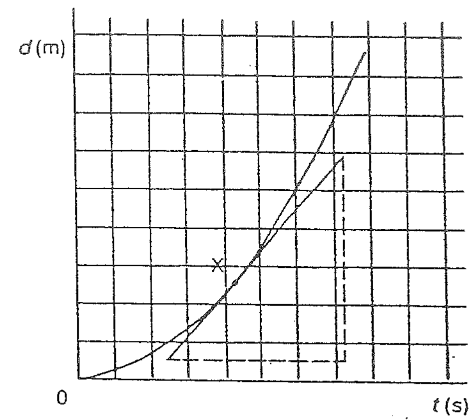
Physics [redacted]
Bernaben

Instantaneous velocity



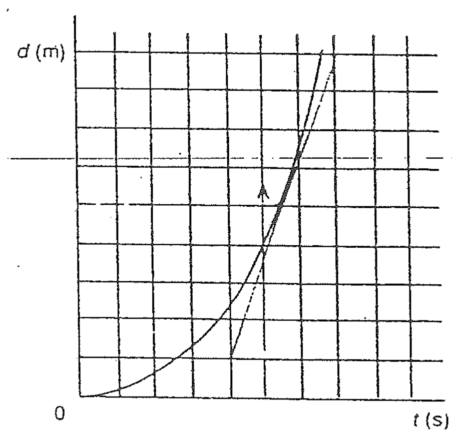
Motion with changing velocity

Slope and Changing Velocity

Constant velocity is shown on a displacement-time graph by a straight line. When a car accelerates, its velocity changes and its displacement-time graph will be curved. The driver can read the speed of the car from the speedometer. How would you find out the velocity from a displacement-time graph?

Here is a typical example of increasing velocity. At first, the object is at rest, so the graph is horizontal. Then the car accelerates—its velocity is increasing, and the slope of the graph also increases.

Look at point A on the graph. How fast is the car moving at that moment? It is necessary to determine the slope of the graph at that moment, but we only know how to find the slope of a straight line.



* slope of tangent to a ~~vel~~ position vs t
* curve represents instantaneous velocity at that instant in time.

Sally-The-Spider

The position-time graph shows the motion of Sally-the-spider in her desperate climb for safety. Poor Sally frantically tried to climb to the top of her web, while Mean-Mark taunted her by knocking her down. Sally was finally saved when her sister Sue climbed into Marks shoe, thus diverting his attention and giving Sally time to escape.

Use the graph to answer the following questions. Show all work and calculations, including any lines you need to draw on the graph.

1. (a) What was Sally's average velocity over her whole climb? (change in displacement ÷ time)

   (b) What was her velocity at the following times: (instantaneous velocity) (change in position ÷ time)

   (i) 10.0 seconds
   (ii) 19.5 seconds
   (iii) 22.5 seconds
   (iv) 45.0 seconds
   (v) 82.0 seconds

2. Calculate Sally's ave-age velocity in the following time intervals: (i) 10.0s – 55.0s (ii) 50.0s – 75.0s

Sally The Spiders' Wild Climb to Safety