

Instantaneous and average speed

Objects around us often change the speed of their motion. It is important to distinguish the following two terms:

Instantaneous speed tells you how fast an object moves *right now*, at specific time t . The formula is the same as usual, but **t must be as small as possible:**

$$v = \frac{d}{t}$$

Average speed tells you how fast an object moves on average. To find it you only need to know the total distance that an object travelled and the total time it took:

$$v_{avg} = \frac{\text{total } d}{\text{total } t}$$

Homework 4

Problem 1. Below is the schedule of “*Acela*” train that runs from Washington DC to New York City:

Washington (0 mi)	5:00 am
Baltimore (41 mi)	5:30 am
Philadelphia (135 mi)	6:30 am
New York (226 mi)	7:42 am

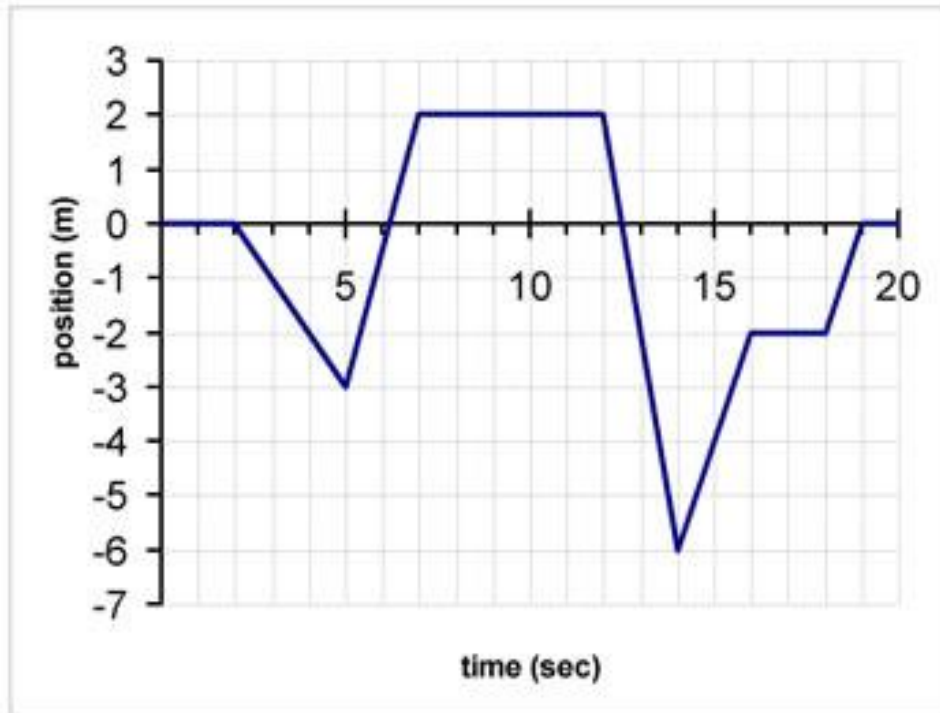


Find the average speed (in miles per hour, mph) for each of the three segments, and for the whole trip. Convert your results first to km/hr, and then to meters per second (m/s). Copy the following table to your answer sheet and fill it out:

Segment	Speed (mph)	Speed (km/hr)	Speed (m/s)
Washington-Baltimore			
Baltimore-Philadelphia			
Philadelphia-NYC			
Washington-NYC			

Problem 2.

The figure below shows the position of a sloth crawling back and forth along a straight line. Find its instantaneous speed at each time interval, copy the table below to your answer sheet and fill it out. Also, find the average speed of the sloth (you'll need to figure out the total distance travelled for this).



Time interval, s	Speed, m/s
0-2	
2-5	
5-7	
7-12	
12-14	
14-16	
16-18	
18-19	
19-20	
Average (0-20)	