

Physics

Exploring Distance vs. Displacement

Name: _____ Block: _____

Learning Target: I can explain the difference between distance and displacement.

There are a lot of ways to measure distance: meters, miles, kilometers, millimeters, etc. Today you will be using meters to explore how distance and displacement are different. You will use a trundle wheel to keep track of your distance while moving around the Fra Café and surrounding area. A trundle wheel clicks at every meter, so two clicks = 2 m. Read the directions carefully and complete each step exactly how it instructs you to.

Part 1: Getting to Know the Trundle Wheel

- a. Start outside the auditorium and set the wheel (the “ticker” should be just past the catch) and measure the distance across the Fra Café all the way to the wall on the other side. Record your distance (you may need to estimate)

- b. Now, go to the desk outside the music hallway. Reset the wheel and measure from the wall to the end of Mr. Denault’s office. Record this distance (again, you may need to estimate).

- c. Calculate the approximate area in square meters (m^2) that is contained within this area of the building.

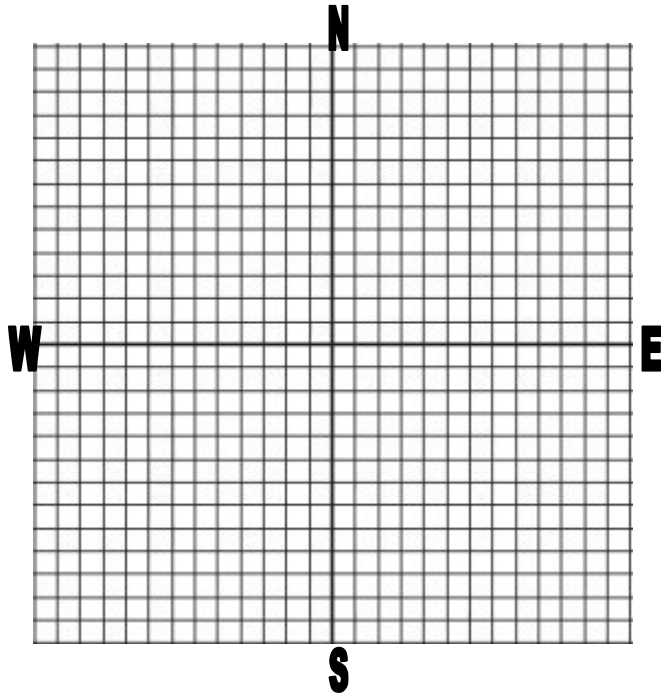
- d. Convert the area you calculated in #3 to square centimeters (cm^2).

- e. Convert the area you calculated in #3 to square miles (mi^2).

Part 2: Distance

In this part of the activity, you will use the graphs to help you keep track of where you're going and where you've been. Use a star to indicate your starting point and a circle to indicate your ending point for each set of instructions. You will also need to keep track of your total distance traveled.

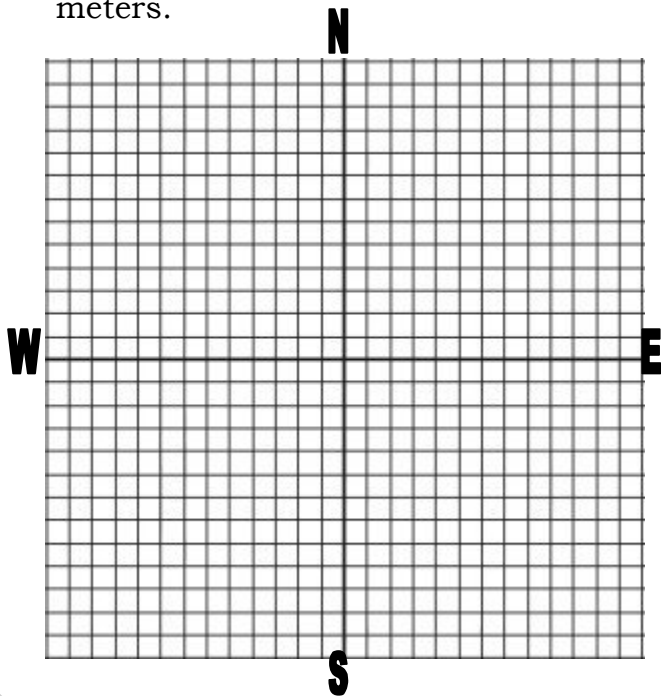
- a. Starting at a point on the floor marked "0", travel North 3 meters. Then travel East 1 meter. Next, go South 2 meters and then West 1 meter. Finally, go South 1 meter.



