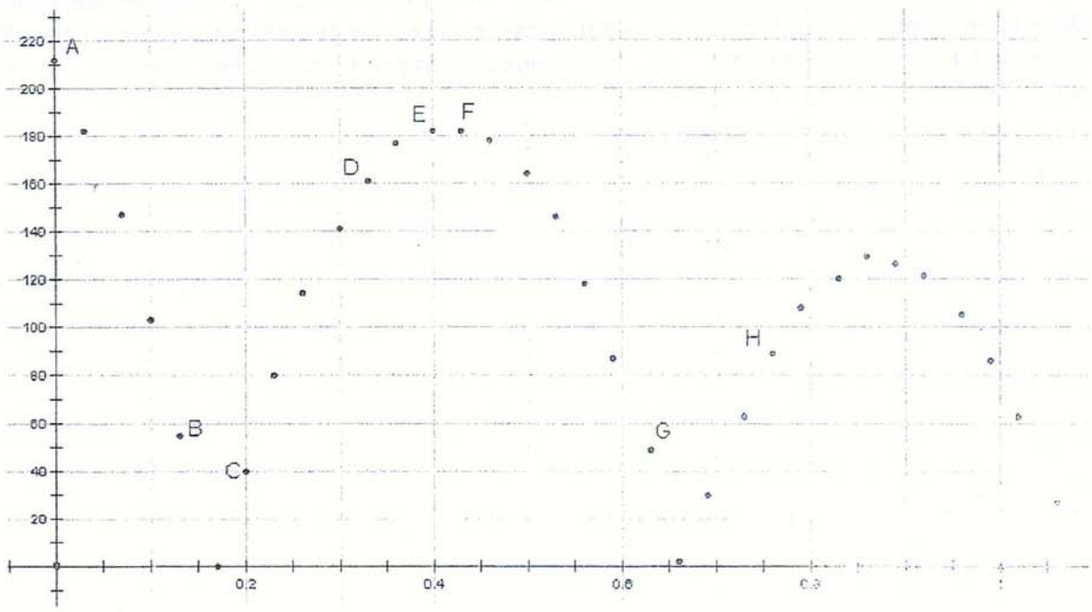
 name _____

That's the Way the Ball Bounces!

A ball is dropped and its height is measured in centimetres at different intervals of time. The graph of the results is below, where the horizontal axis is time, in seconds after the ball is dropped, and the vertical axis is the height of the ball in metres.



Part A: Average Rate of Change

1. Complete the table below to determine the average rate of change of the height of the ball in metres, with respect to the time, in seconds. Complete your work neatly on a separate piece of paper, and transfer you answer onto the table below. Note that the average rate of change is the slope of the secant line that connects the two points.

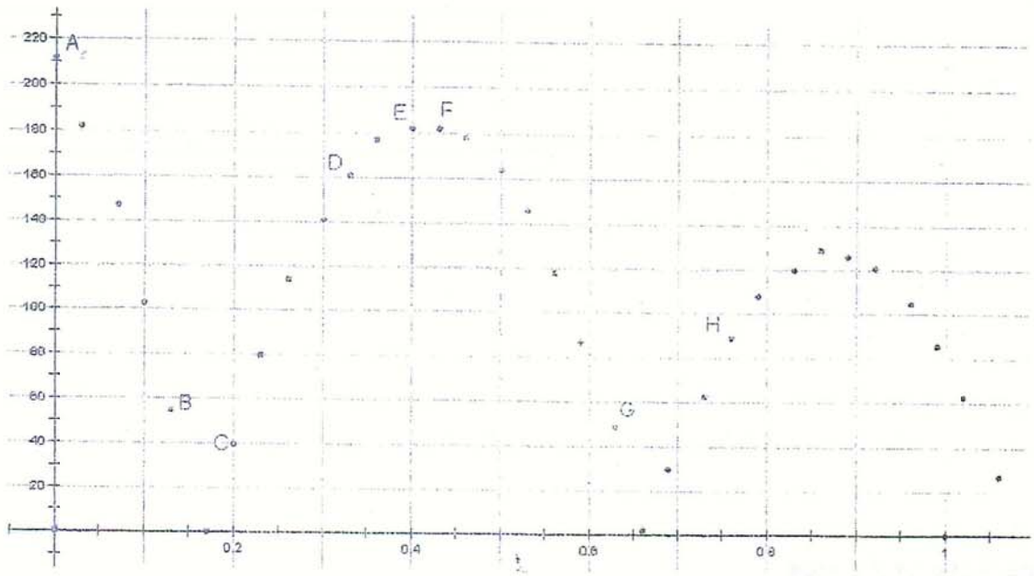
Interval	Coordinates of End Points		Average Rate of Change
AB			
BC			
CD			
DE			
EF			
FG			
GH			

2. Look at your average rates of change. Explain how your results describe both the path of the ball and the speed of the ball.

 name _____

Part B: Average to Instantaneous Rate of Change

3. Complete the following on the graph below.
   (a) With a pencil, lightly sketch a curve of best fit for the data points on the graph below.
   (b) In another colour, draw each secant line for the intervals on the table above. Note that a secant line connects two points of a graph, and models the average rate of change between those two points.
   (c) In a third colour, locate a point on the graph between the two end points of each secant line, where the slope of the tangent line at that point has the same slope as the secant line. Note that the slope of the tangent line is the instantaneous rate of change at that point. Draw a line tangent to the curve at that point.



4. Complete the following table.

Interval	Average Rate of Change	Point where the slope of the tangent line matches the slope of the secant line. *(i.e. Where the average rate of change equals the instantaneous rate of range.)*
AB		
BC		
CD		
DE		
EF		
FG		
GH		

5. Answer the following questions:

a) For which intervals is it difficult to find a matching secant and tangent line?	b) Why is if difficult to find instantaneous rate of change for these intervals?	c) What was happening to the motion of the ball in these intervals?