

TOWN OF PYTHAGORAS

Finding Distances on a Coordinate Grid

Name _____

Hour: _____

On the map of the Town of Pythagoras, the grid lines represent streets. The points represent locations of schools and other buildings. Citizens may drive from location to location on the streets only. They cannot cut across the squares diagonally in a vehicle! Helicopters are also used in the Town of Pythagoras to fly directly from one location to another (they do not have to follow the streets). Each centimeter unit on the number lines of the axes is equal to one mile (1 cm = 1 mi.).

Use the map of the Town of Pythagoras to answer the following questions.

- 1) An emergency has occurred at Andover YMCA and the police need to respond quickly. One possible route they could drive from the police station is 3 blocks east then 5 blocks north.
 - a. What is the total distance that the police had to drive to get to the YMCA? Is this the quickest street route they could take in a police car? Why or why not?
 - b. Describe any other routes they could take in a police car that are as quick, or quicker.
 - c. More police are needed quickly. A helicopter is dispatched from the police station to the Andover YMCA. Find the distance the helicopter must fly (Use a centimeter ruler to measure and round to the nearest tenth of a mile). Is this distance shorter or longer than the route the police car drove? Why?

2) Give the route for the shortest driving distance and the length of the helicopter distance between each pair of locations:

a. Oakview Middle School to Anoka Middle School

Driving route _____ Total Miles _____

Helicopter distance in miles _____

b. Police station to Mercy Hospital

Driving route _____ Total Miles _____

Helicopter distance in miles _____

c. Jackson Middle School to Northdale Middle School

Driving route _____ Total Miles _____

Helicopter distance in miles _____

d. Mercy Hospital to Roosevelt Middle School

Driving route _____ Total Miles _____

Helicopter distance in miles _____

e. Coon Rapids Middle School to Andover YMCA

Driving route _____ Total Miles _____

Helicopter distance in miles _____

3) The Roosevelt Middle School students are going to the zoo, which is located at the point (17, 12). Describe a shortest driving route they can take. Hint: How can you use the coordinates of Roosevelt Middle School, (4, 3) and the coordinates of the zoo (17, 12) to find the total distance east and the total distance north they will drive?

- 4) Give the route for the shortest driving distance and the length of the helicopter distance (if possible) between each pair of coordinates:

a. $(6, 1)$ and $(0, 10)$

Driving route _____ Total Miles _____

Helicopter distance in miles _____

b. $(-2, 6)$ and $(5, 6)$

Driving route _____ Total Miles _____

Helicopter distance in miles _____

c. $(-3, -2)$ and $(12, 3)$

Driving route _____ Total Miles _____

Helicopter distance in miles _____

- d. When given two coordinate pairs, (x_1, y_1) and (x_2, y_2) , explain what to do with the coordinates x_1, y_1, x_2 , and y_2 to find the north/south and east/west distances between them.

- 5) Error Analysis: Stacy found the driving distance between the coordinates $(5, 9)$ and $(7, 4)$ by subtracting the x -values, $5 - 7 = -2$ then subtracting the y -values, $9 - 4 = 5$. Stacy concluded that a vehicle would drive -2 block east and 5 blocks south. She then added -2 and 5 to get a total driving distance of 3 miles. Explain the error(s) in Stacy's thinking.

- 6) Will the helicopter distance ever be greater than the driving distance between any two locations? Explain your reasoning.

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