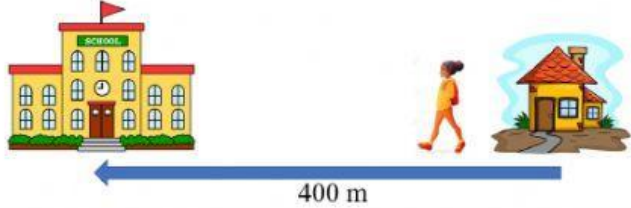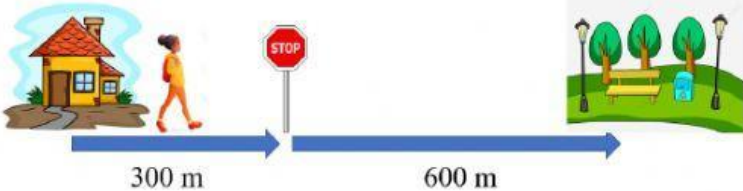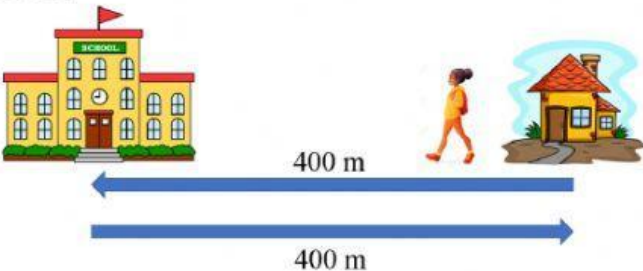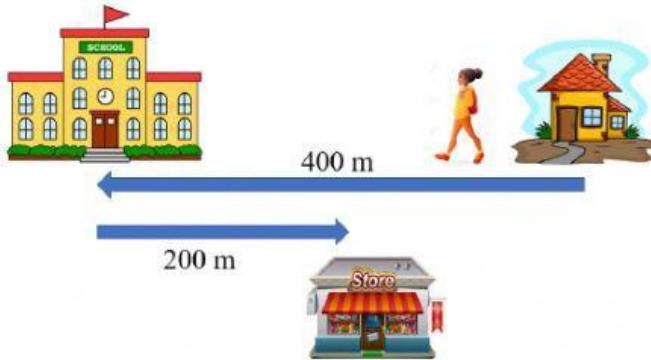Name: _____Date : _____

PHYSICS
Distance & Displacement

- **Distance**: Total path length of motion or travel. Add together all segments of motion.
- **Displacement**: The absolute change in position. The straight-line difference in position between the end of motion (where you ended) and start of motion (where you started). Displacement is a vector. For linear motion, add vectors using + and – values for directions. For 2-dimensional motion, use the Pythagorean Theorem.

For each motion, solve for the distance (d) and the displacement (Δx). The motion always starts at the house. Distance and displacement are evaluated from the start (house). Displacement must have a direction.

#1. Lucinda walked 400 m west from her house to the school. 400 m	**Distance (d) =** **Displacement (Δx) =**
#2. Lucinda walked 300 m east to the street corner. She then walked another 600 m east to the park. 300 m 600 m	**Distance (d) =** **Displacement (Δx) =**
#3. Lucinda walked 400 m west from her house to the school. She then turned and walked 400 m east back to her house. 400 m 400 m	**Distance (d) =** **Displacement (Δx) =**

