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Average Velocity Worksheet AP Physics 1

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Part 1: Foundational Knowledge

What is the formula for average velocity?

Hint: Consider the relationship between displacement and time.

○ a) $\frac{\Delta v}{\Delta t}$
○ b) $\frac{\Delta x}{\Delta t}$
○ c) $\frac{v_i + v_f}{2}$
○ d) $\frac{d}{t}$

Which of the following statements are true about displacement?

Hint: Think about the properties of displacement compared to distance.

☐ a) It is a scalar quantity.
☐ b) It is the shortest distance between two points.
☐ c) It considers direction.
☐ d) It is always equal to the distance traveled.

Explain the difference between average velocity and instantaneous velocity.

Hint: Consider how each type of velocity is measured.

List the units commonly used for measuring velocity.

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Hint: Think about both metric and imperial units.

1. What is the metric unit for velocity?

[   ]

2. What is the imperial unit for velocity?

[   ]

3. What is another common unit for velocity?

[   ]

Part 2: Understanding and Interpretation

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

Hint: Consider what it means for an object's position to not change over time.

○ a) Constant velocity
○ b) Zero velocity
○ c) Increasing velocity
○ d) Decreasing velocity

Which factors must be considered when calculating average velocity?

Hint: Think about what information is needed to find average velocity.

☐ a) Total distance traveled
☐ b) Total displacement
☐ c) Total time taken
☐ d) Direction of motion

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.

Hint: Consider how to calculate total displacement and total time.

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Part 3: Applying Knowledge and Analyzing Relationships

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

Hint: Consider the definition of average velocity in terms of displacement.

◯ a) 8 m/s
◯ b) 0 m/s
◯ c) 4 m/s
◯ d) 2 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?

Hint: Calculate total displacement and total time to find average velocity.

☐ a) 10 km/h east
☐ b) 5 km/h east
☐ c) 20 km/h east
☐ d) 15 km/h east

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

Hint: Use the Pythagorean theorem to find the resultant displacement.

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Part 4: Synthesis and Reflection

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

Hint: Think about how the slope relates to speed and direction.

◯ a) The object is speeding up.
◯ b) The object is slowing down.
◯ c) The object is moving at a constant speed.
◯ d) The object is stationary.

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

Hint: Consider both distance and displacement in your analysis.

☐ a) The total distance traveled is 100 km.
☐ b) The displacement is 20 km north.
☐ c) The average velocity is greater than the average speed.
☐ d) The average speed is 50 km/h if the trip took 2 hours.

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

Hint: Think about situations where the starting and ending points are the same.

◯ a) A car travels in a circle and returns to its starting point.
◯ b) A runner sprints 100 meters in a straight line.
◯ c) A cyclist travels uphill and then stops.
◯ d) A plane flies from New York to Los Angeles.

Evaluate the following statements about average velocity:

Hint: Consider the properties and definitions of average velocity.

☐ a) It can be zero even if the object has moved.
☐ b) It is always equal to the instantaneous velocity at some point.
☐ c) It is always positive.
☐ d) It can be negative.

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.

Hint: Think about the steps involved in measuring distance and time.

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