

3.02 Pythagorean Theorem and the Coordinate Plane

Notes	Video Links & Practice Space
<p>Vocabulary</p> <ol style="list-style-type: none">1. Origin: the _____ of the x- and y-axes in a rectangular coordinate system, where the x- coordinate and y-coordinate are both ____.2. Coordinate: a number used to locate a point on a _____; one of the numbers in an _____, or triple, that locates a point on a _____ or in coordinate space, respectively3. Ordered Pair: a _____ used to locate a point on a coordinate plane written in the form _____, where x is the x-coordinate and y is the y-coordinate4. Vertex: the _____ at which the rays or sides of an _____, the sides of a two-dimensional figure, or the edges of a three-dimensional figure _____.5. Coordinate Plane: a plane determined by two perpendicular number lines called _____; the axes intersect at the _____; each point in the coordinate plane is represented by a _____ that represent the _____; the origin is represented by the coordinate pair _____.	<p>Vocabulary (1:33)</p>

Distance Between Two Points

To find the distance between two points, begin by _____ the two points on the _____, then count the number of units from one point to the other.

REVIEW: Each value of an ordered pair, (x, y) , is called a *coordinate*. The first number is the x-coordinate, and the second number is the y-coordinate.

[Distance Between Points by Counting \(2:01\)](#)

Practice 1: Determine the distance between $(-3, 0)$ and $(1, 0)$?

Practice 2: Determine the distance between $(2, 4)$ to $(2, -3)$?

Using Subtraction to Find Distance

If the values are too large to count the units from one point to another, we can use another method. You can calculate the _____ between two points using _____. Since distance is always positive, you'll need to take the _____ of the difference.

Rules for Finding Distance Using Subtraction

- To find the _____ distance between two points, take the _____ of the difference between the ____-coordinates.
- To find the _____ distance between two points, take the _____ of the difference between the ____-coordinates.

TIP: If the ordered pairs have the same x-coordinate, they lie vertically from each other. If the ordered pairs have the same y-coordinate, they lie horizontally from each other. This means you don't always have to graph it!

[Distance Between Points by Subtracting \(2:17\)](#)

Practice 3: What is the distance from $(2, 4)$ to $(2, -3)$?

Since the graph of these two points is along a _____, we can take the absolute value difference between the ____-coordinates to find the distance.

Finding Distance Using the Pythagorean Theorem

We would need to use the _____ to find the distance between two points on a coordinate plane that are _____ from each other instead of horizontal or vertical.

Step 1: Plot the points on a coordinate plane and connect them with a _____.

Step 2: Create a _____ using the line segment as the _____.

Step 3: Determine the length of each _____, a and b , of the right triangle.

Step 4: Find the length of the _____, c , using the Pythagorean Theorem formula, $a^2 + b^2 = c^2$.

There are two options for creating a right triangle using the hypotenuse line segment. One lies above the line segment, and one lies below. You can choose to draw either right triangle because each one results in the same hypotenuse length.

[Distance using the Pythagorean Theorem \(1:34\)](#)

Practice

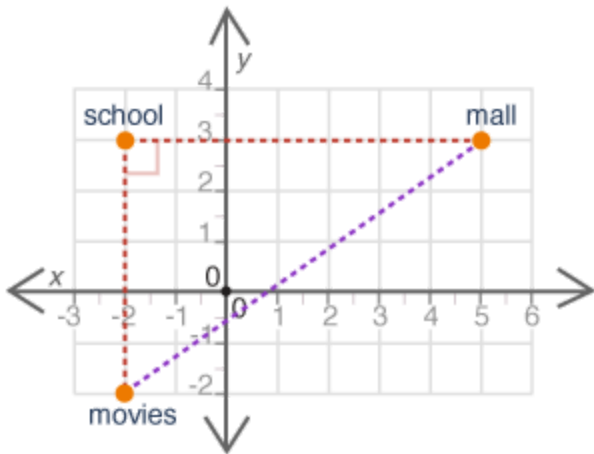
Practice 4: What is the distance between (3,2) and (-2,-1)?

Practice 5: Find the distance between (0,0) and (-3, 4).

[Practice 4 and 5 \(3:51\)](#)

The Pythagorean Theorem in the Real World

We can use the Pythagorean Theorem to solve problems in the real world. Use the [FAST/FASTER strategy](#) to find the important details of the problem, solve it, and test your answer.



[Practice 6 \(3:37\)](#)

Practice 6: Janet rode her bike from school to the mall to the movies. What is the total distance in miles that Janet biked? Show the steps.