Physics Fix 7 Name: _____

Motion Graphs

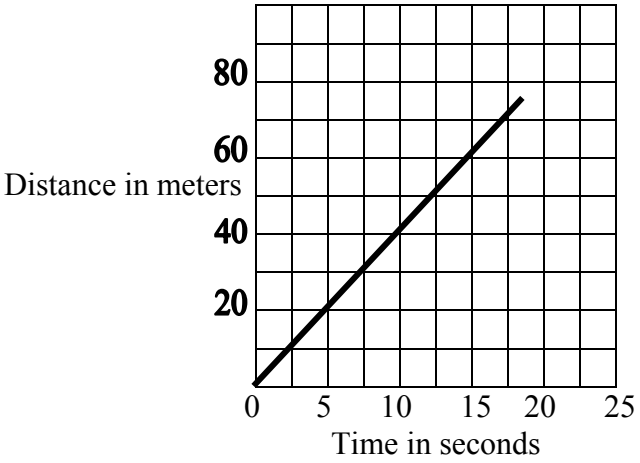
Date: _____
Hour: _____

Information: Speed Graphs

Recall that speed is a measure of how fast an object's distance changes. By graphing distance vs. time we can investigate an object's speed graphically.

Critical Thinking Questions

1. Consider the following graph of a car driving. Use the graph to answer the following questions:



a) How long did it take the car to travel 10 meters?

b) Consider the time interval between 0 and 10 seconds.

i) How far did the car travel during that time?

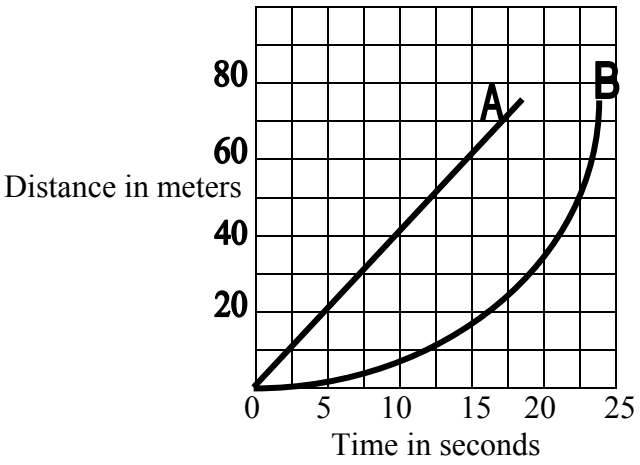
ii) What was the car's average speed during that time?

c) Consider the time interval between 5 and 15 seconds. What was the car's average speed during that time?

d) From this graph we can conclude that between 0 and 15 seconds…

A) the speed was constant
B) the velocity was constant
C) both speed and velocity was constant
D) we can't conclude for sure that the speed or velocity was constant.

2. The following graphs represent two different cars—car A and car B.



   a) What is the average speed of Car A during the time interval of 0-10 seconds?

   b) What was the average speed of Car B during the time interval of 0-10 seconds?

   c) What was the average speed of Car A during the time interval of 10-20 seconds?

   d) What was the average speed of Car B during the time interval of 10-20 seconds?

3. Only one of the cars from the previous question had a *constant* speed. Which one? Justify your answer.

4. Given a graph of distance vs. time, how can you tell if the object had constant speed?

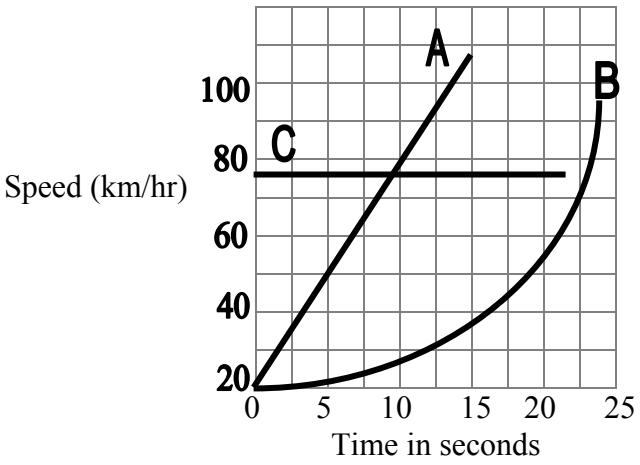
Information: Acceleration Graphs

Since acceleration is a measure of how fast speed changes, we can graphically examine acceleration by graphing speed vs. time.

