

Pythagorean Theorem with Ari

Vocabulary

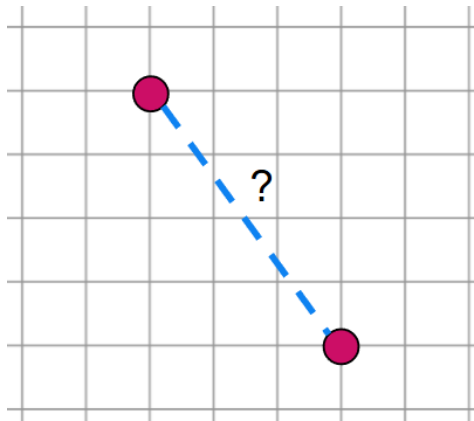
Right Triangle - A triangle with two perpendicular sides that form a 90-degree angle, also called a right angle.

Perpendicular - Two lines that cross to make a 90-degree angle

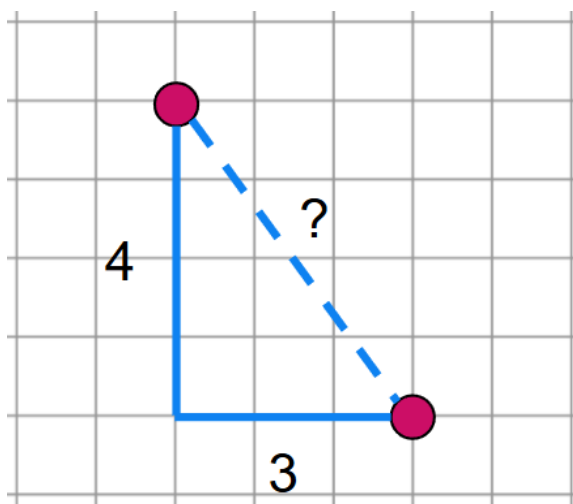
Direct Instruction

Introduction

1. Pose the following question to the class: "How can we figure out the shortest path between two points if we can only move along straight lines (up/down or left/right)?"



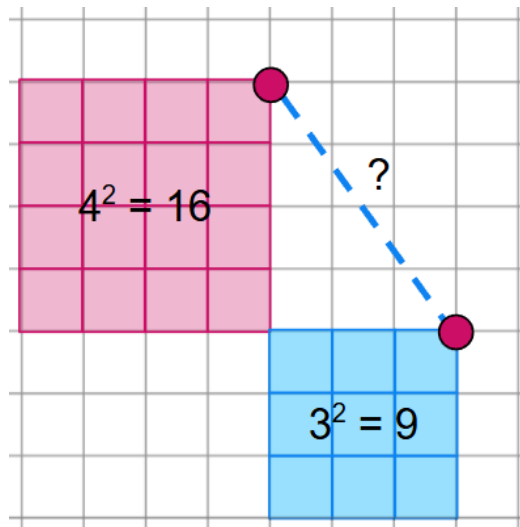
2. There's a neat little trick that we can use to calculate the answer! The first thing we do is measure the horizontal and vertical distance between the points.



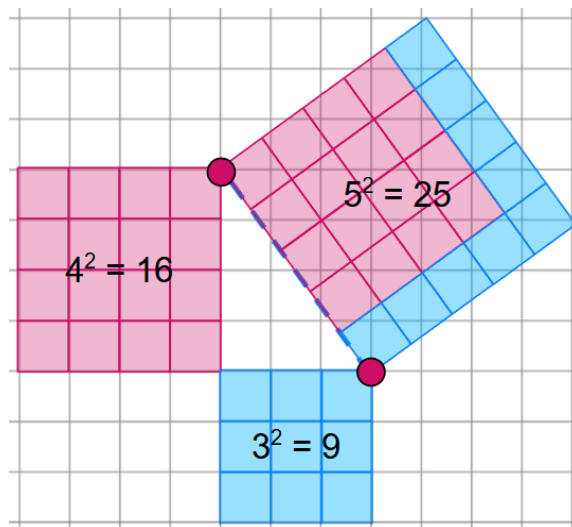
3. After measuring the sides, we square both numbers.

$$3 \times 3 = 3^2 = 9$$

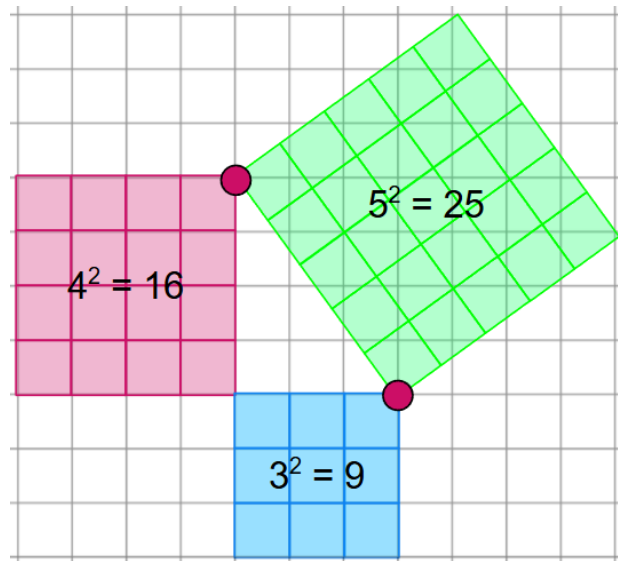
$$4 \times 4 = 4^2 = 16$$



4. This is where it gets really interesting! If we combine the total number of squares ($16 + 9 = 25$) to make an even bigger square, we see that the side of the new square is exactly the distance between the two points!



