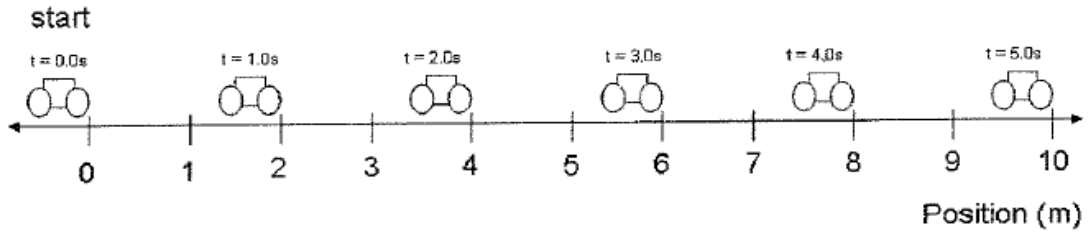
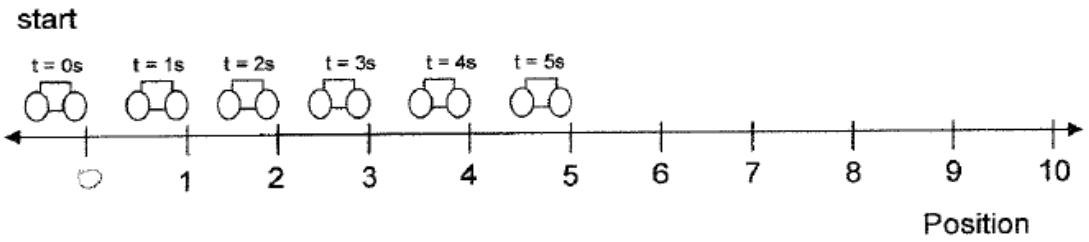
Position vs. Time Graphs—Hidden Meanings

The diagrams below will allow you to "collect" position and time data for two different imaginary toy cars. You will then create a graph for each and interpret the physical meaning of the slope.

Car A



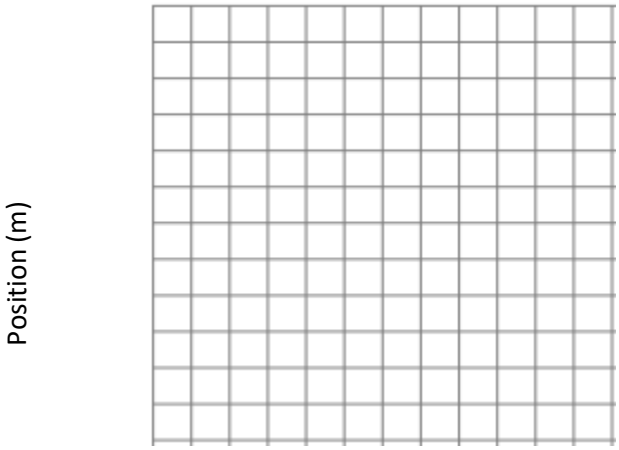
Car B



1. "Collect" data from the diagrams and complete the data table for each car:

Car A		Car B	
Time (s)	**Position (m)**	**Time (s)**	**Position (m)**

2. Plot the position-time data for EACH car on the graph below (2 separate lines):

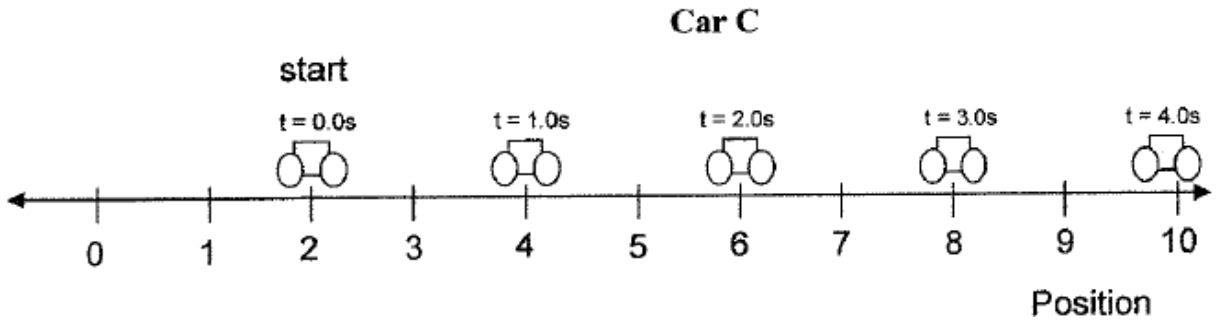


3. Using a ruler, create the best-fit line for EACH car on the graph.
4. Calculate the slope of each of your best-fit lines. Chose two points on each of the lines and label them on your graph. Start with the slope equation and show all of your substitutions and calculations. Include units for all steps!

