

9. Use the information from the velocity-time graph in **Figure 18** to generate the corresponding position-time and acceleration-time graphs.



Figure 18

10. A ski jumper, starting from rest, skis down a straight slope for 3.4 s with a constant acceleration of 4.4 m/s^2 [fwd]. At the end of 3.4 s, determine the jumper's (a) final velocity and (b) displacement.
11. An electron is accelerated uniformly from rest to a velocity of $2.0 \times 10^7 \text{ m/s}$ [E] over the displacement 0.10 m [E].
(a) What is the (constant) acceleration of the electron?
(b) How long does the electron take to reach its final velocity?
12. During a 29.4-s interval, the velocity of a rocket changes from 204 m/s [fwd] to 508 m/s [fwd]. Assuming constant acceleration, determine the displacement of the rocket during this time interval.
13. A bullet leaves the muzzle of a rifle with a velocity of $4.2 \times 10^2 \text{ m/s}$ [fwd]. The rifle barrel is 0.56 m long. The acceleration imparted by the gunpowder gases is uniform as long as the bullet is in the barrel.
(a) What is the average velocity of the bullet in the barrel?
(b) Over what time interval does the uniform acceleration occur?
14. A car (C) and a van (V) are stopped beside each other at a red light. When the light turns green, the vehicles accelerate with the motion depicted in **Figure 19**.

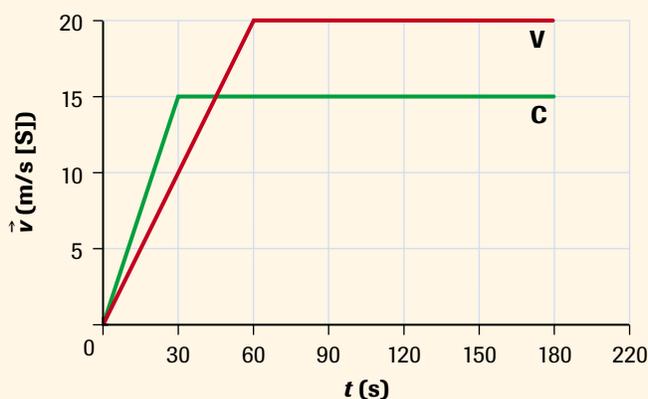


Figure 19

Velocity-time graph of the motions of two vehicles

- (a) At what instant after the light turns green do C and V have the same velocity?
(b) At what instant after the light turns green does V overtake C? (*Hint:* Their displacements must be equal at that instant.)
(c) Determine the displacement from the intersection when V overtakes C.

15. A bird takes 8.5 s to fly from position A to position B along the path shown in **Figure 20**. Determine the average acceleration.

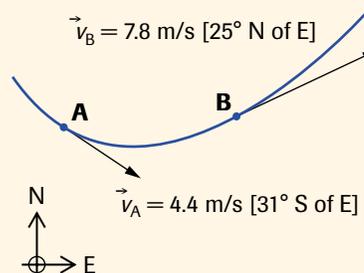


Figure 20

16. A helicopter travelling horizontally at 155 km/h [E] executes a gradual turn, and after 56.5 s flies at 118 km/h [S]. What is the helicopter's average acceleration in kilometres per hour per second?

Applying Inquiry Skills

17. Predict the average acceleration in each of the following situations. State what measurements and calculations you would use to test your predictions.
(a) A bullet travelling with a speed of 175 m/s is brought to rest by a wooden plank.
(b) A test car travelling at 88 km/h is brought to rest by a crash barrier consisting of sand-filled barrels.

Making Connections

18. The fastest time for the women's 100-m dash in a certain track-and-field competition is 11.0 s, whereas the fastest time for the four-woman 100-m relay is 42.7 s. Why would it be wrong to conclude that each of the four women in the relay can run a 100-m dash in less than 11.0 s? (*Hint:* Consider acceleration.)