Name _____ Date _____ Class _____

Directed Reading for Content Mastery

Section 3 ▪ Using Newton's Laws

Chapter 3.3 Review

Directions: *Complete the paragraphs by using the words listed below to fill in the blanks.*

9.8 m/s² accelerate air resistance conservation of momentum continues decelerate equals fall freefall gravity laws of motion momentum satellites straight line terminal velocity velocity weightlessness

Newton's **1.** _____ can be used to explain events in the natural world, such as how a pencil falls to the floor and how planets revolve around the Sun. In the absence of air, all objects fall at the same rate, because the force of Earth's gravity causes objects to **2.** _____ by **3.** _____. **4.** _____ can eventually counteract the acceleration from **5.** _____. This is why a flat piece of paper falls slowly, but when the same paper is crumpled, it falls quickly. When the upward force of air resistance on an object **6.** _____ the downward force of gravity on the object, its **7.** _____ stops increasing. This is called the object's **8.** _____.

9. _____ orbit Earth because of gravity. They travel very fast, but with each meter forward that they travel, they **10.** _____ just a tiny bit due to Earth's gravity. Astronauts in Earth's orbit experience **11.** _____ because they are in **12.** _____. Without gravity, satellites would continue in a **13.** _____ away from Earth.

Newton's laws also describe what happens in collisions. For example, in a moving car, a passenger is also in motion. When the car comes to a sudden stop, the passenger **14.** _____ in motion. To protect the passenger from striking the inside of the car, seatbelts and airbags **15.** _____ passengers slowly. Also, the **16.** _____ describes what happens in a collision. When two objects collide, the total **17.** _____ of the objects before the collision equals the total momentum of the objects after the collision.

Name Date Class

Directed Reading for Content Mastery

Key Terms
Forces and Newton's Laws

Directions: *Determine whether the italicized term makes each statement true or false. If the statement is true, write the word* **true** *in the blank. If the statement is false, write in the blank the term that makes the statement true.*

_____ 1. Objects fall toward Earth at a rate of 9.8 m/s^2 because of *centripetal force.*

_____ 2. $F = ma$ represents Newton's *second* law of motion.

_____ 3. Acceleration toward the center of a curved or circular path is called *gravitational* acceleration.

_____ 4. The *net force* on an object is the combination of all the forces acting on the object.

_____ 5. The force of gravity acting upon an object is the object's *mass.*

_____ 6. *Friction* is the force that opposes motion between surfaces that touch each other.

_____ 7. To every action force there is an equal and opposite reaction force is *the law of conservation of momentum.*

_____ 8. According to *the law of conservation of momentum,* momentum lost equals momentum gained.

_____ 9. The force keeping a ball on a string moving in a circle is *rolling friction.*

_____ 10. *Field* is the tendency of an object to resist a change in motion.

_____ 11. Air resistance acts in the *opposite* direction to that of an object in motion.

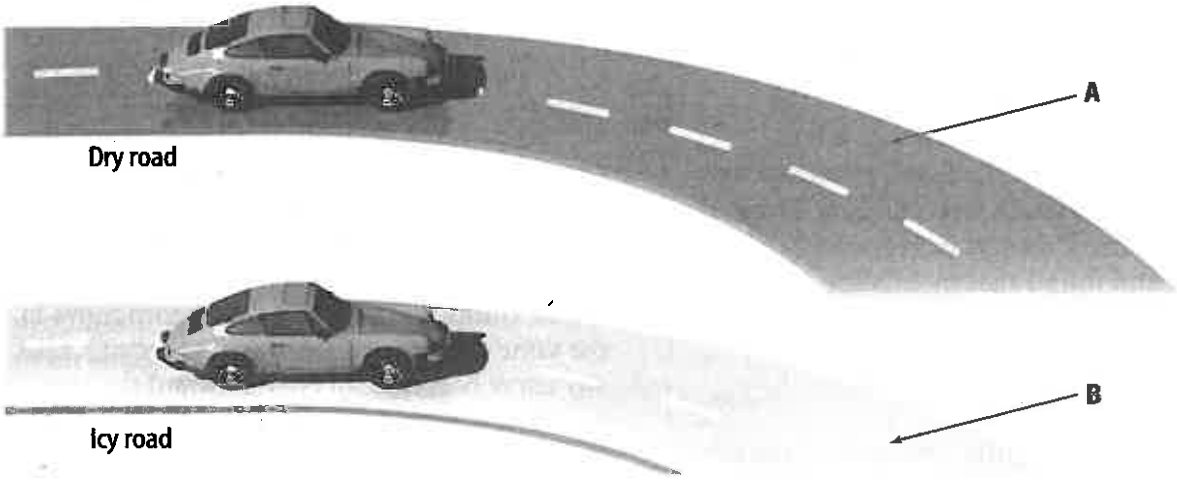
_____ 12. Terminal velocity is the *highest* velocity that a falling object will reach.

Name Date Class

SECTION 3 Reinforcement

Using Newton's Laws

Directions: *Use the illustrations to answer the following questions.*



1. What is the centripetal force that allows a car to move around a sharp curve in a roadway?

2. Draw an arrow on the bottom diagram to show the movement of the car if the centripetal force of the road and car is not enough to overcome the car's inertia when it reaches point B.