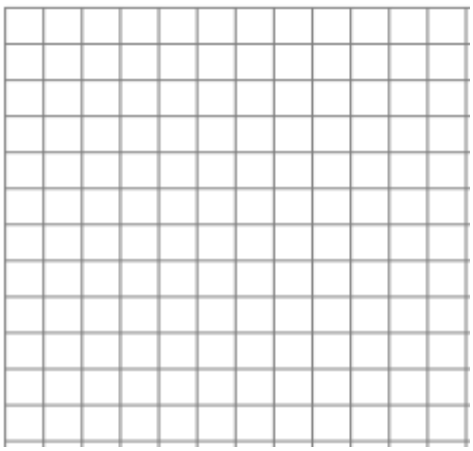
Car A	Car B
Slope =	Slope =

5. How does the slope of the position vs. time graph for car A compare with the slope for car B?

6. What does the slope tell you about the motion of cars A and B? Explain your answer.



Car C	
Time (s)	**Position (m)**



7. Complete the data table, plot the data, and create a best-fit line for car C.

8. Calculate the slope of the graph for car C.

9. Compare the graphs for car A and car C. Describe the differences and similarities you observe in the graphs.

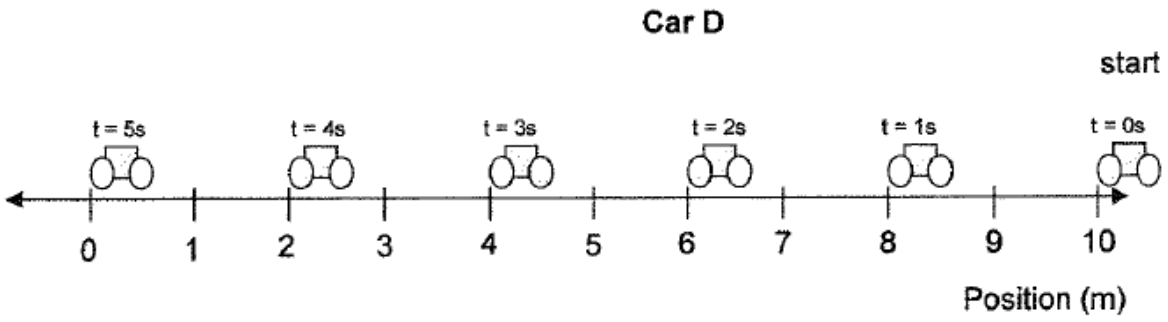
10. What do the similarities between the graphs tell you about the motion of car A compared to the motion of car C?

11. What do the differences between the graphs tell you about the motion of car A compared to the motion of car C?

12. Find the y-intercept for the position vs. time graph for car A, car B, and car C. Be sure to include units!

Car A	Car B	Car C
y-intercept =	y-intercept =	y-intercept =

13. What does the y-intercept tell you about the motion of car A, B, and C? Explain.



Car D	
Time (s)	**Position (m)**

14. Complete the data table, plot the data, and create a best-fit line for car D.

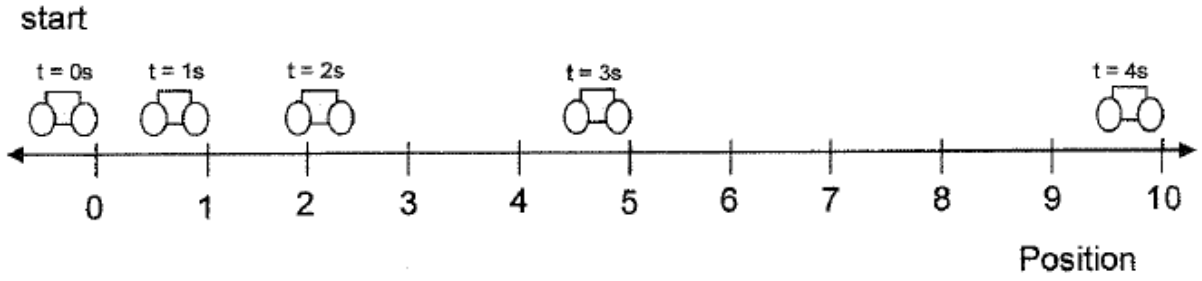
15. Find the slope and y-intercept of the best-fit line for car D. Be sure to include units.

16. Compare the slope of car D with the slope of car A. What is similar and different about the slopes?

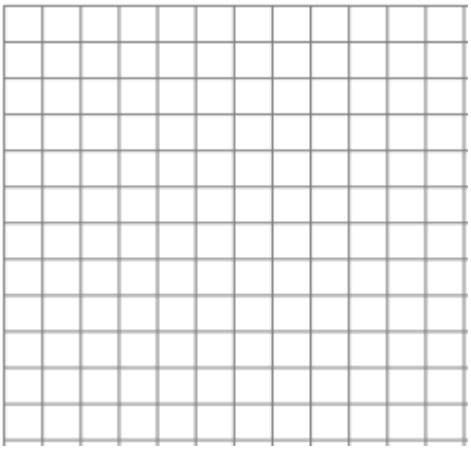
17. What does the similarity tell you about the motion of cars A and D? Explain.

18. What does the difference tell you about the motion of cars A and D? Explain.

Car E



Car E	
Time (s)	**Position (m)**



19. Would a straight line be a good choice for modeling the motion of this car Why or why not?

20. What does the shape of this graph tell you about the motion of this car?

Summary

Based on your work, summarize the meaning of the following:

Feature of position vs time graph	**What it tells us about the motion of the car**
The value of the slope of the best-fit line	
The y-intercept of the best-fit line	
A straight line position vs time graph	
A curved position vs time graph	