Chapter 2 Study Guide

Representing Motion

Vocabulary Review

1. instantaneous velocity
2. magnitude
3. position
4. time interval
5. vector
6. average velocity
7. coordinate system
8. origin
9. position time graph
10. motion diagram
11. resultant
12. particle model
13. distance
14. scalar
15. instantaneous position
16. displacement
17. average speed

Section 2.1 Picturing Motion

1. B
2. B
3. D
4. C
5. A

Section 2.2 Where and When?

1. 4 m, −4 m, 5 m, 3 m, and 0 m
2. 1 m/s
3. −1 m/s
4. A, C, D
5. B

Section 2.3 Position-Time Graphs

1. time
2. position
3. 9.0 m
4. 4.0 s
5. 1.5 m/s
6. $\bar{v} = \frac{\Delta d}{\Delta t}$

   $\Delta t = \frac{\Delta d}{\bar{v}}$

   $= \frac{18.0\text{ m}}{1.5\text{ m/s}}$

   $= 12\text{ s}$
7. $\bar{v} = \frac{\Delta d}{\Delta t}$

   $\Delta d = \bar{v}\Delta t$

   $= (1.5\text{ m/s})(300\text{ s})$

   $= 400\text{ m}$

Section 2.4 How Fast?

1. $\Delta t = t_f - t_i$
2. at $d = 15.0$ m, $t_f = 6.0$ s

   at $d = 5.0$ m, $t_i = 2.0$ s

   $\Delta t = t_f - t_i$

   $= 6.0\text{ s} - 2.0\text{ s}$

   $= 4.0\text{ s}$
3. $\Delta d = d_f - d_i$
4. at $t = 8$ s, $d_f = 20.0$ m

   at $t = 2$ s, $d_i = 5.0$ m

   $\Delta d = d_f - d_i$

   $= 20.0\text{ m} - 5.0\text{ m}$

   $= 15.0\text{ m}$
5. $v = \frac{d_f - d_i}{t_f - t_i}$
6. $v = \frac{d_f - d_i}{t_f - t_i}$

   $= \frac{(20.0\text{ m} - 0.0\text{ m})}{(8.0\text{ s} - 0.0\text{ s})}$

   $= 2.5\text{ m/s}$
7. average speed
8. +2.5 m/s
9. $\bar{v} = \frac{\Delta d}{\Delta t}$

   $\Delta t = \frac{\Delta d}{\bar{v}}$

   $= \frac{150\text{ m}}{2.5\text{ m/s}}$

   $= 6.0 \times 10^1\text{ s}$
10. $\bar{v} = \frac{\Delta d}{\Delta t}$

    $\Delta d = \bar{v}\Delta t$

    $= (2.5\text{ m/s})(200\text{ s})$

    $= 500\text{ m}$
11. $d = vt + d_i$
12. $d = vt + d_i$

    $= (2.5\text{ m/s})(48\text{ s}) + 220\text{ m}$

    $= 340\text{ m}$

Chapter 3 Study Guide

Vocabulary Review

1. velocity-time graph
2. instantaneous acceleration
3. acceleration
4. free fall
5. average acceleration
6. acceleration due to gravity

Section 3.1
Acceleration

1.

Segment	v	Δt	Δd
A	0.25 km/min	10.0 min	2.5 km
B	0.0 km/min	7.0 min	0.0 km
C	0.40 km/min	13.0 min	5.2 km

Δt	Distance Run	Displacement	Average Velocity
30.0 min	7.7 km	7.7 km	0.26 km/min

2. c
3. b.
4. d
5. c
6. a
7. Object B; the graph for Object B has a larger slope than that of Object A.
8. Object C has a negative slope and is, therefore, decelerating.
9. Object B started from rest with a velocity of zero. Object C slows to a stop ($v = 0$ m/s) and remains stopped.
10. Object D begins with negative velocity, crosses the axis and continues with positive velocity. This behavior indicates that it slows to a complete stop and then starts moving again.
11. Object A is moving forward (positive velocity) and Object E is moving backwards (negative velocity).

