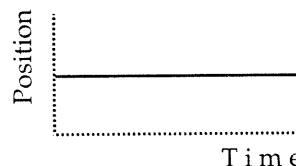


HOMEWORK FOR LAB 1: INTRODUCTION TO MOTION

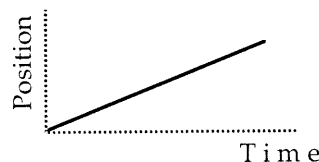
Position-Time Graphs

Answer the following questions in the spaces provided.

1. What do you do to create a horizontal line on a position-time graph?



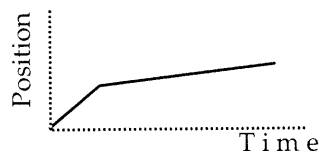
2. How do you walk to create a straight line that slopes up?



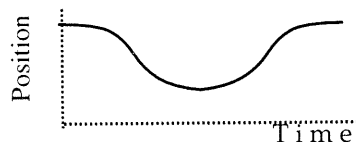
3. How do you walk to create a straight line that slopes down?



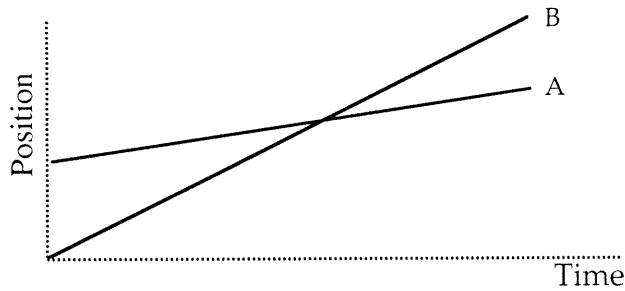
4. How do you move so the graph goes up steeply at first, and then continues up gradually?



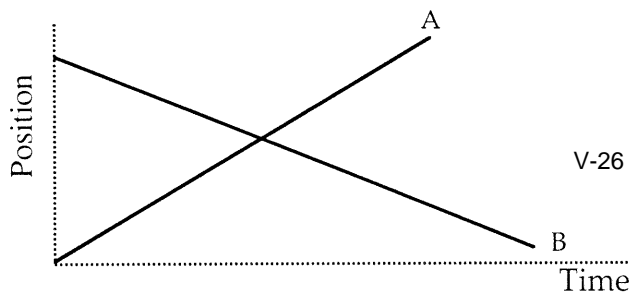
5. How do you walk to create a U-shaped graph?



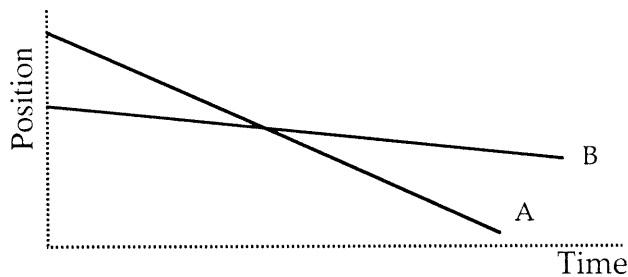
Answer the following about two objects, A and B, whose motion produced the following position-time graphs.



6. a) Which object is moving faster--A or B?
- b) Which starts ahead? Define what you mean by "ahead."
- c) What does the intersection mean?



7. a) Which object is moving faster?
- b) Which object has a negative velocity according to the convention we have established?



8. a) Which object is moving faster?
- b) Which starts ahead? Explain what you mean by "ahead."

Sketch the position-time graph corresponding to each of the following descriptions of the motion of an object.

9. The object moves with a steady (constant) velocity away from the origin.



10. The object is standing still.



11. The object moves with a steady (constant) velocity toward the origin for 5 seconds and then stands still for 5 seconds.



12. The object moves with a steady velocity away from the origin for 5 seconds, then reverses direction and moves at the same speed toward the origin for 5 seconds.



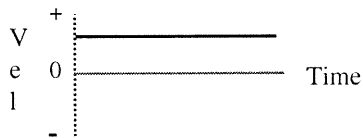
13. The object moves away from the origin, starting slowly and speeding up.



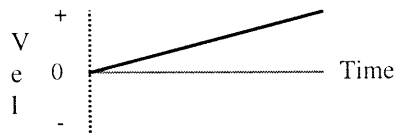
Velocity-Time Graphs

After studying the velocity-time graphs you have made, answer the following questions:

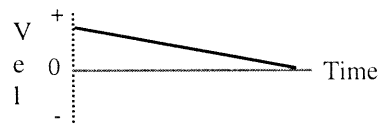
1. How do you move to create a horizontal line in the positive part of a velocity-time graph, as shown below?



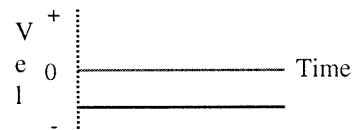
2. How do you move to create a straight-line velocity-time graph that slopes up from zero, as shown below?