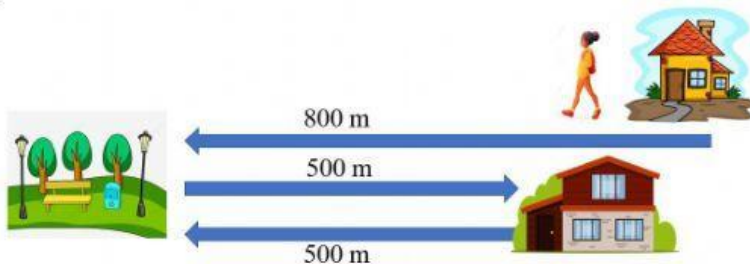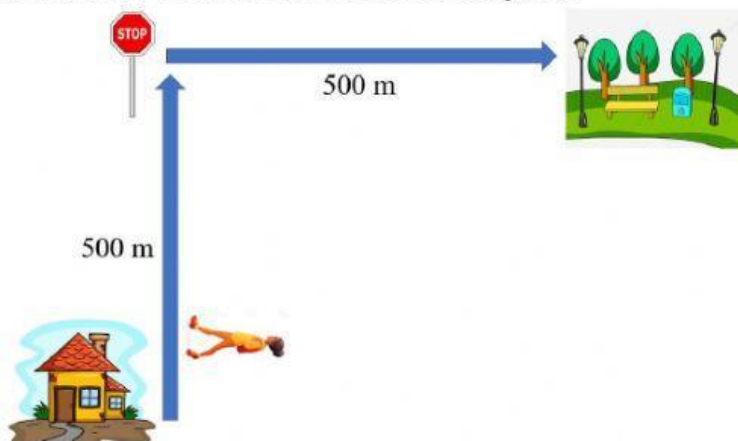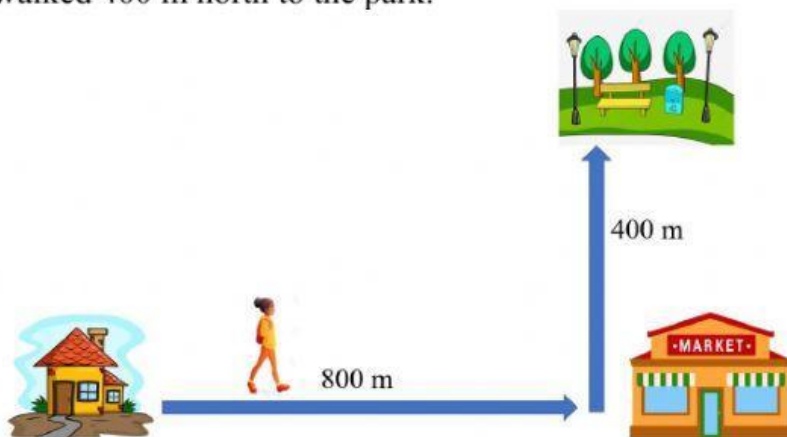|	
#4. Lucinda walked 400 m west from her house to the school. She then walked 200 m east to the store. School 400 m 200 m Store	**Distance (d) =** **Displacement (Δx) =**
#5. Lucinda walked 750 m east from her house to the market. She then walked 1500 m west to her grandmother's house. MARKET 750 m 1500 m	**Distance (d) =** **Displacement (Δx) =**
#6. Lucinda walked 750 m east from her house to the market. She then walked 1500 m west to her grandmother's house. She then walked 750 m east back to her house. MARKET 750 m 1500 m 750 m	**Distance (d) =** **Displacement (Δx) =**
#7. Lucinda walked 800 m west from her house to the park. She then walked 500 m east from the park to her friend's house, and walked another 500 m west back to the park. 800 m 500 m 500 m	**Distance (d) =** **Displacement (Δx) =**

#8. Lucinda walked 500 m north to the street corner, turned, then walked 500 m east to the park.

500 m

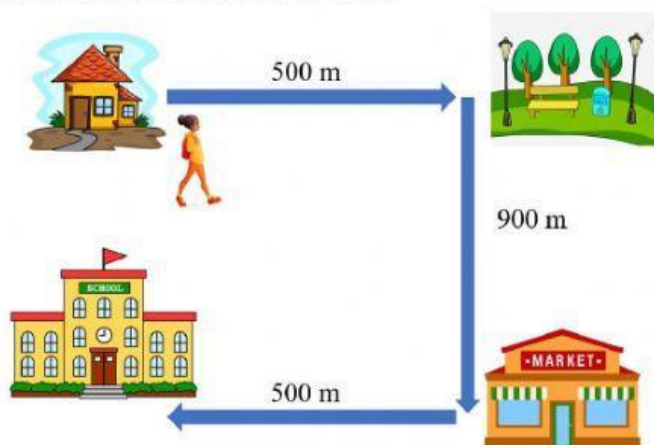500 m

Distance (d) =

Displacement (Δx) =

#9. Lucinda walked 800 m east to the market, turned, then walked 400 m north to the park.

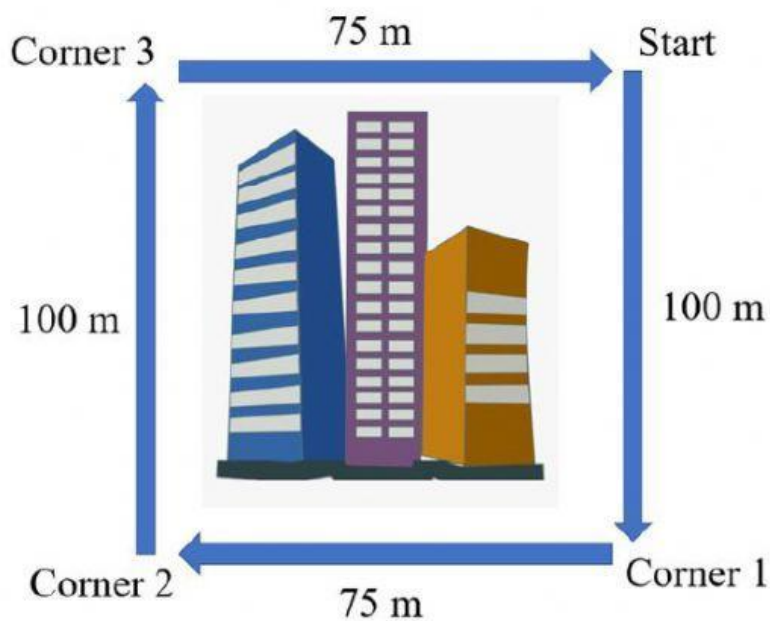400 m

800 m

Distance (d) =

Displacement (Δx) =

#10. Lucinda walked 500 m east from her house to the park, then walked 900 m south to the store, turned, and walked another 500 m west to the school.

