Marble Madness Lab Activity Solutions

Question:

Ms. Clanton drove her P.T. Cruiser 80 kilometers toward the setting sun. The entire trip took 1 hour.

What was Ms. Clanton's **average velocity** over the entire trip? Please express your answer using the proper SI unit(s), and round your answer to two decimal places. Type the magnitude in the first blank and the direction (if necessary) in the second blank. If no direction is necessary, type "none" in the second blank.

Answer:

Average velocity is defined as **displacement / time**. So, we need to find Ms. Clanton's **displacement** and the **time** it took her to undergo the displacement.

First, let's find her displacement. The magnitude of her displacement is 80 kilometers. We are told to express our answer using the proper SI units, so we need to express the displacement using meters. To convert from kilometers to meters, we just need to multiply 80 by 1,000. So, the magnitude of Ms. Clanton's displacement is 80,000 meters. Because displacement is a vector quantity, we must include a direction. The direction is given in the problem as toward the setting sun. The sun sets in the west. **So, Ms. Clanton's displacement is 80,000 meters west**.

Now, we need to find the time it took for Ms. Clanton to undergo the displacement. The time is given in the problem as 1 hour. We need to express 1 hour in seconds because we are told to use proper SI units. There are 3,600 seconds in 1 hour. **So, the time it took for Ms. Clanton to travel her displacement is 3,600 seconds**.

Finally, we need to take Ms. Clanton's displacement and divide it by time to get Ms. Clanton's average velocity over her trip. The displacement is 80,000 meters west. We need to divide it by 3,600 seconds. If we put that in the calculator, we get Ms. Clanton's **average velocity is 22.22 meters/second west**.

Point Breakdown	
Correct Magnitude	2 points
Correct Units	1 point
Correct Direction	2 points
Total Points Possible	**5 points**

Question:

If the "**Average Velocity Versus Ramp Height"** graph has a POSITIVE slope, an increase in ramp height means the average velocity of the marble at the bottom of the ramp will _____.

Answer:

Increase because a positive slope for the Average Velocity Versus Ramp Height graph means that as ramp height increases, so does the average velocity.

Points Possible: 3.33

Question:

If the "**Average Velocity Versus Ramp Height"** graph has a NEGATIVE slope, an increase in ramp height means the average velocity of the marble at the bottom of the ramp will _____.

Answer:

Decrease because a negative slope for the Average Velocity Versus Ramp Height graph means that as ramp height increases, the average velocity decreases.

Points Possible: 3.33

Question:

If the "**Average Velocity Versus Ramp Height"** graph is HORIZONTAL, an increase in ramp height means the average velocity of the marble at the bottom of the ramp will _____.

Answer:

Not change because a horizontal Average Velocity Versus Ramp Height graph means that average velocity does not change with ramp height.

Points Possible: 3.33