

LessonTitle: The Distance Formula		Alg 8.3
Utah State Core Standard and Indicators Algebra Standard 3 Process Standards 1-5		
Summary		
In this lesson, students problem solve for a hiking distance, relate the distance formula to the Pythagorean Theorem, and use the distance formula to find distances on real-life maps of their own areas (internet maps).		
Enduring Understanding	Essential Questions	
The Pythagorean Theorem is a central problem solving tool in both Algebra and Geometry. The Distance Formula is derived using the Pythagorean Theorem. Both are used for finding missing information in the real world and on a coordinate grid.	If you hike 3 miles east and 2 miles north from your campsite, do you know how far you are from camp?	
Skill Focus	Vocabulary Focus	
<ul style="list-style-type: none"> • Problem Solving • Pythagorean theorem and Distance formula problems 		
Assessment		
Materials: Computers with Geometer’s Sketchpad		
Launch ideas: “We discussed the applications of this activity- it could be used to review Pythagorean Theorem (but probably not introduce it) and use the theorem to discover the Distance formula. We liked the flexibility of the lesson, and the different options for launching it.”		
Explore		
Summarize		
Application: “ We also talked about using the lesson to lead into equation of a circle, since it’s so closely related. I decided to do that, and I thought it worked well.”		

Information

Use the Hiking problem below. Have students connect the distance formula with the Pythagorean Theorem. Then practice the distance formula using problems from a textbook or worksheet or have students work on the map problem below.

To find the map of your area, go to mapquest.com. The teacher may choose to do this or have selected students do this ahead of time. Zoom in on the chosen area (the area around the school or of neighborhoods within the school boundaries. Print the graph. Then students will overlay the grid (see below).

- Continue as directed.

Alg 8.3a

Hiking

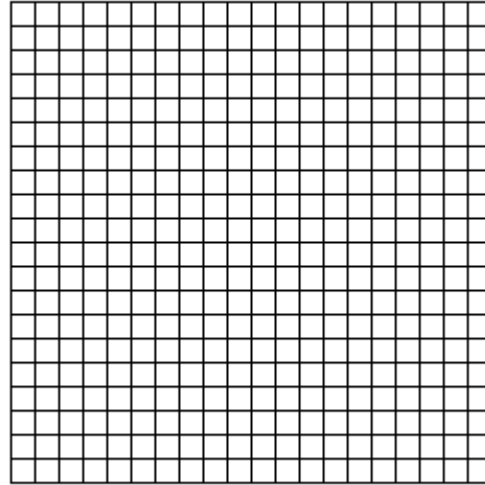
If you hike 7 miles east and 9 miles north from your campsite, how far are you from camp?

Draw your hike.

Make a point for your campsite in the lower left part of the graph paper.

Work with your group to find a way to determine how far you are from camp the crow flies.'

Show your process below.



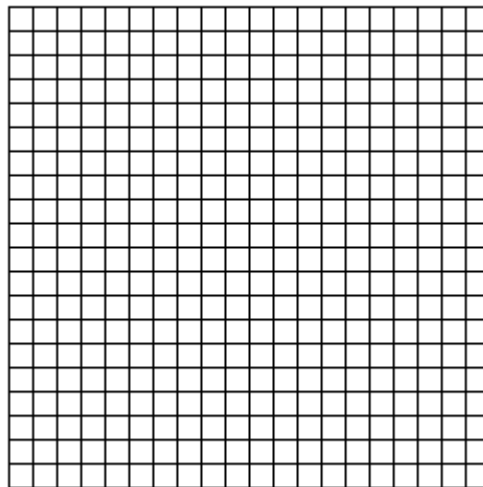
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Compare your strategies with those of groups. What do you notice?

other

Based on your work and the work of other groups, **explain the distance formula**, a formula used to find a segment length when you know two coordinate points. If desired, use the problem above as an example.

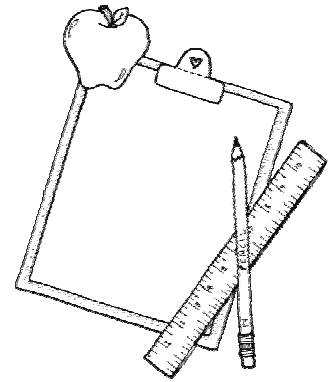
Distance formula: $d = \sqrt{[(x_2 - x_1)^2 + (y_2 - y_1)^2]}$



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Alg 8.3b Using Maps and the Distance Formula

Place the transparency grid over the map that you printed from Map Quest. Locate and mark 2 different locations in each of the four quadrants on your grid using a transparency marker. Write the coordinates for these points below. Also, mark these points on your map when you remove the transparency.



- Point 1:
- Point 2:
- Point 3:
- Point 4:
- Point 5:
- Point 6:
- Point 7:
- Point 8:

Using the distance formula, find the distance between the following sets of points. *Please show your work.*

Point 1 and Point 6:

Point 2 and Point 3:

Point 4 and Point 8:

Point 5 and Point 7:

Now that you have practiced using the distance formula, how could you use it to help prove that the sides of the square are congruent? What other information would you need to know to prove that the figure is a square? Prove that it is a square.

