about how many miles it is from the X to the lake. Jamal decides to expand the map and add more places, so he sets a scale for the map. Using what you know about proportions, if 2 inches on the map represents 4 miles, how many miles will 7 inches represent?



“Well, we cleared the land for our cabin’s foundation about one mile west of their house,” Ezekiel stated.

“But approximately how close is that area to the lake?” Jamal questioned.

“See, this is why math formulas are important. You need to calculate it,” Ezekiel chuckled. “The three points will form a right triangle—the lake is two miles south of their house, and our new home will be one mile west of their cabin.”

“How do I calculate the length of the missing side of the triangle?” Jamal pondered.