Section 3.2
Motion with Constant Acceleration

1.

Initial Conditions			Variables			Equation
Δt	d_f	v_f	$\bar{a}$	d_i	v_i	$v_f - v_i = at_i$
3.0 s	X	?	0.20 m/s^2	X	0.40 m/s	

$$v_f - v_i = \bar{a}t_i$$
$$v_f = v_i + \bar{a}t_i$$
$$= 0.40 \text{ m/s} + (0.20 \text{ m/s}^2)(3.0 \text{ s})$$
$$= 1.0 \text{ m/s}$$

2.

Initial Conditions			Variables			Equation
t_f	d_f	v_i	$\bar{a}$	d_i	v_i	$d_f = d_i + v_i t_f + \frac{1}{2} a t_f^2$
?	45 m	X	4.5 m/s2	0.0 m	15 m/s	

$$d_f = d_i + v_i t_f + \frac{1}{2}\bar{a}t_f^2$$

$$45 \text{ m} = 0.0 \text{ m} + (15 \text{ m/s})\, t_f + \frac{1}{2}\,(4.5 \text{ m/s}^2)t_f^2$$

$$(2.25 \text{ m/s}^2)t_f^2 + (15 \text{ m/s})\, t_f - 45 \text{ m} = 0.0 \text{ m}$$

Using the quadratic equation,

$$t_f = \frac{-15 \text{ m/s} \pm \sqrt{(15 \text{ m/s})^2 - 4(225 \text{ m/s}^2)(-45 \text{ m})}}{2(225 \text{ m/s}^2)}$$

$$= 2.2 \text{ s}$$

3.

Initial Conditions			Variables			Equation
t_f	d_f	v_i	$\bar{a}$	d_i	v_i	$d_f = d_i + v_i t_f + \frac{1}{2} a t_f^2$
3.0 s	?	15.0 m/s	X	0.0 m	10.0 m/s	

$$d_f = d_i + v_i t_f + \frac{1}{2}\bar{a}t_f^2$$
$$= 0.0 \text{ m} + (10 \text{ m/s})(3.0 \text{ s}) +$$
$$\frac{1}{2}\left(\frac{15.0 \text{ m/s} - 10.0 \text{ m/s}}{3.0 \text{ s} - 0.0 \text{ s}}\right)(3.0 \text{ s})^2$$
$$= 37 \text{ m}$$

4.

Initial Conditions			Variables			Equation
Δt	d_f	v_f	$\bar{a}$	d_i	v_i	$v_f^2 = v_i^2 + 2\bar{a}(d_f - d_i)$
X	35.0 m	?	4.5 m/s^2	0.0 m	0.0 m/s	

$$v_f^2 = v_i^2 + 2\bar{a}(d_f - d_i)$$

$$v_f = \sqrt{(0.0\text{ m/s})^2 + 2(4.5\text{ m/s}^2)(35.0\text{ m} - 0.0\text{ m})}$$

$$= 18\text{ m/s}$$

Section 3.3
Free Fall

1. air resistance
2. true
3. the same
4. true
5. true
6. 29.4 m/s
7. true
8. true
9. 9.80 m/s^2
10. true
11.

YOU DON'T HAVE TO DO THIS LAST SECTION. THE QUESTIONS ASKED AND THE DIAGRAM GIVEN ARE INCORRECT. HERE ARE THE ANSWERS AS PROVIDED BY THE TEXT.

11.

	Time				
Variable	t_1	t_2	t_3	t_4	t_5
v	−	−	0	+	+
a	+	+	+	+	+

12. v_1, v_5, v_2, v_4, v_3

13.

	Time				
Variable	t_1	t_2	t_3	t_4	t_5
v	+	+	0	−	−
a	−	−	−	−	−

14. v_1, v_5, v_2, v_4, v_3