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Applying Knowledge Section 9.2

Use with textbook pages 396–400.

Calculating acceleration

1. What is the formula for each of the following quantities?

(a) acceleration _____

(b) change in velocity _____

(c) time interval _____

2. Complete the following table. Use the motion formula to calculate the missing quantities. Show all your work and use the correct units.

Change in Velocity	Time	Acceleration	Formula Used and Calculation Shown
140 m/s	8 s	17.5 m/s ²	$\hat{a} = \frac{\Delta v}{\Delta t} = \frac{140}{8} = 17.5 \text{ m/s}^2$
-60 km/h	4 h		
120 km/h	15 s	48 km/h ²	
12 m/s	2.5 s	-3.5 m/s ²	
-25 m/s		-12.5 m/s ²	
	9.6 h	5 km/h ²	

3. Solve each problem using the appropriate motion formula. Show all your work and use the correct units.

a) A car moving north goes from 5.56 m/s to 63.9 m/s in 7.5 s. What is the acceleration?

b) If a sprinter starts a race and has an acceleration of 2.4 m/s² in 2.5 s, what is his final velocity, assuming the initial velocity is 0 m/s²?

c) A rock accelerates at -9.8 m/s² when falling. How long does it take to change its velocity from -4.5 m/s to -19.4 m/s?

d) A satellite released from a stationary space shuttle accelerates to +68 m/s² in 25 s. What is its change in velocity?

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Analyzing Information Section 9.2

Use with textbook pages 394–396.

Analyzing velocity-time graphs

1. What is the meaning of each of the following features of a velocity-time graph?

(a) the slope of the line _____

(b) a line above the x-axis _____

(c) a line below the x-axis _____

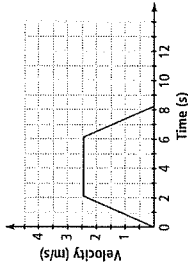
(d) a line with a positive slope _____

(e) a line with a negative slope _____

(f) a horizontal section of the graph _____

(g) a point where the line crosses the x-axis _____

Use the following velocity-time graph representing the motion of a ball moving to the right on a table to answer questions 2 and 3.



2. Complete the following table. Describe the slope, acceleration, and velocity of the ball (e.g. positive, negative, or zero).

MOTION OF A BALL			
Time Interval	Slope	Acceleration	Velocity
0 s – 2 s			
2 s – 6 s			
6 s – 8 s			
8 s – 12 s			

3. Describe the motion of the ball at each time interval.

(a) 0 s – 2 s _____

(b) 2 s – 6 s _____

(c) 6 s – 8 s _____

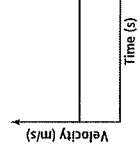
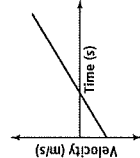
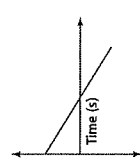
(d) 8 s – 12 s _____

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Use with textbook pages 395-396.

Sketching and interpreting velocity-time graphs

1. Complete the following table. What is the slope (e.g. positive, negative, or zero) of each velocity-time graph? State whether the graph shows positive acceleration, negative acceleration, or zero acceleration.

	Graph A	Graph B	Graph C
Slope			
Acceleration			

2. Sketch a velocity-time graph for each scenario given below.

	Positive Acceleration	Negative Acceleration
Positive Velocity		
Negative Velocity		

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3. (a) Sketch a velocity-time graph of a field trip to the science museum, showing all the stages (i to v) listed below.

- i. the bus is stationary (has an initial velocity of zero) as the students board the bus at school
- ii. the bus has constant acceleration as it leaves the school
- iii. the bus is travelling at the speed limit with uniform motion on the highway
- iv. the bus slows down as it approaches some traffic
- v. the bus comes to a complete stop at the science museum

(b) Identify the sections of the velocity-time graph with positive, negative, and zero slope.

- i: _____
- ii: _____
- iii: _____
- iv: _____
- v: _____

(c) Identify the stages of the field trip with positive, negative, and zero acceleration.

- i: _____
- ii: _____
- iii: _____
- iv: _____
- v: _____