3. How do you move to create a straight-line velocity-time graph that slopes down, as shown below?

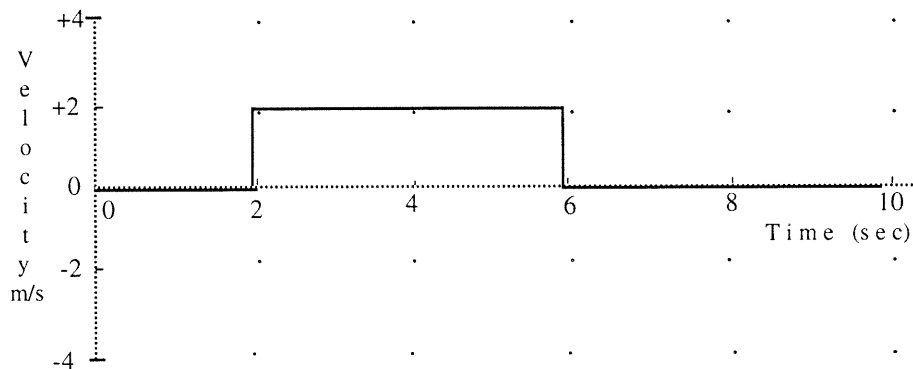


4. How do you move to make a horizontal line in the negative part of a velocity-time graph, as shown below?

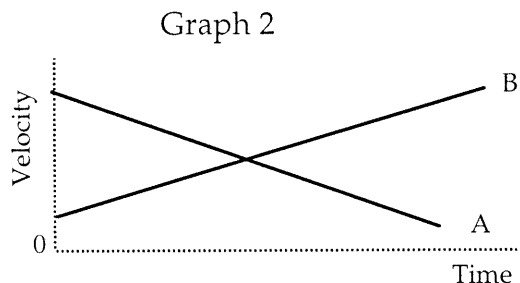
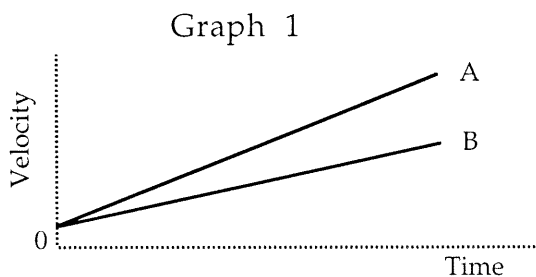


5. The velocity-time graph of an object is shown below. Figure out the total change in position (*displacement*) of the object. Show your work.

Displacement = _____ meters.



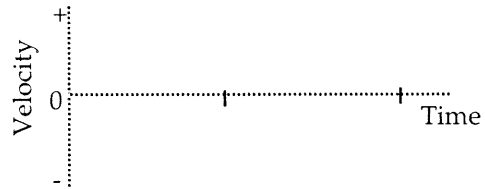
6. Both of the *velocity* graphs below, 1 and 2, show the motion of two objects, A and B. Answer the following questions separately for 1 and for 2. Explain your answers when necessary.



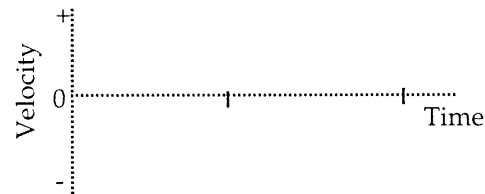
- | | |
|--|--|
| <p>a) Is one faster than the other? If so, which one is faster? (A or B)</p> <p>b) What does the intersection mean?</p> <p>c) Can one tell which object is "ahead"? (define "ahead")</p> <p>d) Does either object A or B reverse direction? Explain.</p> | <p>a) Is one faster than the other? If so, which one is faster? (A or B)</p> <p>b) What does the intersection mean?</p> <p>c) Can one tell which object is "ahead"? (define "ahead")</p> <p>d) Does either object A or B reverse direction? Explain.</p> |
|--|--|

Sketch the velocity -time graph corresponding to each of the following descriptions of the motion of an object.

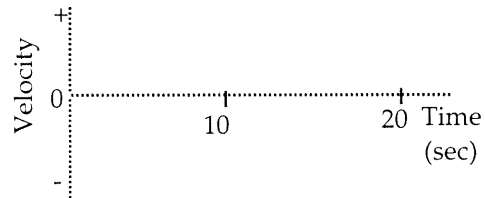
7. The object is moving away from the origin at a steady (constant) velocity.



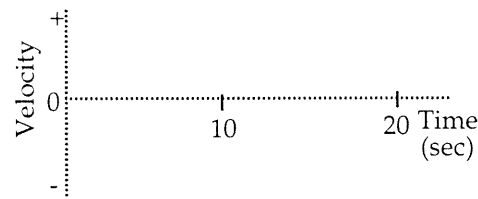
8. The object is standing still.