Total Distance Traveled: _____

Total Displacement: 0 m

- b. Starting at a point on the floor marked "0", travel South 4 meters. Then travel West 2 meters. Next, go North 1 meter and East 2 meters. Finally, go North 2 meters.



Total Distance Traveled: _____

Total Displacement: 1m South

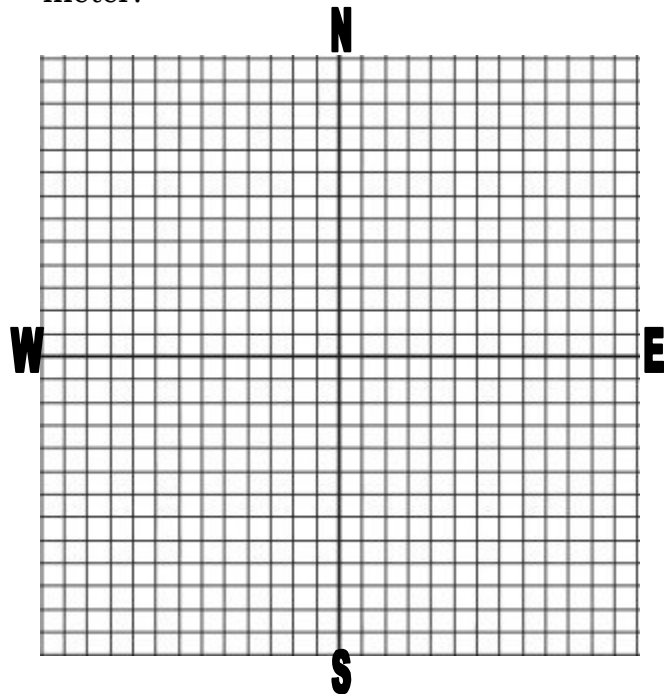


Before moving on to Part 3, you will have a brief discussion with your teacher about displacement.

Part 3: Displacement

In this part of the activity, you will determine both the total distance traveled and the total displacement for each set of instructions. Just like in Part 2, there is a graph to help you.

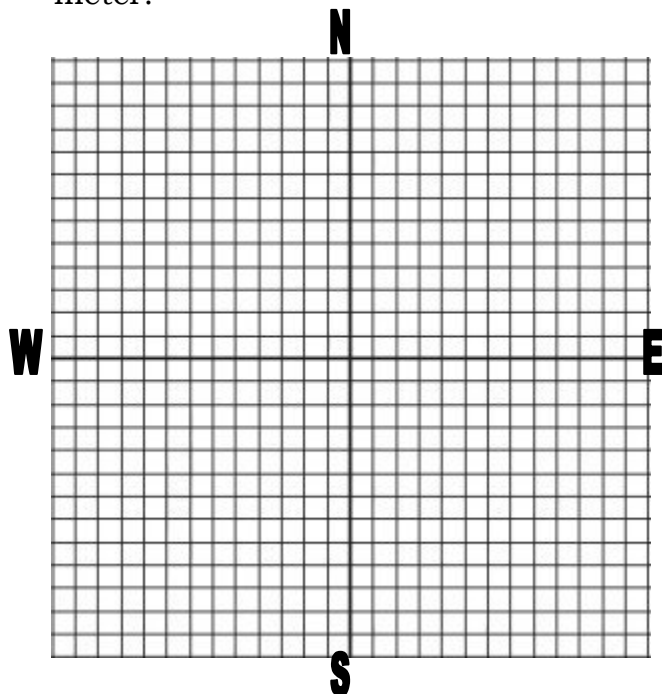
- a. Starting at a point on the floor marked “0”, travel West 3 meters. Then travel South 5 meters. Next, go North 7 meters and East 3 meters. Finally, go North 1 meter.



