Name _____ Class _____ Date _____

Skills Worksheet Chapter 6 – Forces and Motion

Directed Reading A

Section: Gravity and Motion

1. Suppose a baseball and a marble are dropped at the same time from the same height. Which ball would land first according to Aristotle? Explain.

_____

_____

GRAVITY AND FALLING OBJECTS

2. What Italian scientist argued that the mass of an object does not affect the time the object takes to fall to the ground?

_____

3. Why do objects fall to the ground at the same rate?

_____

4. On what two factors does acceleration depend?

_____

5. Does a heavier object or a lighter object experience a greater gravitational force?

_____

6. Why is a heavier object harder to accelerate than a lighter object?

_____

7. Why does a heavier object fall with the same acceleration as a lighter object?

_____

8. The rate at which velocity changes over time is called

_____.

9. How is acceleration calculated?

_____

_____

10. At what rate do all objects accelerate toward Earth?

_____

11. What equation is used to calculate the velocity (Δv) of a falling object?

_____

AIR RESISTANCE AND FALLING OBJECTS

_____ **12.** The force that opposes the motion of objects through air is
- **a.** gravity.
- **b.** net force.
- **c.** velocity.
- **d.** air resistance.

13. What three factors affect the amount of air resistance acting on an object?

_____

_____

_____

14. What do you get when you subtract the force of air resistance from the force of gravity?

_____

15. When a falling object stops accelerating, it has reached

_____ velocity.

16. If there were no air resistance, what would be the velocities of hailstones during a hailstorm?

_____

17. The motion of a body when only the force of gravity is acting on the body is called _____.

18. Why can free fall occur only where there is no air?

_____

19. What are two places that have no air resistance?

_____

_____

ORBITING OBJECTS ARE IN FREE FALL

20. Is it true that an astronaut is weightless in space? Explain your answer.

_____

_____

21. A space shuttle follows the curve of the Earth's surface as it moves at a constant speed, and so is said to be _____ Earth.

22. Why don't space shuttle astronauts in orbit hit their heads on the ceiling of the falling shuttle?

_____

_____

_____

_____

23. What is centripetal force?

_____

_____

_____

_____

PROJECTILE MOTION AND GRAVITY

_____**24.** The curved path that an object follows when thrown, launched, or otherwise projected near the surface of Earth is called
- **a.** terminal velocity.
- **b.** projectile motion.
- **c.** terminal motion.
- **d.** projectile velocity.

_____**25.** The two independent components of projectile motion that combine to form a curved path are
- **a.** horizontal motion and vertical motion.
- **b.** parallel motion and vertical motion.
- **c.** horizontal motion and perpendicular motion.
- **d.** horizontal force and vertical force.

_____**26.** Motion parallel to the ground is called
- **a.** vertical motion.
- **b.** horizontal motion.
- **c.** parallel motion.
- **d.** horizontal force.

_____**27.** Everything on Earth is pulled downward toward the center by
- **a.** acceleration.
- **b.** projectile motion.
- **c.** gravity.
- **d.** vertical motion.

_____**28.** Motion perpendicular to the ground is called
- **a.** vertical motion.
- **b.** horizontal motion.
- **c.** perpendicular motion.
- **d.** perpendicular force.

_____**29.** Objects in projectile motion are pulled down by
- **a.** acceleration.
- **b.** horizontal motion.
- **c.** vertical motion.
- **d.** gravity.

_____**30.** Compared to a falling object, the downward acceleration of a thrown object is
- **a.** the same.
- **b.** faster.
- **c.** slower.
- **d.** constant.

_____**31.** If you want to hit a target with a thrown or propelled object, you must
- **a.** aim directly at the target.
- **b.** aim below the target.
- **c.** aim above the target.
- **d.** stand very close to the target.

Name _____ Class _____ Date _____

Skills Worksheet

Directed Reading A

Section: Newton's Laws of Motion

1. In 1686, what did Sir Issac Newton explain with his three laws of motion?

_____

_____

NEWTON'S FIRST LAW OF MOTION

2. What is Newton's first law of motion?

_____

_____

3. Which of Newton's laws of motion describes the motion of an object that has a net force of 0?

_____

4. What are two examples of objects at rest?

_____

_____

5. How could an unbalanced force work on a chair at rest on the floor to make it slide across the room?

_____

6. According to Newton's first law of motion, what will happen to the motion of objects moving with a certain velocity unless an unbalanced force acts on them?

