Problems

2.1 Relative Motion, Distance, and Displacement 16.

In a coordinate system in which the direction to the right is positive, what are the distance and displacement of a person who walks 35\,\text{meters} to the left, 18\,\text{meters} to the right, and then 26\,\text{meters} to the left?

a. Distance is 79\,\text{m} and displacement is {-43}\,\text{m}.
b. Distance is {-79}\,\text{m} and displacement is 43\,\text{m}.
c. Distance is 43\,\text{m} and displacement is {-79}\,\text{m}.
d. Distance is {-43}\,\text{m} and displacement is 79\,\text{m}.

17.

Billy drops a ball from a height of 1 m. The ball bounces back to a height of 0.8 m, then bounces again to a height of 0.5 m, and bounces once more to a height of 0.2 m. Up is the positive direction. What are the total displacement of the ball and the total distance traveled by the ball?

a. The displacement is equal to –4 m and the distance is equal to 4 m.
b. The displacement is equal to –1 m and the distance is equal to 1 m
c. The displacement is equal to 4 m and the distance is equal to 1 m.
d. The displacement is equal to –1 m and the distance is equal to 4 m.

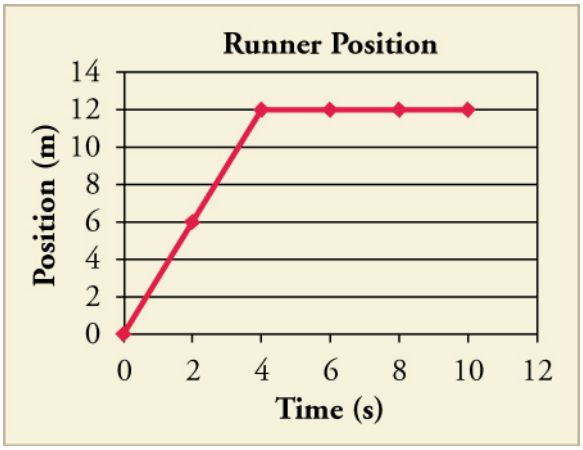
2.2 Speed and Velocity 18.

You sit in a car that is moving at an average speed of 86.4 km/h. During the 3.3 s that you glance out the window, how far has the car traveled?

a. 7.27 m
b. 79 m
c. 285 km
d. 1026 m

2.3 Position vs. Time Graphs 19.

Using the graph, what is the average velocity for the whole 10 seconds?



a. The total average velocity is 0 m/s.
b. The total average velocity is 1.2 m/s.
c. The total average velocity is 1.5 m/s.
d. The total average velocity is 3.0 m/s.

20.

A train starts from rest and speeds up for 15 minutes until it reaches a constant velocity of 100 miles/hour. It stays at this speed for half an hour. Then it slows down for another 15 minutes until it is still. Which of the following correctly describes the position vs time graph of the train's journey?

a. The first 15 minutes is a curve that is concave upward, the middle portion is a straight line with slope 100 miles/hour, and the last portion is a concave downward curve.
b. The first 15 minutes is a curve that is concave downward, the middle portion is a straight line with slope 100 miles/hour, and the last portion is a concave upward curve.
c. The first 15 minutes is a curve that is concave upward, the middle portion is a straight line with slope zero, and the last portion is a concave downward curve.
d. The first 15 minutes is a curve that is concave downward, the middle portion is a straight line with slope zero, and the last portion is a concave upward curve.

2.4 Velocity vs. Time Graphs 21.

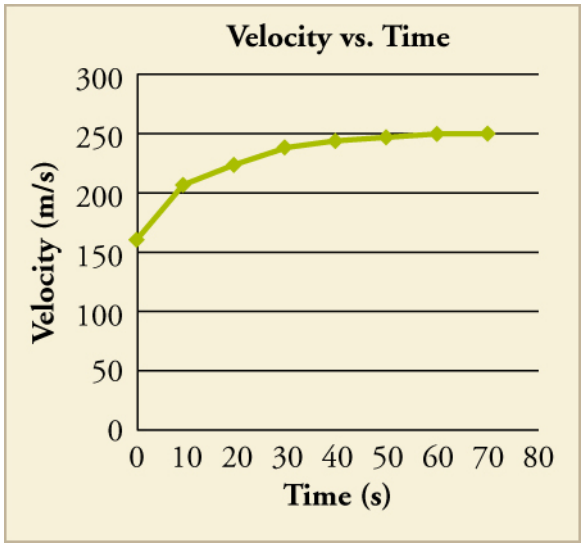
You are characterizing the motion of an object by measuring the location of the object at discrete moments in time. What is the minimum number of data points you would need to estimate the average acceleration of the object?

a. 1
b. 2

c. 3
d. 4

22.

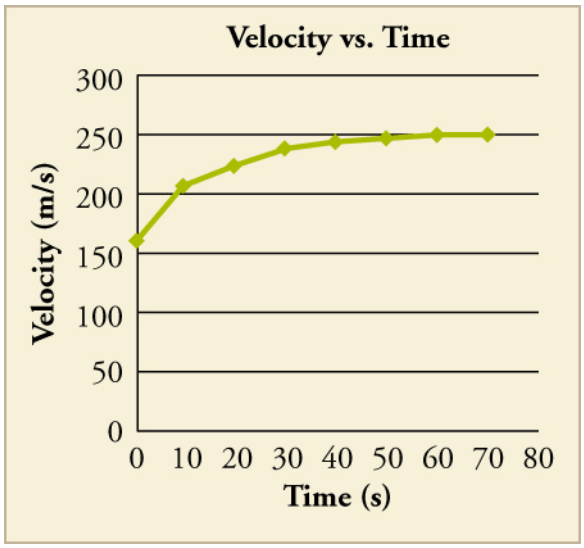
Which option best describes the average acceleration from 40 to 70 s?



a. It is negative and smaller in magnitude than the initial acceleration.
b. It is negative and larger in magnitude than the initial acceleration.
c. It is positive and smaller in magnitude than the initial acceleration.
d. It is positive and larger in magnitude than the initial acceleration.

23.

The graph shows velocity vs. time.



Calculate the net displacement using seven different divisions. Calculate it again using two divisions: $0 \rightarrow 40$ s and $40 \rightarrow 70$ s . Compare. Using both, calculate the average velocity.

a. Displacement and average velocity using seven divisions are 14,312.5 m and 204.5 m/s while with two divisions are 15,500 m and 221.4 m/s respectively.
b. Displacement and average velocity using seven divisions are 15,500 m and 221.4 m/s while with two divisions are 14,312.5 m and 204.5 m/s respectively.
c. Displacement and average velocity using seven divisions are 15,500 m and 204.5 m/s while with two divisions are 14,312.5 m and 221.4 m/s respectively.
d. Displacement and average velocity using seven divisions are 14,312.5 m and 221.4 m/s while with two divisions are 15,500 m and 204.5 m/s respectively.