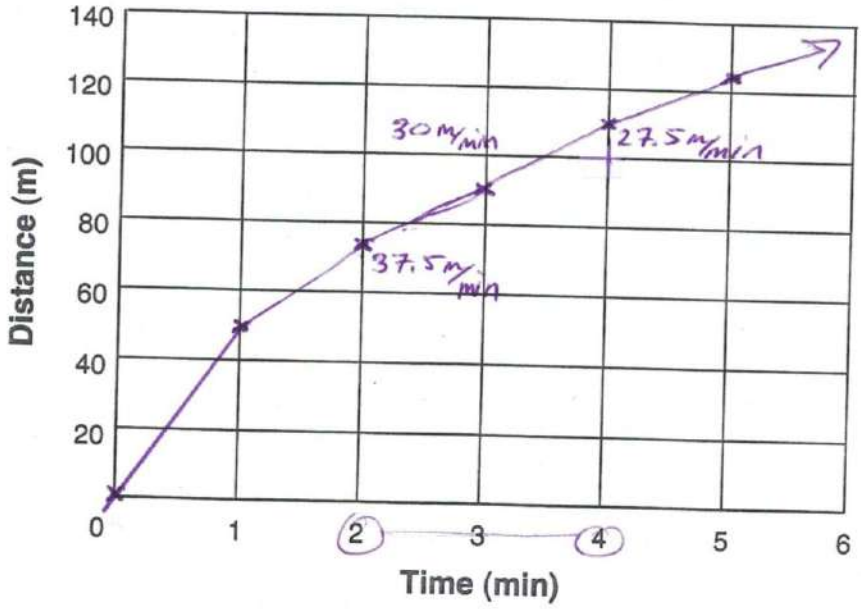
Calculating Average Speed

Graph the following data on the grid below and answer the questions at the bottom of the page.

