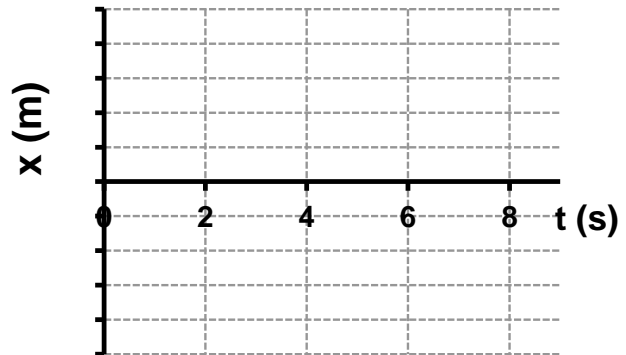
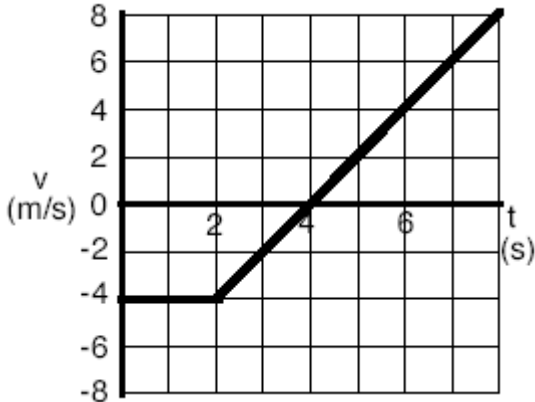


Name: _____

1-D Kinematics Problems

1. Answer the following based on the velocity vs. time graph.



a. Give a written description of the motion.

b. Determine the displacement from $t = 0$ s to $t = 4$ s.

c. Determine the displacement from $t = 2$ s to $t = 6$ s.

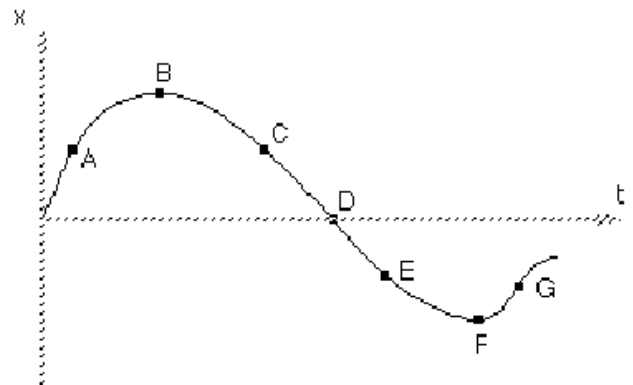
d. Determine the object's acceleration at $t = 4$ s.

e. Sketch a possible $x-t$ graph for the motion of the object. Label the axis. Explain why your graph is only one of many possible graphs.

2. Answer the following based on the position vs. time graph.

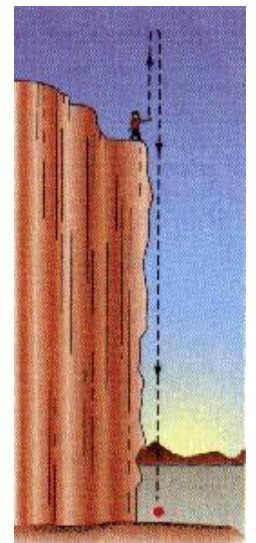
a. Where on the graph above is the object moving most slowly? (How do you know?)

b. Between which points is the object speeding up? (How do you know?)



c. Between which points is the object slowing down? (How do you know?)

- d. Where on the graph above is the object changing direction? (How do you know?)
3. A car moves at 12 m/s and coasts up a hill with a uniform acceleration of -1.6 m/s^2
- What is the displacement after 6 sec?
 - What is the displacement after 9 sec?
 - What is going on? Plot v-t graph of this problem to explain. Determine Δx from the graph.
4. A speedboat starts from rest and accelerates at $+2.01 \text{ m/s}^2$ for 7.00 s. At the end of this time, the boat continues for an additional 6.00 s with an acceleration of $+0.518 \text{ m/s}^2$. Following this, the boat accelerates at -1.49 m/s^2 for 8.00 s.
- What is the velocity of the boat at $t = 21.0 \text{ s}$?
 - Find the total displacement of the boat.
- This is a 3 segment problem! The end velocity of the first segment is the start velocity of the second, the end velocity of the second is the start velocity of the third, etc
5. **Challenging: Reaction Time Problem** - A car is traveling 20 m/s when the driver sees a child standing on the road. She takes 0.8 s to react then steps on the brakes and slows at 7.0 m/s^2 . How far does the car go before it stops?
6. On a planet that has no atmosphere, a rocket 14.2 m tall is resting on its launch pad. Freefall acceleration on the planet is 4.45 m/s^2 . A ball is dropped from the top of the rocket with zero initial velocity.
- how long does it take to reach the launch pad
 - what is the speed of the ball just before it hits the ground?
7. You are a bungee jumping fanatic and want to be the first bungee jumper on Jupiter. The length of your bungee cord is 45.0 m. Free fall acceleration on Jupiter is 23.1 m/s^2 . What is the ratio of your speed on Jupiter to your speed on Earth when you have dropped 45 m? Ignore the effects of air resistance and assume that you start at rest.
8. A stone is thrown vertically upwards with a speed of 20.0 m/s.
- How fast is it moving when it reaches a height of 12.0 m?
 - How long is required to reach this height?
 - Why are there 2 answers to b?
9. A stone is thrown vertically upward with a speed of 12.0 m/s from the edge of a cliff 75.0 m high as shown at right.
- How much later does it reach the bottom of the cliff?
 - What is its speed just before hitting?
 - What total distance did it travel?



Answers

3. a) 43.2 m b) 43.2 m

4. a) 5.26 m/s b) 232.7 m

5. 44.6m

6. a) 2.53 s b) -11.3 m/s

$$7. \frac{v_{f \text{ Jupiter}}}{v_{f \text{ Earth}}} = \sqrt{\frac{23.1}{9.8}} = 1.54$$

8. a) $\pm 12.8 \text{ m/s}$ b) 0.73s or 3.35s

9. a) 5.32s b) -40.1 m/s c) 89.7m