Position-Time Graphs

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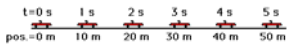
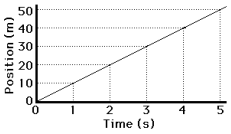
- The specific features of the motion of objects are demonstrated by the shape and the slope of the lines on a position vs. time graph.

To begin, consider a car moving with a constant, rightward (+) velocity of +10 m/s.



If the position-time data for such a car were graphed, then the resulting graph would look like the graph at the right. Note that a motion described as a constant, positive velocity results in a line of constant and positive slope when plotted as a position-time graph.



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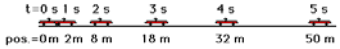
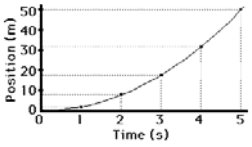
Now consider a car moving with a rightward (+), changing velocity that is, a car that is moving rightward but speeding up.



If the position-time data for such a car were graphed, then the resulting graph would look like the graph at the right. Note that a motion described as a changing, positive velocity results in a line of changing and positive slope when plotted as a position-time graph.



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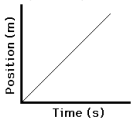
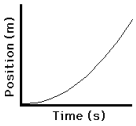
The position vs. time graphs for the two types of motion: constant velocity and changing velocity are depicted as follows.





- The shapes of the position versus time graphs for these two basic types of motion reveal an important principle.
- The principle is that the slope of the line on a position-time graph reveals useful information about the velocity of the object.
- Whatever characteristics the velocity has, the slope will exhibit the same (and vice versa).
  - If the velocity is constant, then the slope is constant (i.e., a straight line).
  - If the velocity is changing, then the slope is changing (i.e., a curved line).
  - If the velocity is positive, then the slope is positive .
- This very principle can be extended to any motion conceivable.