Time (min)	Distance (m)
0	0
1	50
2	75
3	90
4	110
5	125



#1 $s = d/t$

$s = 75m/120s$

$s = 0.625 m/s$

or

$s = 37.5 m/min$

#4 $d = 110 - 75$

$d = 35m$

$t = 2 min$

$s = d/t$

$s = 35m/2min$

$s = 17.5 m/min$

#5 $d = 110 - 125$

$d = 15m$

$s = d/t$ $t = 1 min$

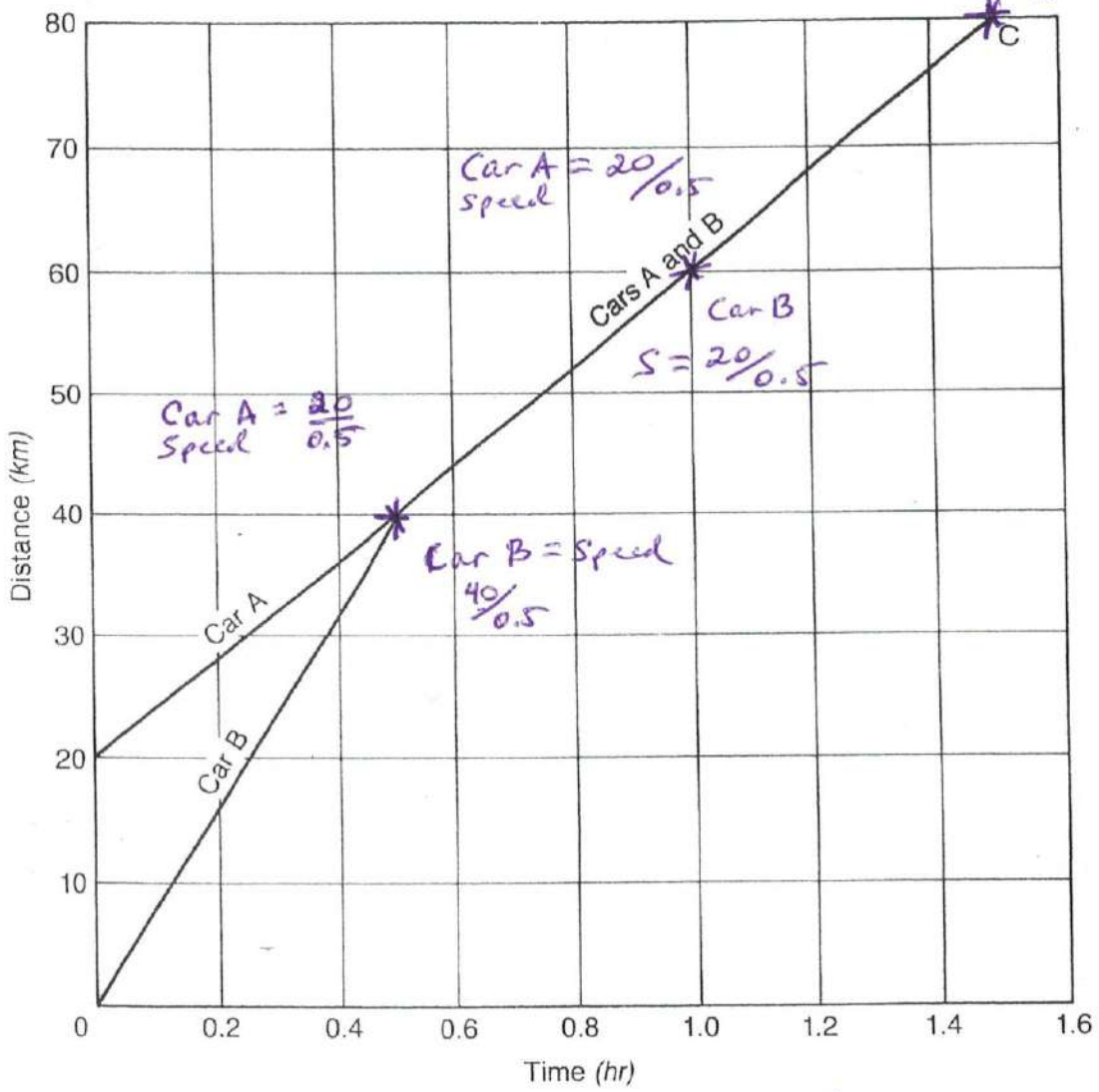
$s = 15 m/min$

$$\text{Average Speed} = \frac{\text{Total Distance}}{\text{Total Time}}$$

1. What is the average speed after two minutes? 37.5 m/min
2. After three minutes? 30 m/min
3. After five minutes? 25 m/min
4. What is the average speed between two and four minutes? 17.5 m/min
5. What is the average speed between four and five minutes? 15 m/min

A Speedy Journey

Use the graph below to answer the questions about the journeys of two cars. A & B Speed S = 20/0.5 km/hr



1. How far did car A travel before it met car B? Car 20 km / Car B 40 km
2. How long had the two cars been traveling before they met? 1/2 hour
3. How far did both cars travel at the same speed? 1.5 hr − 0.5 hr = 1 hr
4. How long did it take both cars to get to point C? Car B definitely 1.5 hr
5. Which car had constant speed? Car A What was its speed? 40 km/hr
6. What were the speeds of the other car? 80 km/hr 40 km/hr

