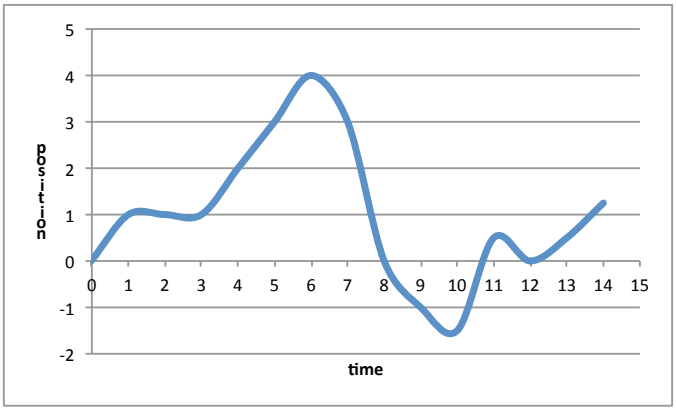
HW#1: Constant & Accelerated Motion

1. A track star runs the 100m dash in 9.82s.
a. What is his average speed? [10.2 m/s]
b. What is his average speed in kilometers per hour. [36.7 kph]

2. From the chart determine the intervals where velocity is positive, negative, or zero.



time interval	direction (slope)	time interval	direction (slope)	time interval	direction (slope)
0→1	+	5→6	+	10→11	+
1→2	0	6→7	-	11→12	-
2→3	0	7→8	-	12→13	+
3→4	+	8→9	-	13→14	+
4→5	+	9→10	-		

3a. A stone is dropped from the roof of a 24.0m high building. Calculate the speed the stone when it hits the ground.
[-21.7 m/s]
b. A stone is thrown from the roof of a 24.0m high building at a speed of 3 m/s. Calculate the speed the stone when it hits the ground. [-21.9 m/s]

4. A car is traveling 72.0 km/h when the driver applies the brakes. If if the car slows down uniformly with an acceleration of -4.5 m/s^2, how long does it take for the car to stop? [4.44s] How far does the car travel before coming to rest? [44.4 m]

5. A stone is projected vertically downward from the top of a building with an initial speed of 9.0 m/s and hits the water 2.7 s later. Determine the height of the building. [-60.0m] What is the final velocity? [-35.5 m/s]

6. A stone is dropped from the roof of a tall building. A second stone is dropped 1.50 s later. How far apart are the stones when the second one has reached a speed of 21.0 m/s? [42.3 m apart]

7. A stone in a slingshot is shot straight in the air at a velocity of 80 m/s. On its way straight down it hits a glider 1.25 seconds after attaining its highest point.

a) What was its velocity when it hit the glider? [-12.25 m/s]
b) What was the altitude of the glider? [318.9 m]

8. A log is floating on swiftly moving water. A stone is dropped from rest from a 75-m-high bridge and lands on the log as it passes under the bridge. If the log moves with a constant speed of 5.0 m/s, what is the horizontal distance between the log and the bridge when the stone is released? [19.6m]

9. The driver of a car traveling at 90 mi/hr observes a hazard on the road and applies the brakes, giving constant deceleration of 7.5 ft/s^2. If the driver's reaction time is 0.15 s, how much time does it take to stop the car after sighting the hazard? What is the total distance traveled before the car comes to rest?