



Section 4.2 Learning Goals

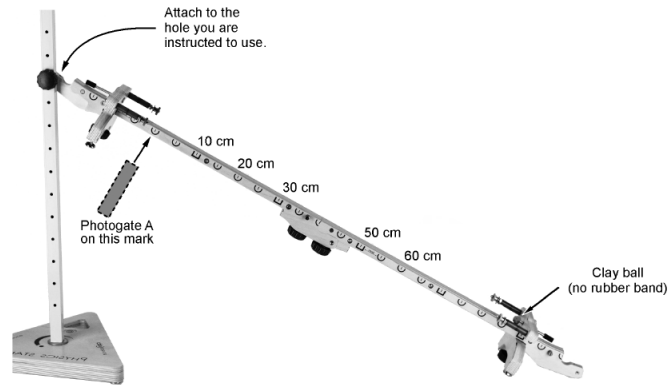
- **Construct and analyze graphs of position versus time, and speed versus time.**
- **Recognize and explain how the slope of a line describes the motion of an object.**
- **Explain the meaning of constant speed.**

Investigation 4A

Speed

■ Key Question:

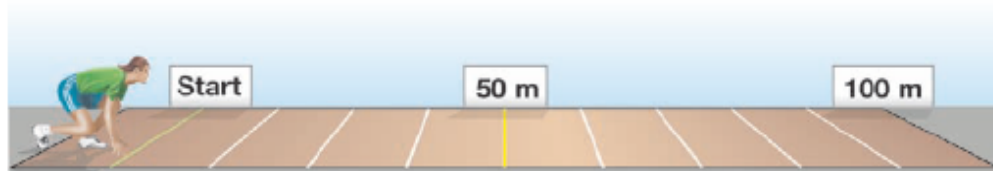
- Can you predict the speed of the car as it moves down the





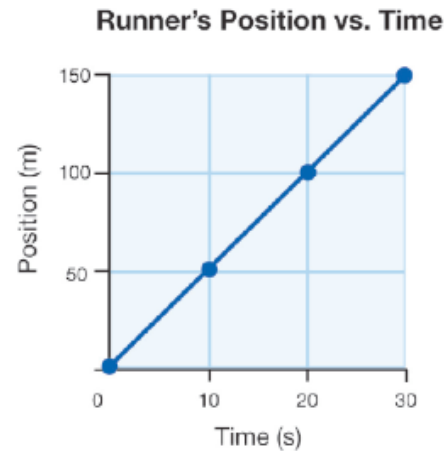
4.2 Graphs of Motion

- **Constant speed means the speed stays the same.**
- **An object moving at a constant speed always creates a position vs. time graph that is a straight line.**





4.2 Graphs of Motion

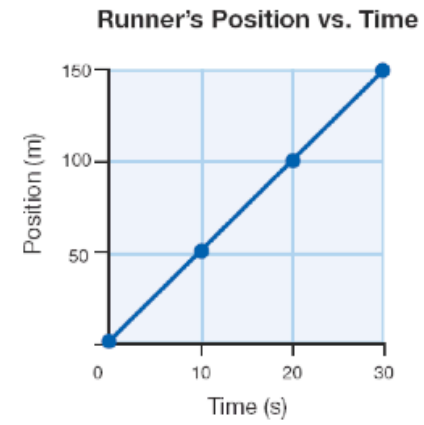


- The data shows the runner took 10 seconds to run each 50-meter segment.
- Because the time was the same for each segment, you know the speed was the same for each segment.



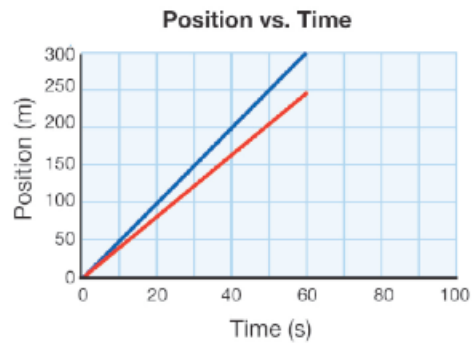
Position and Time Data for a Runner

Time (s)	Position (m)
0	0
10	50
20	100
30	150





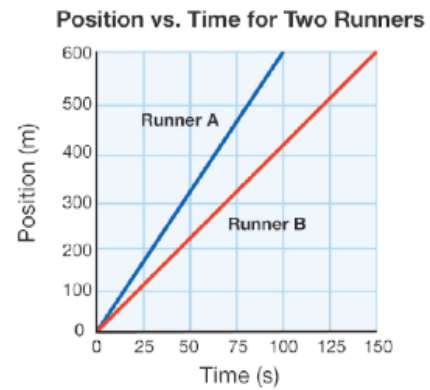
4.2 Graphs of Motion



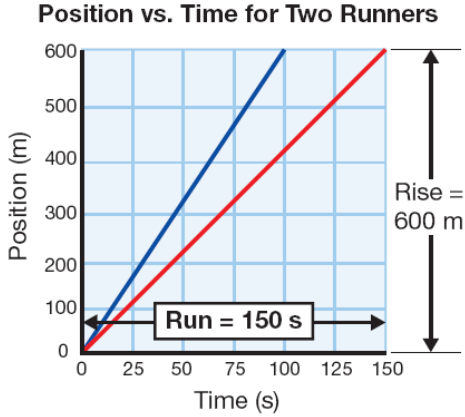
- You can use position vs. time graphs to compare the motion of different objects.
- The steeper line on a position vs. time graph means a faster speed.

4.2 Slope

- The steepness of a line is the ratio of the rise to the run, or the slope.



Slope Calculation



$$\text{Slope} = \frac{\text{Rise}}{\text{Run}}$$
$$= \frac{600 \text{ m}}{150 \text{ s}}$$
$$= 4 \text{ m/s}$$

Runner B's speed is 4 m/s

The speed is the slope of the position vs. time graph



4.2 Calculating distance

- Suppose we draw a rectangle on the speed vs. time graph between the x-axis and the line showing the speed. On the graph, the length is equal to the time and the height is equal to the speed.
- The area of the rectangle is equal to its length times its height.



Calculating Distance