3. Explain how you know the car is accelerating when it reaches point A in the first diagram.

4. Describe what a person in the passenger seat will feel as the car reaches point A.

5. What provides the force on the person in the passenger seat?

Name _____ Date _____ Class _____

Chapter Test B

Forces and Newton's Law

I. Testing Concepts

Directions: *For each of the following, write the letter of the term or phrase that best completes each statement or answers each question.*

_____ **1.** The upward force exerted on an object falling through air is _____.
a. terminal velocity **c.** air resistance
b. momentum **d.** weightless

_____ **2.** When an object moves in a circular path, it accelerates toward the center of the circle as a result of _____.
a. terminal velocity **c.** centripetal force
b. momentum **d.** friction

_____ **3.** The statement "to every reaction there is an equal and opposite reaction" is _____.
a. the law of conservation of momentum **c.** Newton's second law of motion
b. Newton's first law of motion **d.** Newton's third law of motion

_____ **4.** The product of mass and velocity gives a quantity known as _____.
a. momentum **b.** friction **c.** inertia **d.** velocity

_____ **5.** When a rocket lifts off, its upward momentum is matched by the downward momentum of _____.
a. nothing **c.** air pushed out of the way by the rocket
b. hot gases expelled by the rocket **d.** the launch pad

_____ **6.** An object that is in free fall seems to be _____.
a. weightless **c.** speeded up by air resistance
b. slowed by air resistance **d.** not moving

_____ **7.** The relationship among mass, force, and acceleration is explained by _____.
a. Newton's first law of motion **c.** Newton's third law of motion
b. Newton's second law of motion **d.** the conservation of momentum

_____ **8.** When two objects collide, their momentum after the collision is explained by _____.
a. Newton's first law of motion **c.** Newton's third law of motion
b. Newton's second law of motion **d.** the conservation of momentum

_____ **9.** A feather will fall through the air more slowly than a brick because of _____.
a. gravity **b.** air resistance **c.** terminal velocity **d.** momentum

_____ **10.** In the absence of air, a penny and a feather dropped from the same height will _____.
a. fall at different rates **c.** fall at the same rates
b. float **d.** not have momentum

_____ **11.** The amount of gravitational force between objects depends on their _____.
a. frictional forces **c.** inertia
b. speed and direction **d.** masses and the distances between them

_____ **12.** When a car traveling at 50 km/h collides head-on with something solid, the car stops within approximately _____.
a. 10 seconds **b.** 2 seconds **c.** 100 seconds **d.** 0.1 seconds

Chapter Test B (continued)

_____ 13. An object at terminal velocity has an acceleration of _____.
a. zero **b.** one g **c.** 9.8 m/s² **d.** 98 m/s²

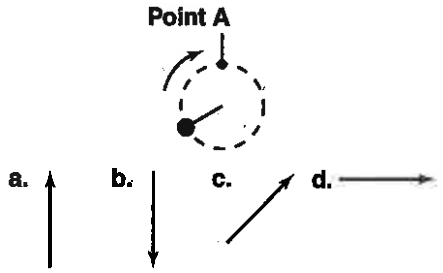
_____ 14. If a 300-N action force is exerted to the right, the reaction force will be _____.
a. 300 N to the right **c.** 300 N to the left
b. 600 N to the right **d.** 600 N to the left

_____ 15. When a force is exerted on an object, an equal and opposite force is exerted by the object. These forces are referred to as _____.
a. centripetal forces **c.** gravitational forces
b. friction forces **d.** action-reaction forces

_____ 16. Acceleration due to gravity is _____.
a. 98 m/s² **b.** 9.8 m/s² **c.** 9.8 m/s **d.** 0.98 m/s

_____ 17. A real car moving at 10 km/h has more momentum than a toy car moving at the same rate because _____.
a. its mass is greater **c.** it moves faster
b. its mass is less **d.** of friction

_____ 18. An object attached to a string that is being swung in a clockwise circular path is shown. Assume the string breaks at point A. In which direction will the object be traveling an instant later?



_____ 19. According to Newton's second law of motion, _____.
a. $F = mv$ **b.** $F = ma$ **c.** $F = pv$ **d.** $F = pa$

_____ 20. Friction between the tire of a moving car and the dry pavement is _____ friction.
a. static **b.** rolling **c.** sliding **d.** riding

_____ 21. Gravity is one of _____ basic forces.
a. two **b.** three **c.** four **d.** five

_____ 22. A car rounding a curve is subject to _____ force.
a. rolling **b.** static **c.** centripetal **d.** gravitational

_____ 23. Astronauts aboard the International Space Station are _____ because they are in orbit around the Earth.
a. at terminal velocity **c.** frictionless
b. motionless **d.** weightless

Name _____ Date _____ Class _____

Chapter Test C

Forces and Newton's Law

I. Testing Concepts

Directions: *In the blank, write the term that best completes each statement or answers the question.*

1. _____ is the force that opposes the sliding motion of two surfaces that are touching each other.
2. _____ is a force that opposes the motion of objects that move through the air.
3. Gravity is always _____.
4. The gravitational force exerted on an object is called the object's _____.
5. Acceleration toward the center of a curved path is called _____ acceleration.
6. The sum of all the forces acting on an object is known as the _____ force.
7. The momentum of an object is the _____ of its mass and its velocity.
8. A baseball hurled by a powerful pitcher has greater _____ than one lobbed gently.
9. The acceleration of an object depends on its _____ as well as the force exerted on it.
10. $a = F_{net}/$_____
11. If the net force on a moving object is _____, it will continue to move in a straight line with a constant speed.
12. The amount of friction between two surfaces depends on _____ and the force pressing the surfaces together.
13. To keep a sliding object moving, you must continually overcome _____.
14. Air resistance acts in _____ to the motion of an object through air.
15. As an object falls faster, the force of air resistance _____.
16. At terminal velocity, the acceleration of an object is _____.
17. Terminal velocity depends on the size, shape, and _____ of a falling object.
18. There are _____ basic forces in the universe.