

Distance, Time, Speed

d – **distance** travelled

v – **speed**

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

t – travel **time**

Physical Quantity	Standard Units (metric system)	Other Units
Length, distance (d)	meter (m)	kilometer: 1km = 1000m centimeter: 1cm = 0.01 m 1 mile ≈ 1.6 km; 1ft ≈ 0.3m; 1inch ≈ 2.5 cm
Time (t)	second (s)	hour: 1hr = 3600 s
Speed (s)	m/s	km/hr, mile/hr (mph) cm/s, km/s.....

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 moment. 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 3

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. Measure speed of a moving object (toy, rain drop on a window, a pet...). Sketch your experiment, record your data and compute the result (both in the units in which you made your measurements, and in m/s). Also answer the following question: did you measure instantaneous or average speed of the object?