_____

_____

7. If you were in a bumper car that stops when it hit another car, would you continue to move forward? Why or why not?

_____

8. What unbalanced force acts to stop a desk that is sliding across a floor?

_____

9. What does friction do to the motion of objects?

_____

10. What is Newton's first law sometimes called?

_____

11. What is the tendency of an object to resist being moved or, if the object is moving, to resist a change in speed or direction until an outside force acts on the object?

_____

12. Why is it easier to change the motion of an object with a large mass than an object with a small mass?

_____

_____

_____

NEWTON'S SECOND LAW OF MOTION

13. What is Newton's second law of motion?

_____

_____

14. What happens to the acceleration of an object as its mass decreases?

_____

_____

15. What happens to the acceleration of an object if the force on the object increases?

_____

_____

16. Why would a cart start moving faster if you gave it a hard push than if you gave it a soft push?

_____

_____

17. In what direction do objects accelerate?

_____

18. How is the relationship of acceleration (a) to mass (m) and force (F) expressed mathematically?

_____

19. Why is an apple easier to accelerate than a watermelon?

_____

_____

NEWTON'S THIRD LAW OF MOTION

20. What is Newton's third law of motion?

_____

_____

_____

21. Explain why Newton's third law can be stated as "all forces act in pairs."

_____

_____

22. What action and reaction forces are present when you are sitting on a chair?

_____

_____

_____

23. How do action and reaction forces move a swimmer forward in the water?

_____

_____

_____

24. Since all forces act in pairs, what happens when a force is exerted?

_____

25. When a ball falls to Earth, why is it hard to see the effect of the reaction force exerted by the ball on Earth?

_____

_____

_____

Name _____ Class _____ Date _____

Skills Worksheet

Directed Reading A

Section: Momentum

1. Why does it take a large truck longer to stop than a compact car, even though both are traveling at the same velocity?

_____

_____

MOMENTUM, MASS, AND VELOCITY

2. The product of the mass and velocity of an object is its _____.

3. Why does a fast-moving car have more momentum than a slow-moving car of the same mass?

_____

_____

4. What is the equation used to calculate momentum?

_____

_____

Match the correct description with the correct term. Write the letter in the space provided.

_____ 5. the mass of an object in kilograms

_____ 6. the velocity of an object in meters per second

_____ 7. units of momentum

_____ 8. kilograms multiplied by meters per second

a. m

b. v

c. kg•m/s

d. p

9. What is the direction of momentum?

_____

_____

THE LAW OF CONSERVATION OF MOMENTUM

_____**10.** If a cue ball hits a billiard ball so that the billiard ball starts moving and the cue ball stops, what happens to the cue ball's momentum?
- **a.** Some of the cue ball's momentum has transferred from the billiard ball.
- **b.** All of the cue ball's momentum has transferred from the billiard ball.
- **c.** All of the cue ball's momentum has transferred to the billiard ball.
- **d.** Some of the cue ball's momentum has transferred to the billiard ball.

_____**11.** The law that states that any time objects collide, the total amount of momentum is conserved, or stays the same, is called the
- **a.** law of conservation of momentum.
- **b.** law of preservation of momentum.
- **c.** law of preservation of velocity.
- **d.** law of conservation of velocity.

_____**12.** When two objects stick together, the mass of the combined objects is equal to the
- **a.** mass of the smaller object subtracted from the larger object.
- **b.** product of the masses of the two objects.
- **c.** masses of the two objects added together.
- **d.** mass of the larger object divided by the smaller object.

_____**13.** If momentum is conserved, what happens to velocity when mass changes?
- **a.** Velocity stays the same.
- **b.** Velocity always increases.
- **c.** Velocity always decreases.
- **d.** Velocity changes.

_____**14.** What usually happens to momentum when objects collide?
- **a.** Momentum of each object remains the same.
- **b.** Momentum of each object increases.
- **c.** Momentum of each object becomes equal.
- **d.** Momentum transfers from one object to another.

_____**15.** When objects collide, the total momentum of all objects
- **a.** remains the same.
- **b.** increases.
- **c.** decreases.
- **d.** is divided in half.

16. How is the collision of a cue ball and a billiard ball an example of Newton's third law and the conservation of momentum?

_____