

Name: Key

Visual Representation of Motion – Fall 1999

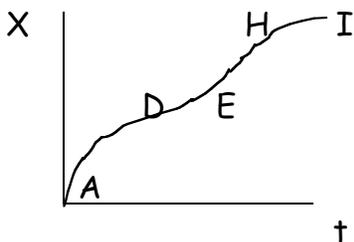
For every answer below, please write a few words telling my why you chose your answer.

A car moves in a straight line toward the right. The following points show the location of the car at equal time intervals.

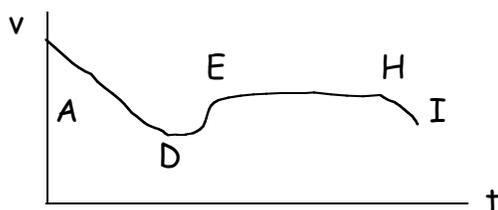


Answer the following questions by writing two points: For example, one answer might be between points C and E, or C-E. Also tell me why you chose that answer.

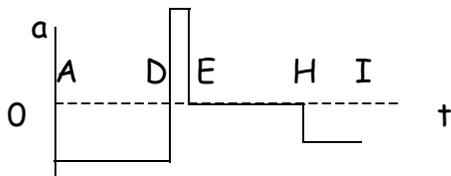
- Between which points is the car undergoing the greatest acceleration or deceleration?
D-F, because the distance between E and F has increased tremendously compared to the distance between D and E. So the velocity between E and F is much greater than the velocity between D and E.
- Between which points is the car decelerating?
A-E and H-I because in those cases the distance between the points is decreasing.
- Between which points is the car traveling at a constant average velocity?
E-H because the distance between those points is constant.
- Where does the car have the highest instantaneous velocity?
A-B because those points have the largest distance between them.
- Draw a graph of this car's motion with time on the x axis and position on the y axis.



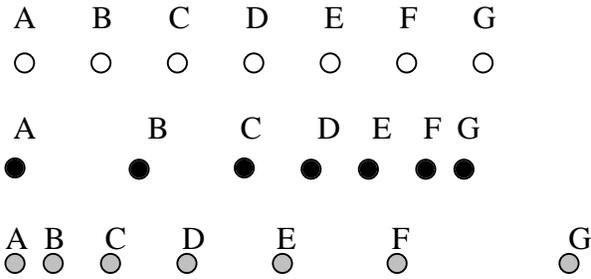
- Draw a graph of this car's motion with time on the x axis and velocity on the y axis.



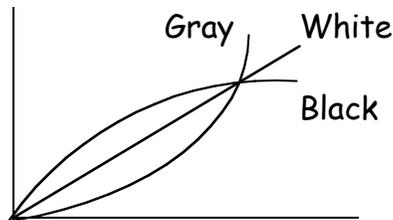
- Draw a graph of this car's motion with time on the x axis and acceleration on the y axis.



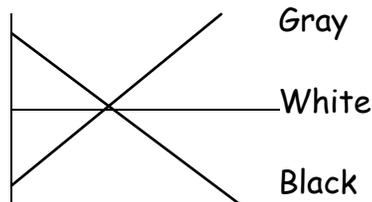
Three cars move to the right in a straight line. The following points show the location of the cars at equal time intervals. One car is shown by white circles, one by black circles and one by gray circles. Please tell me why you chose each answer.



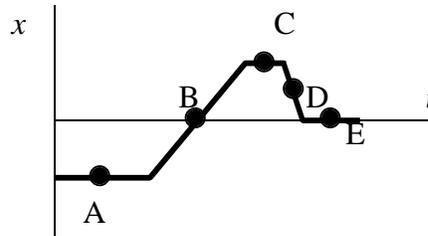
8. Which car(s) is (are) traveling at a constant velocity?
White, because the spacing between the dots is always the same.
9. Which car has the highest average velocity?
Gray, because it covers the greatest distance in the same amount of time.
10. Is there any place (or places) where the white car and the black car have the same instantaneous velocity? If so at approximately what point?
Yes, at approximately C-D for both cars. The distance between C-D is about the same for both cars so they have the same velocities.
11. Is there any place (or places) where the gray car and the black car have the same instantaneous velocity? If so at approximately what point?
Yes. There are lots of places the distances between the points are about the same. A-B for the black car is about the same as F-G for the gray car. A-B for the gray car is about the same as F-G for the black car. C-D for both cars is about the same distances, with many more instances.
12. Is there any place where gray car and the black car are at the same place at the same time? If so at approximately what point?
Yes at A and somewhere between F and G.
13. Draw a graph of position vs. time for all three cars. (Draw a different line for each car on the same graph).



14. Draw a graph of velocity vs. for all three cars. (Draw a different line for each car on the same graph).



The figure shows a position vs. time graph for an object moving in a straight line. At which lettered point or points:



15. Is the motion slowest? Why?

A, C, and E all show that x is not changing so the object is stopped there. It is not moving.

16. Is the motion fastest? Why?

At D because the slope, which is the velocity $\Delta x/\Delta t$, is the greatest.

17. Is the object moving at a constant non-zero velocity?

At B and at D because the slope is constant and not zero.

18. Is the object moving in the negative x direction?

At D because the slope is negative and the x values are decreasing.

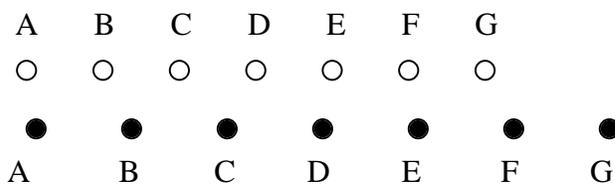
19. Is the object turning around?

At C because at B the object is moving in the positive direction and at D it is moving in the negative direction. Also, it passes the same position twice so it must have reversed directions.

20. Is the object at rest?

At A, C, and E, because the x value is not changing, (and the slope, which is the velocity, is zero).

Two cars move in a straight line toward the right. The following points show the location of the car at equal time intervals. One car is shown by white circles and one by black circles.



21. Which car has the greatest acceleration? Why?

Neither, they both have zero acceleration. If the car is accelerating the velocity will change so the distance between the points will change. Since the distance between the points never changes, the velocity is not changing and there is no acceleration. The black car is moving faster because it travels a longer distance in the same amount of time, but its velocity is not changing.