Total Distance Traveled: _____

Total Displacement: _____

- b. Starting at a point on the floor marked “0”, travel North 8 meters. Then travel East 5 meters. Next, go South 1 meter and West 4 meters. Finally, go South 6 meter.



Total Distance Traveled: _____

Total Displacement: _____



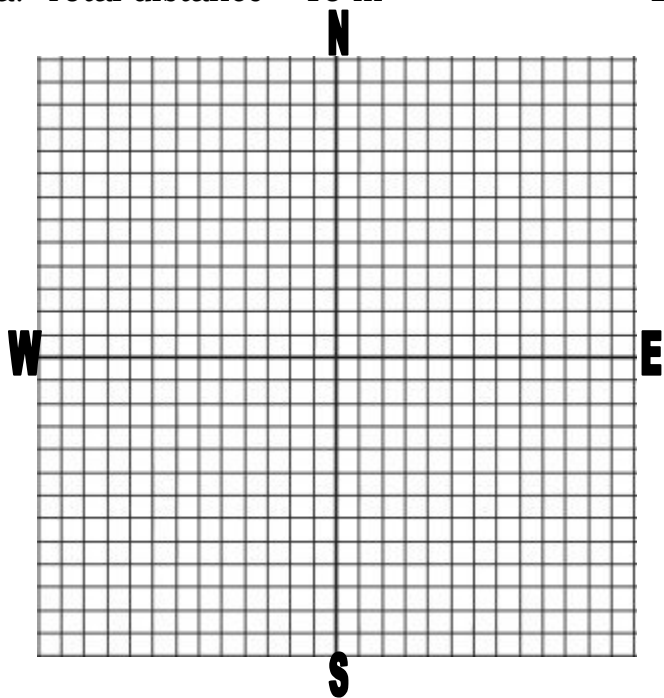
Before moving on, have a brief discussion with your teacher about distance vs. displacement.

Part 4: Now You Do It!

In this part, you will be given a total distance, a total displacement, or both and you will then have to map out a set of directions that leads to that destination. Your directions **MUST** include *at least* 4 steps.

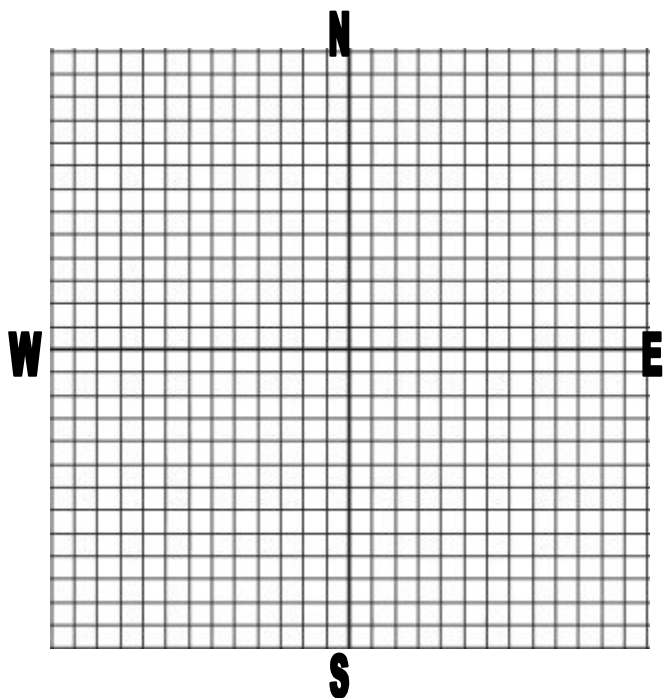
a. Total distance = 15 m

Directions:

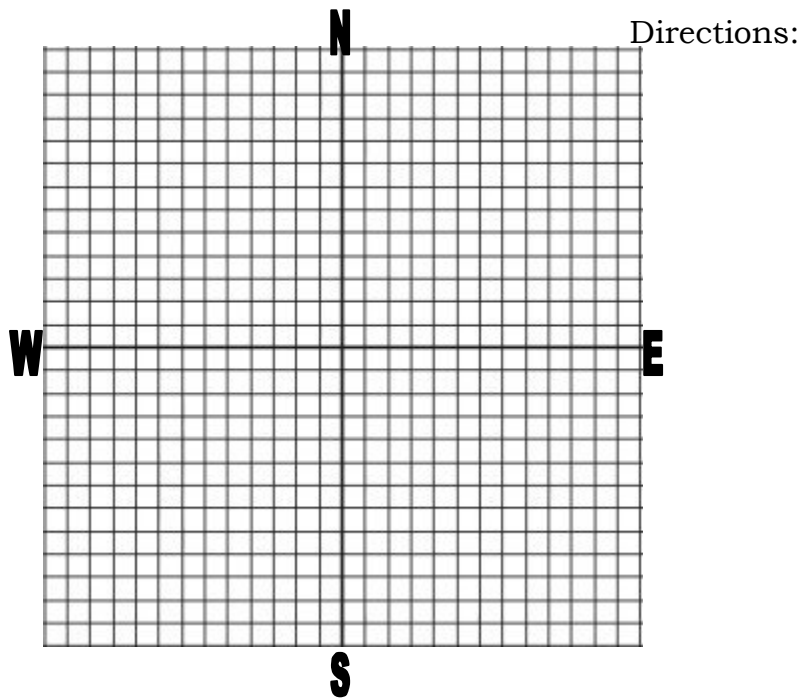


b. Total displacement = 4 m East

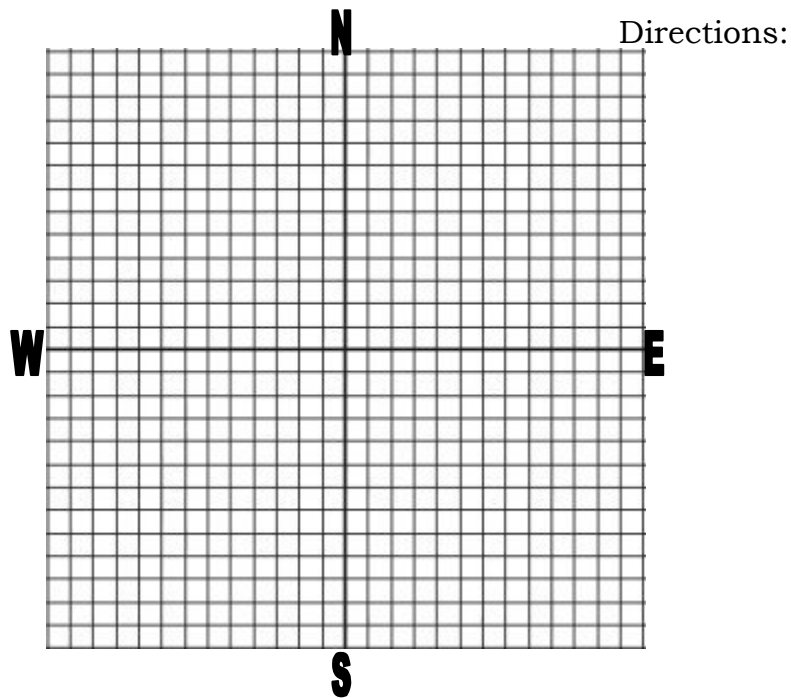
Directions:



c. Total distance = 24 m, total displacement = 7 m South



d. Total distance = 15 m, total displacement = 1 m Southeast



Questions

1. In your own words, based on this activity, define DISTANCE.
2. In your own words, based on this activity, define DISPLACEMENT.
3. How are distance and displacement the same?
4. How are distance and displacement different?
5. Can my total distance be greater than my total displacement? Explain your answer.
6. Can my total displacement be greater than my total distance? Explain your answer.
7. Explain the difference between distance and displacement.