NAME DATE CLASS

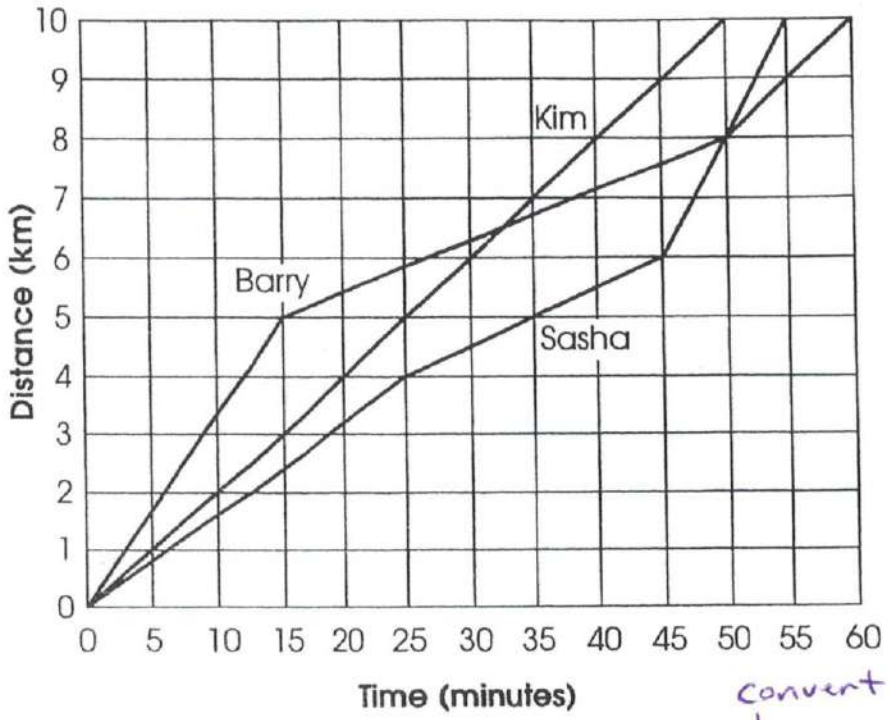
Chapter 3

REINFORCEMENT

Use with Text Pages 64–71

• Motion and Speed

Sasha, Kim, and Barry decided to have a 10-km bicycle race after school. They asked the coach to show them how far 10 km was on the school track. They then had their race on the track. Their race results are shown on the time-distance graph below. Use this graph to fill in the table of race results, calculate average speeds, and answer the questions.



convert to hours ÷ 60

Race Results			
Cyclist	Total distance	Total time	Average speed
Kim	10 km	50 min → 0.83	12 km/hr
Sasha	10 km	55 min → 0.916	10.9 km/hr
Barry	10 km	60 min → 1 hr	10 km/hr

1. Which cyclist kept a constant speed during the entire race? What was this speed? Kim

2. Which cyclist won the race? What was the winning time? Kim ; 50 min

3. Which cyclist placed second in the race? What was second place time? Sasha 55 min

4. Which cyclist placed last? What was last place time? Barry 60 min

5. Which cyclist started off fastest? Barry - 20 km/hr 1st 15 min.

REINFORCEMENT

• Velocity and Acceleration

The Car Race

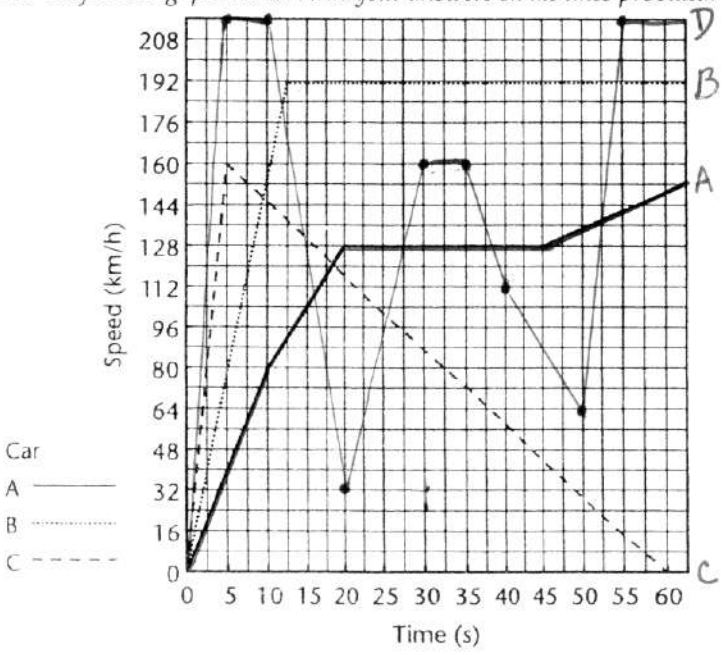
Read! Read! Read!

The graph below represents three cars during the first minute of a race. Using the following information, draw another curve on the grid representing the motion of Car D.

Car D accelerates from a rest position at 0 seconds to a speed of 208 km/h at 5 seconds and maintains this speed for 5 seconds. The car decelerates to 32 km/h at 20 seconds. It then accelerates to a speed of 160 km/h at 30 seconds and maintains this speed for 5 seconds. Car D then decelerates to 112 km/h at 40 seconds, decelerates to 64 km/h at 50 seconds, and accelerates to 208 km/h at 55 seconds.

rework
rebuild
bigger graph

Use your graph to answer the following questions. Write your answers on the lines provided.