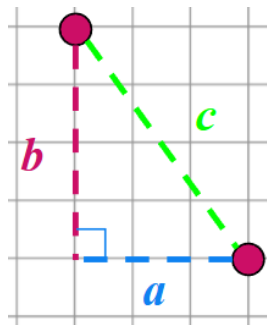
5. This can be represented mathematically as $3^2 + 4^2 = 5^2$.



6. If we think of each of the side lengths as variables, we can simplify further to:

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

This is called the **Pythagorean Theorem**, and it allows us to find the missing side length of a right triangle as long as we know two of the sides.

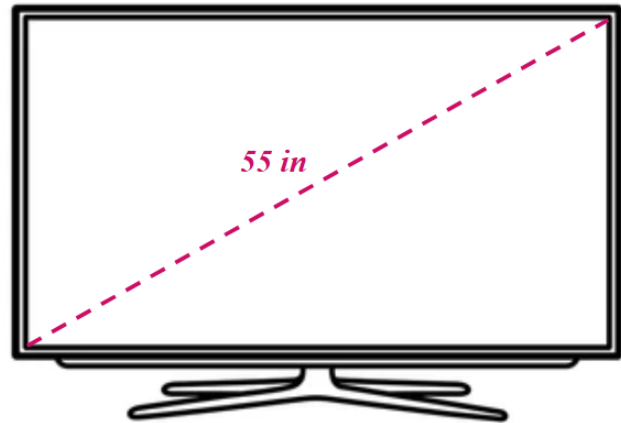
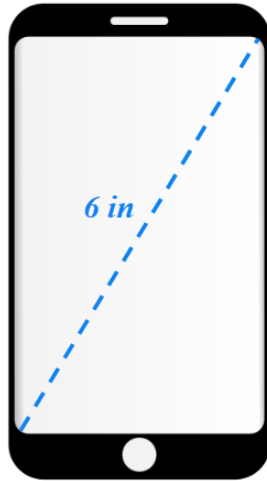


Solving for c by taking the square root, we get:

$$c = \sqrt{a^2 + b^2}$$

Activity 1 - Calculating Distance using the Pythagorean Theorem

1. Place students into groups and provide each group with their own Ari.
2. The Pythagorean Theorem is used to calculate the size of TVs and phone screens. When a manufacturer says a phone has a 6-inch screen or a TV has a 55-inch screen, they measure the diagonal distance from one corner to the opposite.



3. For this activity, students will need to calculate the diagonal distance between two points of an object by measuring the width and length using Ari.

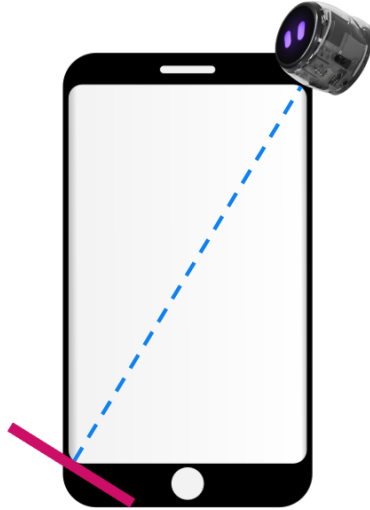
Each group can measure any objects they like but they should find at least 3 objects to measure. Some possible ideas include projector screens, textbooks, computer screens, doors, windows, desks, cabinets, etc. Have them record the width and length in their Student Activity Sheets.

4. Once the dimensions of at least 3 objects have been taken, students should use the Pythagorean Theorem to calculate the diagonal distance of each object.

Activity 2 - Verifying Distance with Ari

1. For the second activity, students will use Ari to measure the diagonal distance (corner to corner) of each object that they used in Activity 1.

2. Students should set up Ari in one corner of the object they are measuring, face it towards the opposite corner, and place a flat surface on the other end in order to take the measurement.



3. Repeat step 2 for the remaining objects and have students record all measurements in their Student Activity Sheets.
4. Once all measurements are taken, students should calculate the difference between the distance obtained using the Pythagorean Theorem and the measured distance.

④ Evaluate: Exit Ticket

Students will fill out and submit their Exit Tickets (The last page of the Student Activity Sheet).