

Use with textbook pages 362–366.

### Calculating average velocity

- What is the formula for each of the following quantities?  
 a) average velocity \_\_\_\_\_ b) displacement \_\_\_\_\_ c) time \_\_\_\_\_
- Complete the following table. Use the motion formula to calculate the missing quantities. Show all your work and use the correct units.

Displacement	Time	Average Velocity	Formula Used and Calculation Shown
15.6 m	3 s	5.2 m/s	$\bar{v}_w = \frac{\Delta d}{\Delta t} = \frac{15.6}{3} = 5.2 \text{ m/s}$
357.5 km	6.5 h		
22.6 m		5.65 m/s	
12.6 m	3.25 h	75 km/h	
24 km	3.15 s	32 km/h	
	8 s	60 m/s	

- Complete the following table. Show all your work and use the correct units.

Question	Formula Used and Calculation Shown	Answer
a) A woman wants to paddle 420 m across a lake in her kayak. If she paddles across the lake at an average velocity of 2.8 m/s, how long does it take her to cross?		
b) If a cyclist rides west at 14 m/s, how long would it take her to travel 980 m?		
c) A cheetah runs at a velocity of 30 m/s [E]. If it runs for 8.5 s, what is its displacement?		
d) The Australian dragonfly can fly at 16 m/s. How long does it take to fly 224 m?		
e) The Skyride gondola at Grouse Mountain in North Vancouver takes 8 min to go up the 3 km mountain. What is the average velocity of the gondola?		
f) Due to plate tectonics, the North American and European continents are drifting apart at an average speed of about 3 cm per year. At this speed, how long (in years) will it take for them to drift apart by another 2400 m?		
g) A dragster heading north, reaches a velocity of 628 km/h from rest in 3.72 s. How far did it travel in that time?		

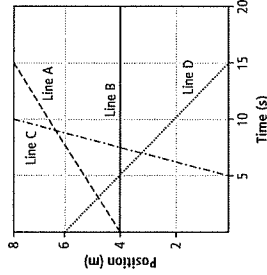
Use with textbook pages 364–367.

### Slopes of position-time graphs

- What does the slope of a line on a position-time graph represent?  
\_\_\_\_\_
- What does a straight line on a position-time graph represent?  
\_\_\_\_\_
- Define slope.  
\_\_\_\_\_

- What is the formula used to calculate the slope of a straight line?  
\_\_\_\_\_

- Using the position-time graph, determine the slope of each line segment by completing the following table.



Line	Rise	Run	Slope Calculation	Slope
A				
B				
C				
D				

Name \_\_\_\_\_

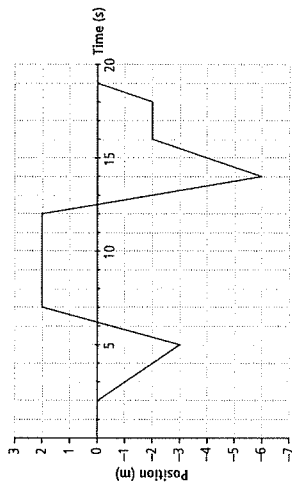
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Analyzing Information  
Section 8.2

Use with textbook pages 364–367.

### Analyzing position-time graphs

1. Use the following position versus time graph showing a girl's movement up and down the aisle of a store to answer the questions below. The origin is at one end of the aisle.



- a) Complete the following table. Determine how far the girl travelled during each time interval and calculate the average velocity for each section of the graph.

Time Interval	Displacement	Average Velocity
0 s–2 s		
2 s–5 s		
5 s–7 s		
7 s–12 s		
12 s–14 s		
14 s–16 s		
16 s–18 s		
18 s–19 s		
19 s–20 s		

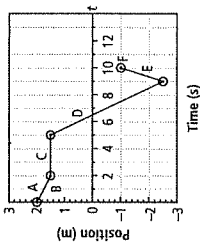
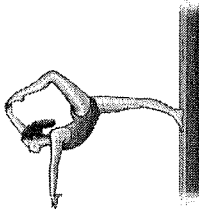
- b) When does the girl have a position of  $-6$  m? \_\_\_\_\_  
 c) What is the girl's total displacement after 20 seconds? \_\_\_\_\_

Name \_\_\_\_\_

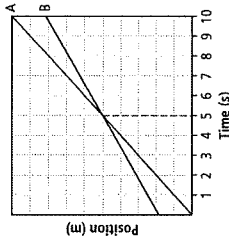
Date \_\_\_\_\_

Analyzing Information  
Section 8.2

2. Use the following position-time graph, showing the motion of a gymnast on a balance beam, to Match each Descriptor below with the corresponding part of the Graph shown above. Each part of the Graph may be used as often as necessary. Assume the centre of the balance beam is the reference point (origin).



- \_\_\_\_\_ a) She stands still for 3 s.  
 \_\_\_\_\_ b) She moves even faster to the right for 1 s.  
 \_\_\_\_\_ c) She moves very slowly to the left for 2 s.  
 \_\_\_\_\_ d) She moves more quickly to the left for 4 s.  
 \_\_\_\_\_ e) She ends up 1 m left of the centre of the balance beam.  
 \_\_\_\_\_ f) She starts 2 m to the right of the centre of the balance beam.
3. Use the following position-time graph, showing the motion of two runners, to answer the questions below.



- a) What does the  $y$ -intercept represent? \_\_\_\_\_  
 b) Do the runners start at the same place? \_\_\_\_\_  
 c) At about 2 s, which runner is running faster? How can you tell? \_\_\_\_\_  
 d) What occurs at 5 s? \_\_\_\_\_  
 e) At 10 s, which runner is ahead? \_\_\_\_\_

Name \_\_\_\_\_

Date \_\_\_\_\_

**Extension Activity**  
**Section 8.2**

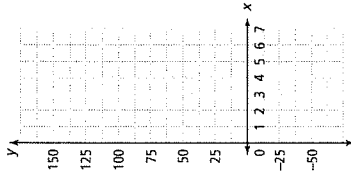
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### Constructing and interpreting position-time graphs

1. Use the following data table, showing a car's recorded positions over 7 seconds, to answer the questions below. Assume 0 m is the reference point.

Time (s)	Position (m)
0	125
1	100
2	75
3	50
4	25
5	0
6	-25
7	-50

a) Label the *x*-axis with Time (s) and the *y*-axis with Position (m). Use the grid to plot the data points from the data table. Draw a best-fit line through the points.



- b) When was the car 50 m [E] of the reference point? \_\_\_\_\_
- c) What was the car's position at 1 s? \_\_\_\_\_
- d) Where was the car at 5.5 s? \_\_\_\_\_
- e) What was the car's average velocity between 0 s and 7 s? \_\_\_\_\_
- f) Describe the motion of the car during the time interval 2 s – 4 s. \_\_\_\_\_

Name \_\_\_\_\_

Date \_\_\_\_\_

**Extension Activity**  
**Section 8.2**

2. Sketch a position-time graph for each of the following scenarios. If specific time, positions, and velocities are given, label them on the graph. Assume all motion is uniform and in a straight line.

- a) A car is travelling north at a velocity of 50 km/h. It slows down to 30 km/h when it enters a school zone.
- b) A boy walks away from the kitchen table, 4 m to the right with a velocity of 2 m/s. He spends 6 s getting a bowl of fruit salad out of the refrigerator, and then walks back to the table at a velocity of 1 m/s.
- c) At soccer practice, the coach makes the players run back and forth between two lines four times.