Acceleration ↗ +

Acceleration ↘ −

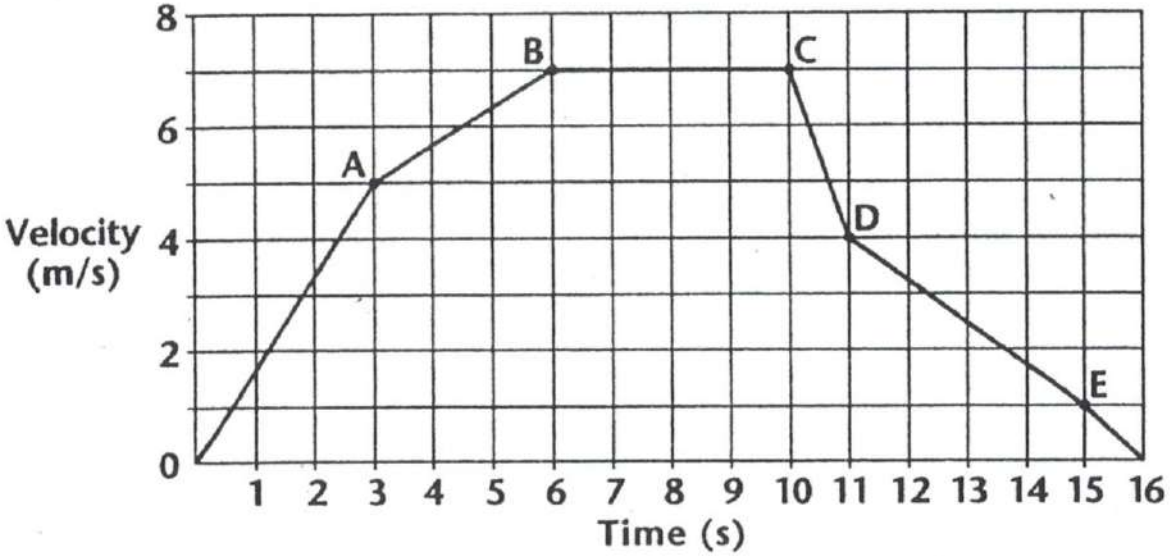
Acceleration = ∅ → horizon.
(speed constant)

1. Over which time period is Car B's acceleration the greatest? 0–12.5 min
2. What is Car B's speed at 10 seconds? 160 Km/hr
3. When is Car B's acceleration equal to zero? 12.5s – 62.5s (constant speed)
4. When is Car C's acceleration equal to zero? @ 60sec. (stopped)
5. Which car(s) have a negative acceleration during the race? car c
6. Which car has traveled the farthest at the end of one minute? car b
7. Which car may have had a reckless driver? Explain. car d
8. Which car appears to have stalled? Explain. Car C, it accelerates but then abruptly decelerates all the way to the finish.

ENRICHMENT • Velocity and Acceleration

Interpreting Velocity and Acceleration Graphs

A car traveled through city traffic during rush hour. There was a lot of starting and stopping. The graph below shows its motion for a 16-second interval.



1. Calculate the acceleration between each lettered interval. Remember the measurement of acceleration can be negative.

AB - Accel = $\frac{V_F - V_I}{T}$ $\frac{7\,m/s - 5\,m/s}{3s} = 2/3\ m/s^2$

BC - $\frac{7\,m/s - 7\,m/s}{4s} = \frac{0}{4} = 0$ accel = constant speed 7 m/s

CD - $\frac{4\,m/s - 7\,m/s}{1s} = -3\ m/s^2$ deceleration

DE $(1\,m/s - 4\,m/s) / 4s = -0.75\ m/s^2$

2. Describe with words what happened to the car during each lettered interval.

AB The car is speeding up - accelerating.

BC The car is moving along at a constant speed of 7 m/s.

CD The car decelerates rapidly "braking"

DE The car is decelerating "coasting to a stop"