500 m

900 m

500 m

Distance (d) =

Displacement (Δx) =

Corner 3   75 m   Start
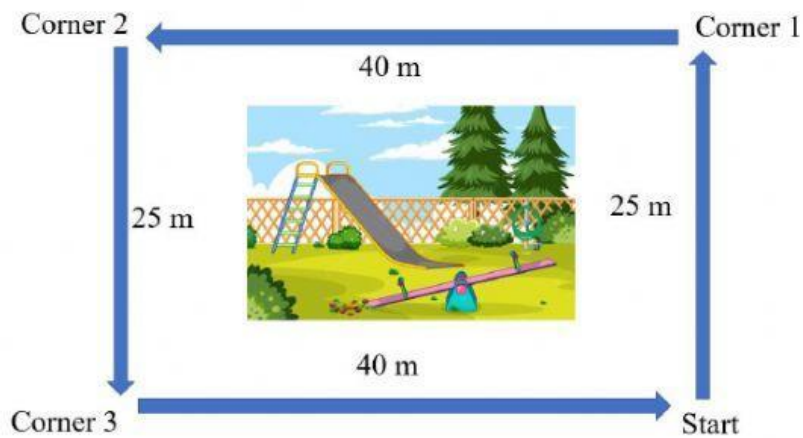
100 m   100 m

Corner 2   75 m   Corner 1

#11. Lucinda walked around the city block. She started at the northeast corner. She walked from Start to Corner 1, then to Corner 2, then to Corner 3, and returned to Start.

Calculate distance and displacement from Start to Corner 1, to Corner 2, to Corner 3, and back to Start.

Path of travel	Distance d (m)	Displacement Δx (m)
Start → Corner 1		
Start → Corner 2		
Start → Corner 3		
Start → Start		

Distances are additive. They are progressive from Start to each corner.
Displacements are all relative to Start.
Displacement must have a direction.

Corner 2 ← 40 m → Corner 1

25 m   25 m

Corner 3 → 40 m → Start

#12. Lucinda walked around the playground. She started at the southeast corner. She walked from Start to Corner 1, then to Corner 2, then to Corner 3, and returned to Start.

Calculate distance and displacement from Start to Corner 1, to Corner 2, to Corner 3, and back to Start.

Path of travel	Distance (m)	Displacement (m)
Start → Corner 1		
Start → Corner 2		
Start → Corner 3		
Start → Start		

Distances are additive. They are progressive from Start to each corner.
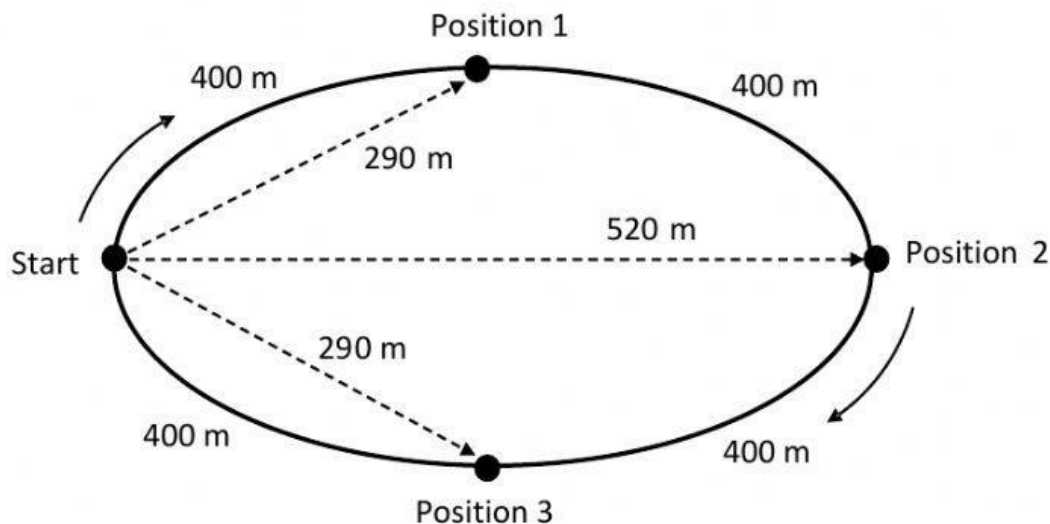Displacements are all relative to Start.
Displacement must have a direction.

#13. The diagram shows a racetrack. The racetrack is an oval. Cars must move around the oval on the solid black line. Cars move from Start to position 1, 2, 3, and back to start. The straight dashed lines represent the straight-line between Start and each position (1, 2, 3) on the track. Using the diagram, determine the distances and displacement moved by the car from Start to 1, Start to 2, Start to 3, and Start back to start.

	Distance d (m)	Displacement Δx (m)
Start → Position 1		
Start → Position 2		
Start → Position 3		
Start → Start		

Distances are additive. They are progressive from Start to each corner.
Displacements are all relative to Start.
Displacement must have a direction.