Critical Thinking Questions

5. Consider the graph from question 2. Which car had an acceleration of zero?

6. Consider the following graph of Cars A, B, and C:



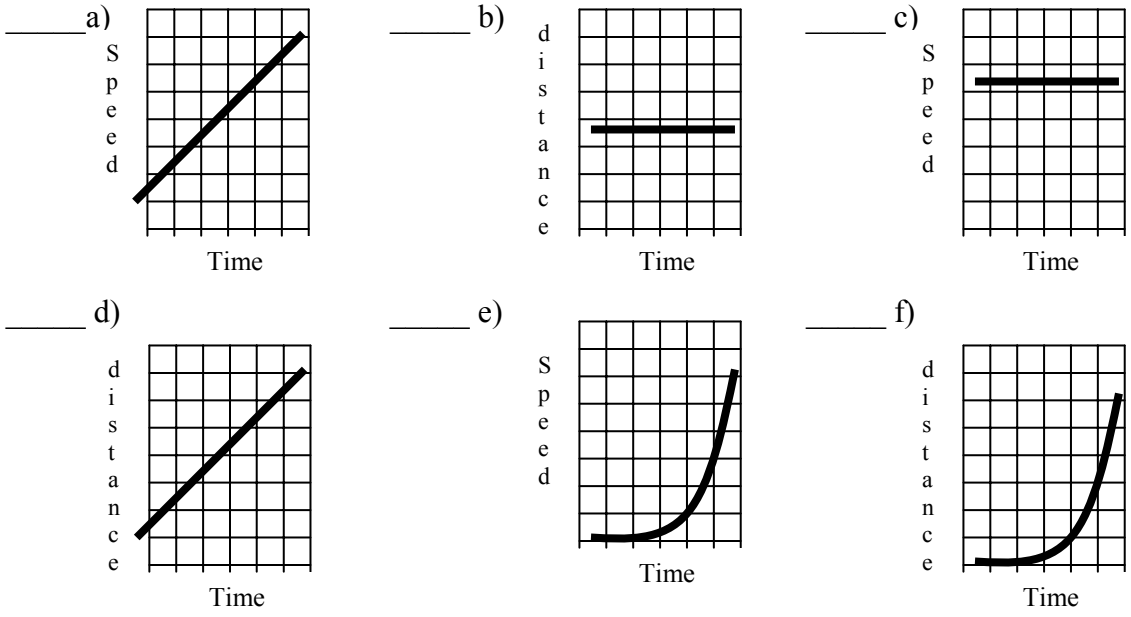
a) Which car(s) is/are accelerating?

b) Car D is driving at 60 km/hr at time zero seconds. The acceleration of Car D between 0 and 25 seconds is 0 km/hr-s. Draw the graph for Car D on the graph above.

c) What is the average acceleration for Car A between the time of 0 and 5 seconds?

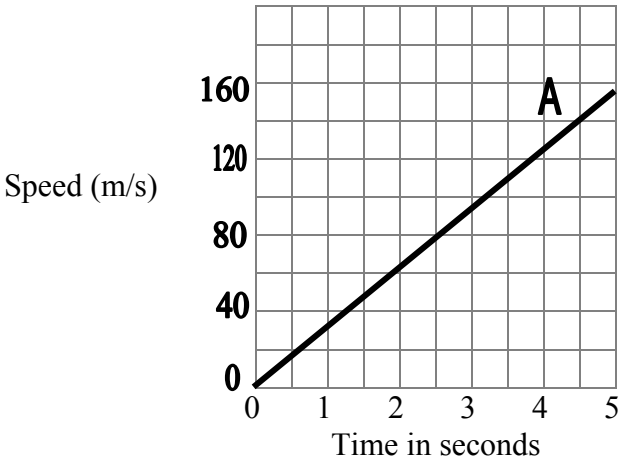
d) Draw a graph for Car E on the graph above. Car E is traveling at 40 km/hr at time 0. The car's average acceleration is 2 km/hr-s during the entire time interval of 0-25 seconds.

7. Label each of the graphs with the following labels. You may use some more than once or not at all. (1) Constant Speed, (2) Constant Acceleration, (3) Not Moving, (4) Acceleration (not constant)

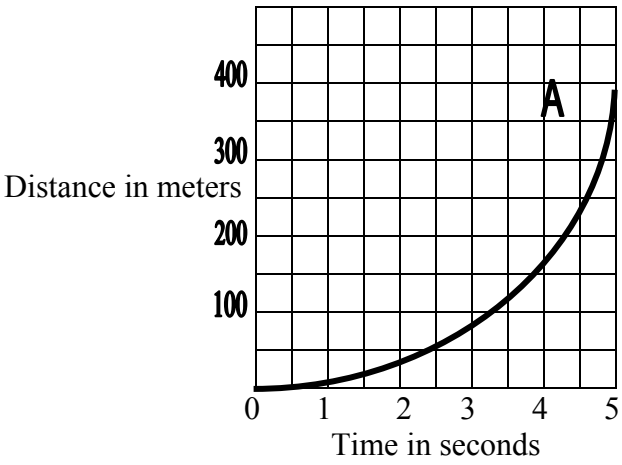


8. Consider the graph of speed vs. time for Car A as it accelerates constantly at 32 m/s^2.

Graph 1: Speed (m/s) vs. Time (s)



Graph 2: Distance (m) vs. Time (s) for the same car during the same time period.



a) Calculate the area under the line for Graph 1. Hint: this is like finding the area of a triangle using the formula area=1/2 base x height. The height is about 160 and the length of the base is about 5.

b) Using Graph 2, find the distance the car traveled during the 5 second time span?

c) Given your answer to parts a and b, fill in the blank: If you have a graph of speed vs. time, the area under the graph is equal to the _____ the car traveled.

d) Find the slope of the line in Graph 1. How does the value for the slope relate to the acceleration of Car A (as stated at the beginning of question 8)?