

# Average Velocity Worksheet AP Physics 1 Answer Key PDF

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## Part 1: Foundational Knowledge

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**What is the formula for average velocity?**

undefined. a)  $\left( \frac{\Delta v}{\Delta t} \right)$

**undefined. b)  $\left( \frac{\Delta x}{\Delta t} \right)$  ✓**

undefined. c)  $\left( \frac{v_i + v_f}{2} \right)$

undefined. d)  $\left( \frac{d}{t} \right)$

The formula for average velocity is the change in position divided by the change in time.

**Which of the following statements are true about displacement?**

undefined. a) It is a scalar quantity.

**undefined. b) It is the shortest distance between two points. ✓**

**undefined. c) It considers direction. ✓**

undefined. d) It is always equal to the distance traveled.

Displacement is a vector quantity that represents the shortest distance between two points and considers direction.

**Explain the difference between average velocity and instantaneous velocity.**

**Average velocity is the total displacement divided by total time, while instantaneous velocity is the velocity at a specific moment in time.**

**List the units commonly used for measuring velocity.**

1. What is the metric unit for velocity?

**Meters per second (m/s)**

2. What is the imperial unit for velocity?

### Miles per hour (mph)

3. What is another common unit for velocity?

### Kilometers per hour (km/h)

Common units for measuring velocity include meters per second (m/s) and kilometers per hour (km/h).

## Part 2: Understanding and Interpretation

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**On a position vs. time graph, what does a horizontal line indicate?**

undefined. a) Constant velocity

undefined. **b) Zero velocity ✓**

undefined. c) Increasing velocity

undefined. d) Decreasing velocity

A horizontal line on a position vs. time graph indicates that the object is at rest, meaning its velocity is zero.

**Which factors must be considered when calculating average velocity?**

undefined. a) Total distance traveled

undefined. **b) Total displacement ✓**

undefined. **c) Total time taken ✓**

undefined. **d) Direction of motion ✓**

To calculate average velocity, you need to consider total displacement and total time taken.

**Describe how you would determine the average velocity of a car that travels 100 meters north in 20 seconds, then 50 meters south in 10 seconds.**

**To find the average velocity, calculate the total displacement (100 m north - 50 m south) and divide by the total time (30 seconds).**

## Part 3: Applying Knowledge and Analyzing Relationships

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**A runner completes a 400-meter lap in 50 seconds. What is their average velocity if they end at the starting point?**

undefined. a) 8 m/s

**undefined. b) 0 m/s ✓**

undefined. c) 4 m/s

undefined. d) 2 m/s

Since the runner ends at the starting point, the total displacement is zero, resulting in an average velocity of 0 m/s.

**A cyclist travels 10 km east in 30 minutes and then 5 km west in 15 minutes. What is the average velocity of the cyclist?**

undefined. a) 10 km/h east

**undefined. b) 5 km/h east ✓**

undefined. c) 20 km/h east

undefined. d) 15 km/h east

The average velocity is calculated by taking the total displacement (10 km east - 5 km west) and dividing by the total time (45 minutes).

**Calculate the average velocity of a hiker who walks 3 km north, then 4 km east, in a total time of 2 hours.**

**The average velocity can be calculated by finding the resultant displacement and dividing it by the total time.**

## Part 4: Synthesis and Reflection

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**If the slope of a position vs. time graph is decreasing, what does this indicate about the object's motion?**

undefined. a) The object is speeding up.

**undefined. b) The object is slowing down. ✓**

undefined. c) The object is moving at a constant speed.

undefined. d) The object is stationary.

A decreasing slope indicates that the object is slowing down.

**Analyze the following scenario: A car travels 60 km north, then 40 km south. Which statements are correct?**

**undefined. a) The total distance traveled is 100 km. ✓**

**undefined. b) The displacement is 20 km north. ✓**

undefined. c) The average velocity is greater than the average speed.

**undefined. d) The average speed is 50 km/h if the trip took 2 hours. ✓**

The total distance traveled is 100 km, the displacement is 20 km north, and the average speed is 50 km/h if the trip took 2 hours.

**Which scenario best demonstrates a situation where average velocity is zero?**

**undefined. a) A car travels in a circle and returns to its starting point. ✓**

undefined. b) A runner sprints 100 meters in a straight line.

undefined. c) A cyclist travels uphill and then stops.

undefined. d) A plane flies from New York to Los Angeles.

A car traveling in a circle and returning to its starting point demonstrates a situation where average velocity is zero.

**Evaluate the following statements about average velocity:**

**undefined. a) It can be zero even if the object has moved. ✓**

undefined. b) It is always equal to the instantaneous velocity at some point.

undefined. c) It is always positive.

**undefined. d) It can be negative. ✓**

Average velocity can be zero even if the object has moved, and it can be negative, but it is not always equal to instantaneous velocity.

**Design an experiment to measure the average velocity of a toy car on a track. Include the materials needed, procedure, and how you would calculate the average velocity.**

**An experiment could involve measuring the distance the toy car travels and the time taken, then using the formula for average velocity to calculate the result.**