Describing Motion Numerically

Read from **Lesson 1** of the **1-D Kinematics** chapter at **The Physics Classroom**:

http://www.physicsclassroom.com/Class/1DKin/U1L1d.html
http://www.physicsclassroom.com/Class/1DKin/U1L1e.html

MOP Connection: Kinematic Concepts: sublevel 8

Motion can be described using words, diagrams, numerical information, equations, and graphs. Describing motion with numbers can involve a variety of skills. On this page, we will focus on the use tabular data to describe the motion of objects.

1. Position-time information for a giant sea turtle, a cheetah, and the continent of North America are shown in the data tables below. Assume that the motion is uniform for these three objects and fill in the blanks of the table. Then record the speed of these three objects (include units).

Giant Sea Turtle

Time (hr)	Position (mi)
0	0
1	0.23
2	0.46
3	________
4	0.92
5	________
6	_____

Speed = ___________

Cheetah

Time (s)	Position (m)
0	0
0.5	12.5
1	________
1.5	________
2	________
2.5	________
3	75.0

Speed = ___________

North America

Time (yr)	Position (cm)
0	0
0.25	________
0.50	0.50
0.75	0.75
1.0	________
1.25	________
1.50	1.50

Speed = ___________

2 Motion information for a snail, a Honda Accord, and a peregrine falcon are shown in the tables below. Fill in the blanks of the table. Then record the acceleration of the three objects (include the appropriate units). Pay careful attention to column headings.

Snail

Time (day)	Position (ft)
0	0
1	11
2	________
3	________
4	44
5	________
6	66

Acceleration = _________

Honda Accord

Time (s)	Velocity (mi/hr)
0	60, E
0.5	54, E
1	________
1.5	42, E
2	________
2.5	________
3	24, E

Acceleration = __________

Peregrine Falcon

Time (s)	Velocity (m/s)
0	0
0.25	________
0.50	18, down
0.75	27, down
1.0	________
1.25	________
1.5	54, down

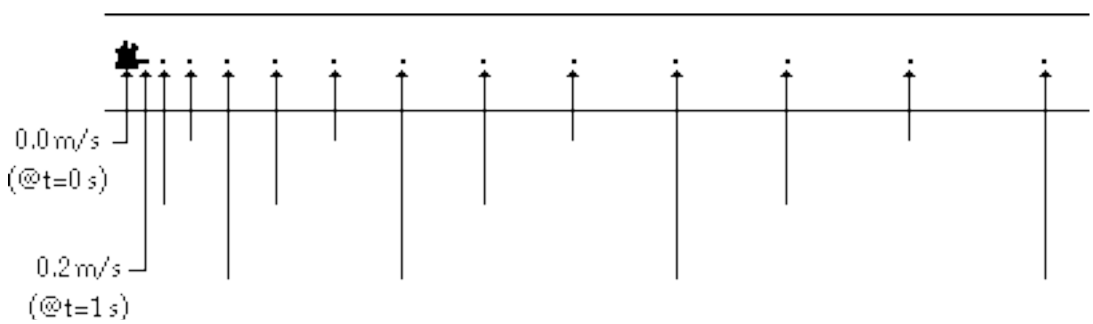
Acceleration = __________

3. Use the following equality to form a conversion factor in order to convert the speed of the cheetah (from question #1) into units of miles/hour. (**1 m/s = 2.24 mi/hr**) **PSYW**

4. Use the following equalities to convert the speed of the snail (from question #2) to units of miles per hour. Show your conversion factors.

   GIVEN: **2.83 x 10^5 ft/day = 1 m/s** **1 m/s = 2.24 mi/hr**

5. Lisa Carr is stopped at the corner of Willow and Phingsten Roads. Lisa's borrowed car has an oil leak; it leaves a trace of oil drops on the roadway at regular time intervals. As the light turns green, Lisa accelerates from rest at a rate of 0.20 m/s^2. The diagram shows the trace left by Lisa's car as she accelerates. Assume that Lisa's car drips one drop every second. Indicate on the diagram the instantaneous velocities of Lisa's car at the end of each 1-s time interval.



6. Determine the acceleration of the objects whose motion is depicted by the following data.

Data Set A

t (s)	v (m/s)
0	32
1	28
2	24
3	20
4	16
5	12
6	8

a = ________ m/s/s

Data Set B

t (s)	v (m/s)
0	12
0.5	10
1.0	8
1.5	6
2.0	4
2.5	2
3.0	0

a = ________ m/s/s

Data Set C

t (s)	v (m/s)
0	24
1	21
2	18
3	15
4	12
5	9
6	6

a = ________ m/s/s

Data Set D

t (s)	v (m/s)
0	32
0.5	28
1.0	24
1.5	20
2.0	16
2.5	12
3.0	8

a = ________ m/s/s

