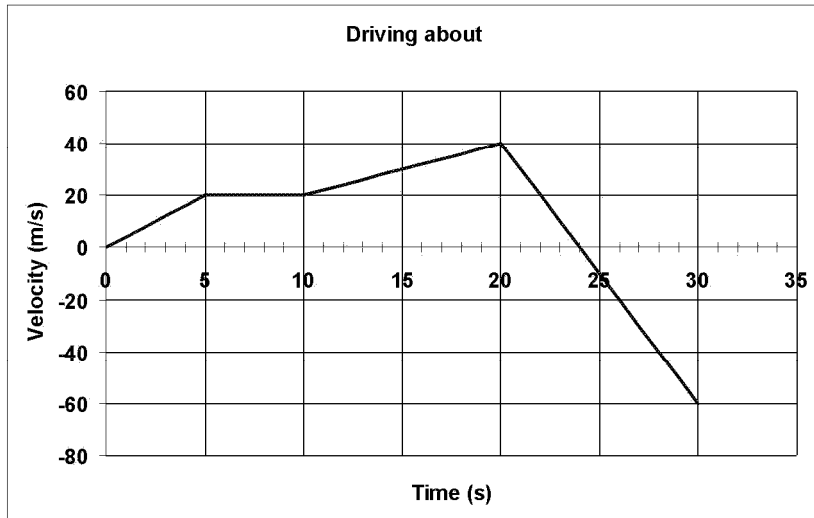
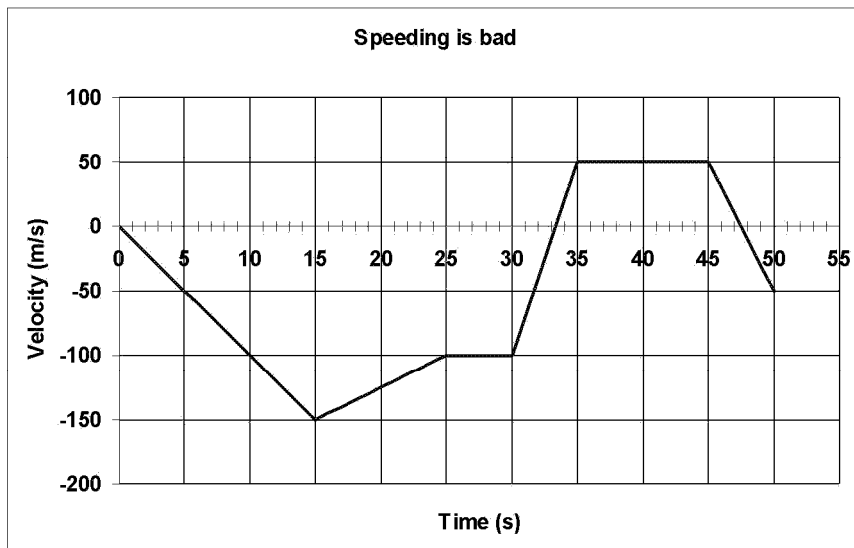


Physics 112  
Change in Velocity



1. Refer to the above image for the following v-t graph questions. **a)** What was the acceleration during the first five seconds? **b)** At what time(s) was there a change in direction? **c)** What was the displacement and distance for the entire 30 s? **d)** What was the average speed and velocity for the entire trip?



2. Refer to the above image for the following v-t graph questions. **a)** What was the magnitude of the greatest acceleration? **b)** What distance was traveled between 10 and 30 seconds? **c)** Calculate the average speed and velocity for the full 50 s.
3. A car undergoes a constant acceleration from rest to 28 m/s in 9.5 s. What distance was covered in that time?

4. Not noticing a red light a drivers slams on the brakes squeeling to a halt in 3.75 s. Just before hitting the brakes the car was traveling 17 m/s and was 30 m from the light. **a)** What was the average acceleration of the car? **b)** Determine if the driver able to stop before reaching the traffic light by finding the distance required to stop.
5. An airplane lands with a speed of 70 m/s. After 3.5 s the airplane is traveling 17.5 m/s. **a)** What was the average acceleration of the airplane? **b)** What distance does the airplane need to stop?



6. During take off a Boeing 747 airplane accelerates at a constant  $10.8 \text{ m/s}^2$ . The airplane accelerated, from rest, for 7.8 s before it left the ground. **a)** With what speed did the airplane leave the ground? **b)** What distance was required for take-off?



7. A ball is thrown upwards, on the Earth ( $a_{\text{gravity}} = -9.81 \text{ m/s}^2$ , with an initial speed of 17 m/s. **a)** How long will the ball be traveling upwards? **b)** How high up will the ball travel?
8. A loonie dropped from the observation deck on the CN Tower in Toronto takes 8.35 s to hit the ground. **a)** Assuming no air resistance, with what speed is the loonie striking the ground? **b)** How high is the observation deck from the ground? (take  $a_{\text{gravity}} = -9.81 \text{ m/s}^2$ )



9. During its fall to Earth, hail stones from cumulonimbus clouds reach a terminal velocity (a constant speed) because of air resistance. **a)** Calculate at what speed a hail stone would strike the Earth if it continued to accelerate at  $a_{\text{gravity}} = -9.8 \text{ m/s}^2$  during its 20.2 s fall to the ground.



**Answer List**

1.    a)  $a = 4.0 \text{ m/s}^2$  b)  $t = 24 \text{ s}$  c)  $disp = 350 \text{ m}$ ,  $dist = 710 \text{ m}$  d)  $Speed = 24 \text{ m/s}$ ,  $v_{avg} = 11.7 \text{ m/s}$
2.    a)  $30 \text{ m/s}^2$  b)  $dist = 2375 \text{ m}$  c)  $speed = 74 \text{ m/s}$ ,  $v_{avg} = -50 \text{ m/s}$
3.     $d = 133 \text{ m}$
4.    **a)**  $a_{avg} = -4.5 \text{ m/s}^2$ , **b)** No, the driver needed 32 m to stop so the car ended up 2 m into the intersection.
5.    **a)**  $a_{avg} = -15 \text{ m/s}^2$  **b)**  $d = 163 \text{ m}$
6.    **a)**  $v_f = 84 \text{ m/s}$  **b)**  $d = 330 \text{ m}$
7.    **a)**  $t = 1.73 \text{ s}$ ; **b)**  $d = 15 \text{ m}$
8.    **a)**  $v_f = -82 \text{ m/s}$ ; **b)**  $d = 342 \text{ m}$
9.    **a)**  $v_f = -198 \text{ m/s}$ ;