Solution for Homework 1

Chapter 1:
Questions:
1.7 The total cost is directly proportional to the total weight.

1.8 The driving time is directly proportional to the total distance since the speed is constant (90km/hr). The proportionality constant is the speed (90km/hr).

1.9 If assuming that the water runs away at constant rate, the relationship is direct proportion with negative proportionality constant.

Remaining amount of water = water running rate x time + initial amount of water where water running rate is the proportionality constant, and is negative, initial amount of water is also constant, remaining amount of water and time are variables.

Chapter 3:
Questions:

3.3 no. Great uniform speed means zero acceleration. Great change in speed means great acceleration.

3.4 No. If speed is constant, but driving direction changes, the acceleration is not zero.

3.5 yes. When you start your car at traffic light, the velocity is zero, but the acceleration is not zero.

3.7 Their velocities are not equal. The velocity is a vector. Their velocities have different directions.
But they have the same speed (40km/hr).

3.10 Its velocity at the highest point is zero. Its acceleration at this point is the gravitational acceleration ($9.8 m/s^2$).

Exercises:

3.5 average speed = distance / time
= 100 m / 9.8 sec = 10.2 m/sec
time = distance / average speed
= 1500 m / 10.2 (m/sec)= 147 sec

3.9 time = distance / average speed = 1400km / 90 (km/hr) = 15.6 hr

3.15 a) km/hr = km/hr (1mile/1.609km) =0.621 mile/hr
b) m/s = 100cm/s x (1inch / 2.54cm) x (1foot/12inch) = 3.28 ft/s
c) mi/hr = 1609m/3600s =0.4469m/s

3.17 average accelaration = (final velocity-initial velocity)/time
= (6.0m/s-0m/s)/5.0sec
= $1.2 m/s^2$

3.19 final speed = acceleration x time
= $3.0 m/s^2$ x 2.5 s = 7.5m/s

distance = ½ x acceleration x $time^2$
= ½ x $3.0 m/s^2$ x $(2.5s)^2$
=9.4 m