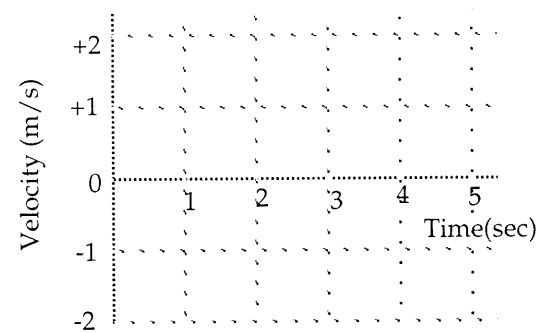
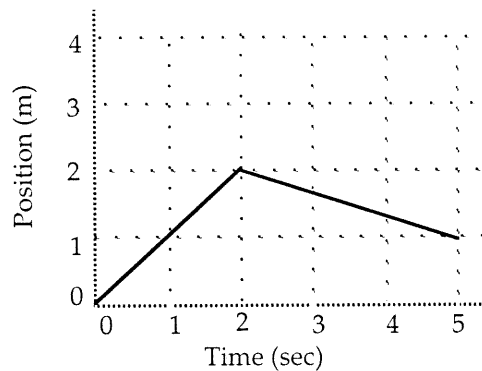
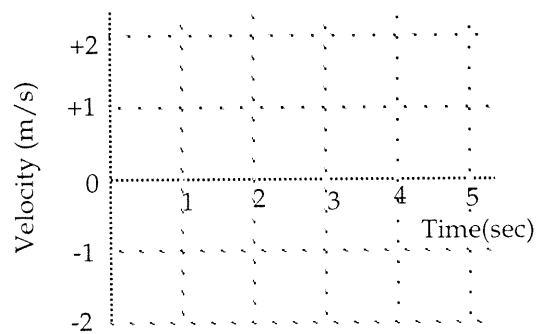
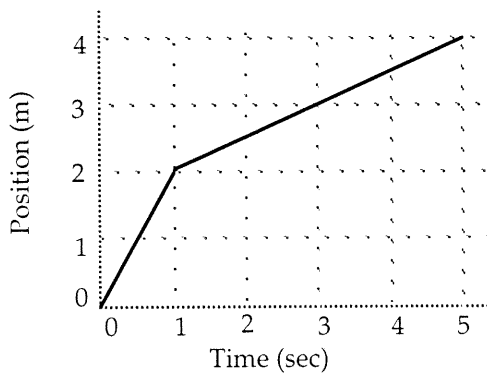
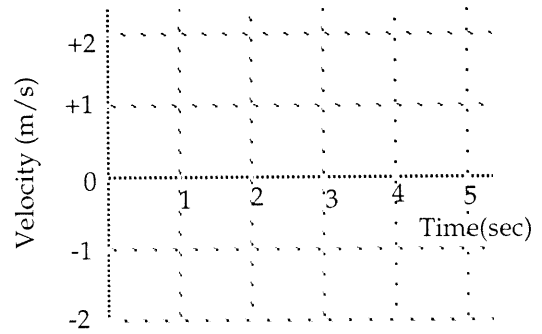
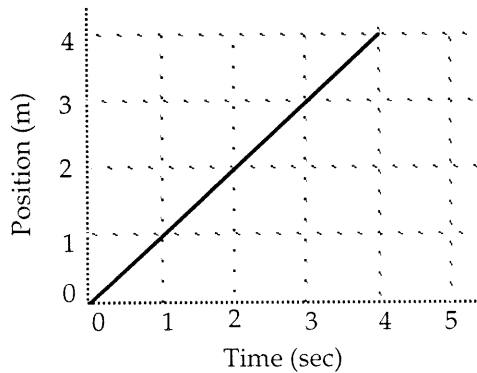
9. The object moves toward the origin at a steady (constant) velocity for 10 seconds, and then stands still for 10 seconds.



10. The object moves away from the origin at a steady (constant) velocity for 10 seconds, reverses direction and moves back toward the origin at the same speed for 10 seconds.



11. Draw the velocity graphs for an object whose motion produced the position-time graphs shown below on the left. Position is in meters and velocity in meters per second. **Note:** Unlike most real objects, you can assume these objects can change velocity so quickly that it looks instantaneous with this time scale.



12. Draw careful graphs below of position and velocity for a cart that—
- moves away from the origin at a slow and *steady* (constant) velocity for the first 5 seconds.
 - moves away at a medium-fast, *steady* (constant) velocity for the next 5 seconds.
 - stands still for the next 5 seconds.
 - moves toward the origin at a slow and *steady* (constant) velocity for the next 5 seconds.
 - stands still for the last 5 seconds.

