

Motion Diagrams with Acceleration

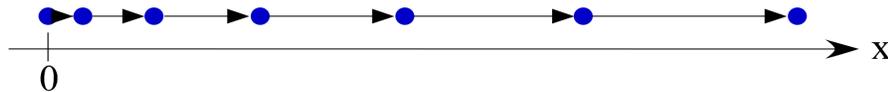
In the previous unit we have learned how to draw a motion diagram for an object moving with a constant velocity. To create these motion diagrams, we used dots for time and arrows to represent the direction and distance an object traveled. When an object moves with increasing or decreasing speed, the distance between successive dots increases or decreases, respectively.

Example:

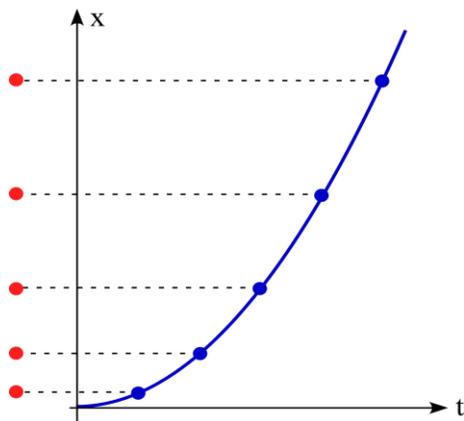
A car starts from rest and speeds up. Dots are drawn at regular time intervals, and get farther and farther apart. The distance between the dots increases and this indicates that the velocity of the car is increasing. The arrows show direction and distance between each time interval.

To determine if the car is moving in a positive or negative direction be sure to label the diagram with + on the right and - on the left.

Label each of the motion diagrams on this page with + or -.

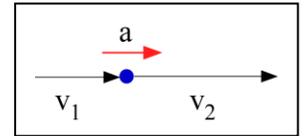


Here, we have placed the motion diagram vertically and lined it up next to the X/t graph. Clearly you can see the relationship between the positions on the motion diagram and the positions on the vertical axis of the X/t graph.

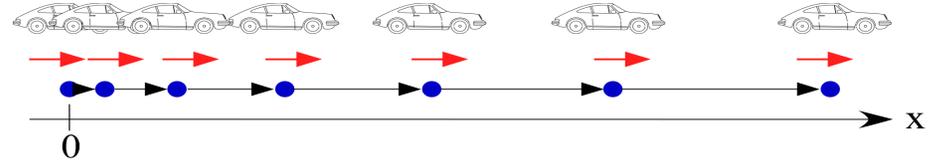


Name _____ Date _____ Period ____

In addition, we can also represent the acceleration of the car on the motion diagram. The acceleration is the change in velocity over a given time. Acceleration vectors are arrows drawn above dots at each time interval.

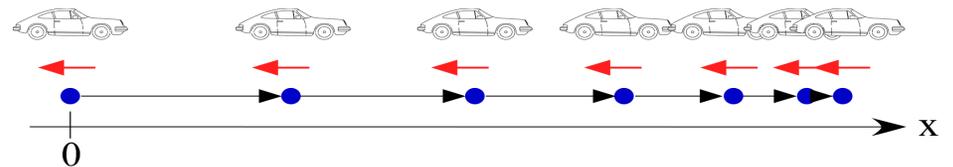


Since the acceleration involves two velocities (initial and final), we draw the acceleration vector above the dot where the two velocity vectors meet. Acceleration vectors do not change length.



The car in the example above is speeding up so the acceleration vectors are drawn above each dot and in the direction of the object's motion.

If the car is slowing down, the acceleration vectors are drawn above each dot, but are flipped and now face the direction that opposes the car's motion.



What does the direction for the Acceleration Vectors indicate?

Motion Diagrams with Acceleration Questions

Name _____ Date _____

1. What do the dots in a motion diagram indicate?

2. How can we tell if a motion diagram shows an object moving with a constant speed? _____

3. How can we tell if a motion diagram shows an object is accelerating? _____

4. How do we know if an object is moving in the positive or negative direction? _____

5. How can we tell if a motion diagram shows an object speeding up or slowing down? _____

6. What is the difference between a velocity vector and an acceleration Vector? Draw an example and explain.
