Acceleration Problems

1. An object has a speed of 2.00 m/s. Three seconds later it is going 8.00 m/s. What average acceleration did it experience? Answer: 2.00 m/s^2.

2. A car traveling in a straight line has a speed of 30.0 m/s at some instant. After 3.00 s, its speed is 20.0 m/s. What is its average acceleration in this time interval?

3. A car goes from 90.0 km/hr to a stop in 3.00 s. (SUPER BRAKES!) What is its acceleration?

4. An object is accelerated from rest at a constant rate of 5.00 m/s^2. What will be its speed after 8.00 seconds?

5. A car company claims that its car can accelerate from rest to a speed of 28.0 m/s in 20.0 s. Find the average acceleration of the car?

6. A bear spies some honey and takes off from rest at a rate of 2.00 m/s^2. If the honey is 9.00 m away, how fast will his snout be going at the moment of ecstasy?

7. The engine of a model rocket accelerates the rocket vertically upward for 2.00 s such that its speed is given by the following data. At $t = 0$, its speed is zero; at $t = 1.00$ s, its speed is 5.00 m/s; at $t = 2.00$ s, its speed is 10.0 m/s, at $t = 3.00$ s, its speed is 15.0 m/s, and at $t = 4.00$ s its speed is 20.0 m/s. Plot a velocity vs. time graph for this motion and from it determine the average acceleration. What do you expect its acceleration to be at $t = 5.00$ s? Why? What will its velocity be at $t = 10.0$ s if it continues at this acceleration?

8. A car moving at 30.0 m/s slows uniformly to a speed of 10.0 m/s in a time of 5.00 s. Determine the acceleration of the car? Answers: - 4.00 m/s^2

9. Use the position vs. time graph to the right to draw a velocity vs. time graph corresponding to the motion of the object. What is the instantaneous velocity of the object at a time of 5.00 seconds? How about at 2.5 seconds? What is the average speed for the whole trip?
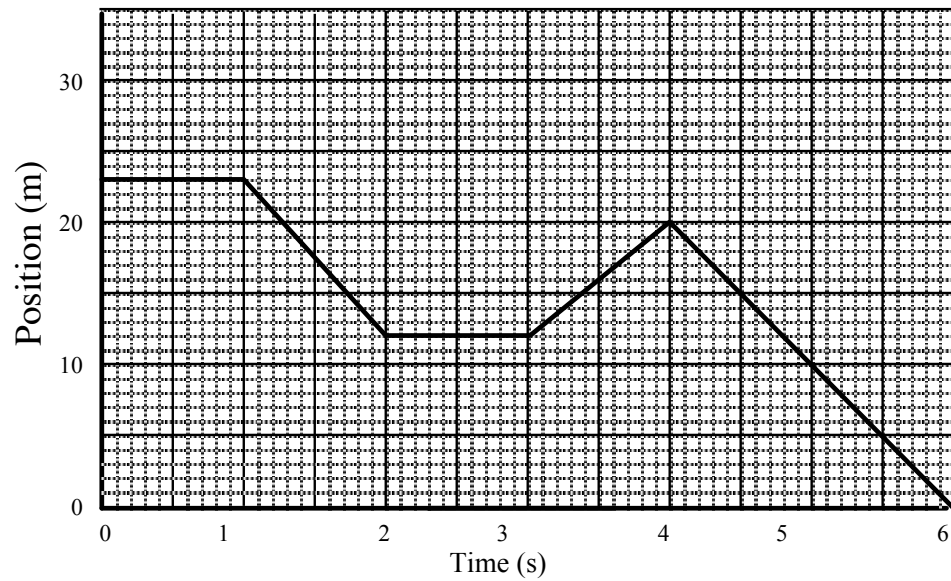
10. Use the velocity vs. time graph to the right. What is the instantaneous velocity of the object at a time of 5.00 seconds? What is the acceleration of the object during each of the following intervals: 0 to 1.00 s, 1.00 s to 2.00 s, 2.00 s to 3.00 s, 3.00 s to 4.00 s, and 4.00 s to 5.00 s? What can you say about the acceleration during each of those intervals?
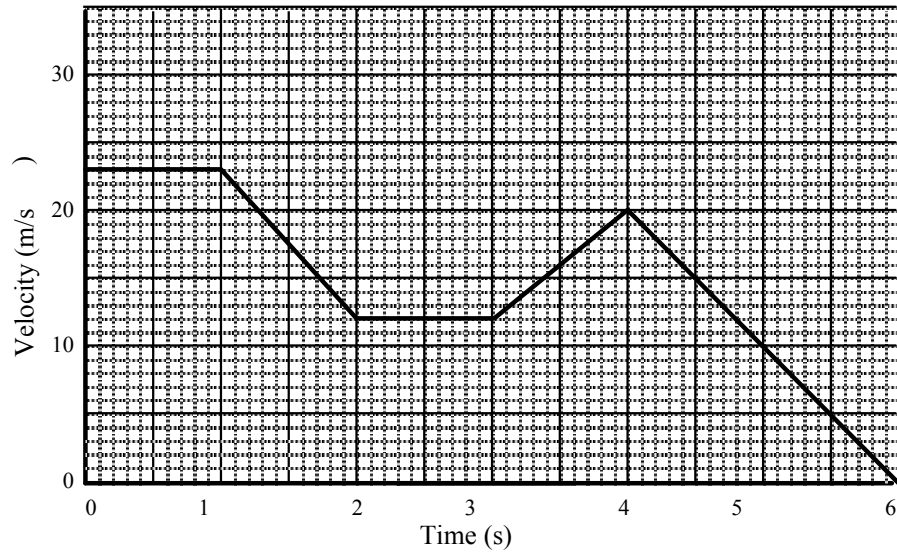
11. A ball is thrown vertically upward at t = 0, and is caught at the same level at t = 6.00 s. The graph below describes the position of the ball above hand level as a function of time. Sketch a velocity vs. time graph for this situation.

Position (m)

30

20

10

0

0   1   2   3   4   5   6

Time (s)