

Other Assessment Opportunities

- BLM 3-24, Chapter 9 Quiz
- BLM 3-25, Unit 3 Test
- Assessment Checklist 1, Making Observations and Inferences
- Assessment Checklist 3, Designing an Experiment
- Assessment Checklist 4, Laboratory Report
- Assessment Checklist 17, Science Math Connect
- Assessment Checklist 18, Data Table
- Assessment Checklist 19, Graph from Data
- Process Skills Rubric 3, Controlling Variables
- Process Skills Rubric 4, Problem Solving
- Process Skills Rubric 5, Fair Testing
- Process Skills Rubric 6, Designing Experiments
- Process Skills Rubric 8, Interpreting Data
- Process Skills Rubric 10, Measuring and Reporting
- Assessment Rubric 5, Conduct an Investigation Rubric
- Assessment Rubric 6, Design Your Own Investigation Rubric
- Assessment Rubric 12, Using Tools, Equipment, and Materials Rubric

CHAPTER 9 ASSESSMENT, p. 406-407**■ PREPARE YOUR OWN SUMMARY**

Student summaries should incorporate the following main ideas:

1. Describing Acceleration
 - Acceleration is the rate of change in velocity.
 - The direction of the acceleration is the same as the direction of the change in velocity.
 - If an object's acceleration is in the same direction as its velocity, the object's speed will increase.
 - If an object's acceleration is in the opposite direction as its velocity, the object's speed will decrease. This acceleration is sometimes called deceleration.
 - Zero acceleration means the object's velocity is constant.
2. Calculating Acceleration
 - A change in velocity is calculated by subtracting the initial velocity from the final velocity.
 - The SI unit for acceleration is m/s^2 .
 - The relationship of acceleration, change in velocity, and time interval is given by $\vec{a} = \frac{\Delta \vec{v}}{\Delta t}$.
 - Both change in velocity and time interval can be calculated by rearranging the acceleration equation such that: $\Delta \vec{v} = (\vec{a})(\Delta t)$ and $\Delta t = \frac{\Delta \vec{v}}{\vec{a}}$.

3. Velocity-Time Graph

- The slope of a velocity-time graph is average acceleration.
- Constant acceleration is represented by a straight line on a velocity-time graph.
- A positive slope represents the object increasing its velocity in the direction indicated by the positive y-axis.
- A negative slope represents an acceleration opposite the direction indicated by the positive y-axis. This could represent the object slowing down if its initial velocity is in the positive direction or speeding up if its initial velocity is in the negative direction.
- A zero slope on a velocity-time graph means the object is moving with a constant velocity.

4. Acceleration Due to Gravity

- Air resistance acts against the direction of motion of an object.
- In the absence of air resistance, all objects accelerate at the same rate due to gravity.
- Absent air resistance, the acceleration due to gravity near the surface of Earth is 9.8 m/s^2 downward.

■ CHAPTER REVIEW ANSWERS**Checking Concepts**

1. Change in velocity is the final velocity minus the initial velocity.
2. (a) Acceleration is the rate of change in velocity.
(b) The SI unit for acceleration is m/s^2 .
3. The direction of the change in velocity is the same as the direction of the acceleration.
4. (a) If the acceleration is in the same direction as the object's velocity, the object will speed up in the direction of motion.
(b) If the acceleration is opposite the direction of the object's velocity, the object will slow down in the direction of motion.
5. Acceleration opposite the direction of motion is also called deceleration.
- 6.

	Initial Velocity	Acceleration	Speeding Up or Slowing Down
(a)	Positive (+)	Positive (+)	Speeding up
(b)	Positive (+)	Negative (-)	Slowing down
(c)	Negative (-)	Positive (+)	Slowing down
(d)	Negative (-)	Negative (-)	Speeding up

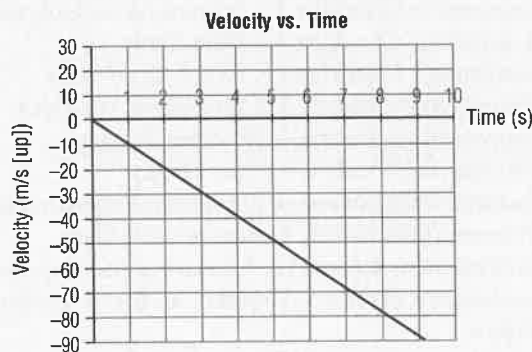
7. The slope of a velocity-time graph represents the average acceleration.
8. If the best-fit line passes through all the data points on a velocity-time graph, this indicates that the acceleration of the object is constant.
9. The upward velocity of the ball is decreasing. This means that the acceleration of the ball must be downward.
10. The relationship of acceleration, change in velocity, and time interval is given as $\vec{a} = \frac{\Delta \vec{v}}{\Delta t}$.
11. In the absence of air resistance, the brick and the \$5 bill will fall at the same rate and hit the ground at the same time with the same velocity.
12. Near the surface of Earth, the acceleration due to gravity is 9.8 m/s^2 downward.

Understanding Key Ideas

13. The girl's change in velocity is 4 m/s [S] .
14. (a) The ball's change in velocity is 8.0 m/s [east] .
(b) The ball's acceleration is east.
15. (a) The direction of the acceleration for the falling ball is downward.
(b) The direction of the acceleration of the football is forward or in the direction of the motion of the foot.
(c) The direction of the acceleration of the jet is in the direction it is heading if it is taking off, and opposite the jet's heading if it is landing.
16. (a) The jogger's acceleration was positive (+) during the time interval $5 \text{ s} - 10 \text{ s}$.
(b) The jogger's acceleration was negative (-) during the time interval $0 \text{ s} - 5.0 \text{ s}$.
(a) The jogger's acceleration was zero during the time interval $10 \text{ s} - 15 \text{ s}$.
17. An acceleration of 0 m/s^2 does not necessarily mean that the object is stationary. An object travelling at a constant velocity also has zero acceleration since its change in velocity would be zero.
18. (a) Line 3
(b) Line 1
(c) Line 4
(d) Line 2
19. The skateboarder accelerates at 2.0 m/s^2 [backward].
20. It takes 8.0 s to change the velocity.
21. (a) $6 \text{ m/s}^2 \text{ [N]}$
(b) 0 m/s^2
(c) $2 \text{ m/s}^2 \text{ [S]}$
(d) $1 \text{ m/s}^2 \text{ [N]}$

Apply Your Understanding

22. (a) The falcon's final velocity was 89 m/s .
(b) It takes the falcon 9.1 s to reach this top speed.
(c) Students' answers may vary, but the graph could look like the following:



Pause and Reflect Answer

Students' answers may vary but could include situations like amusement park rides, snowboarding, collisions in sports, and falling from a height and landing on a firm surface. Students may describe the physical and other effects of the experiences.

UNIT 3 ASSESSMENT

PROJECT

Walk That Graph, p. 410

Purpose

- Students use words and physical movement to interpret the motion represented by both position-time and velocity-time graphs.

Advance Preparation

WHEN TO BEGIN	WHAT TO DO	APPARATUS/MATERIALS
1 day before	Gather materials and apparatus. Create position-time and velocity-time graphs for the students to analyze.	For each group: Option A – motion sensor – data collection device, such as computer or graphing calculator. Option B – long tape measure – stopwatch

Time Required

- 60 min

Safety Precautions

None