Name _____ Class _____ Date _____

PAGES 14-19

Chapter 1 section 3 FRICTION /20

Section: Friction: A Force that Opposes Motion

1. What unbalanced force causes a ball to stop rolling?

_____

_____

2. When two surfaces are in contact, the force that opposes motion between the two surfaces is the force of _____.

THE SOURCE OF FRICTION

3. Two factors affect the amount of friction. What are those two sources?

_____

_____

_____

4. Dry pavement creates more friction than ice on pavement does. Why is that true?

_____

_____

_____

5. Why is more force needed to slide a large book across a table than to slide a small book across the same table?

_____

_____

_____

6. Why does an ice-hockey puck have less friction than a ball rolling on the ground?

_____

_____

_____

TYPES OF FRICTION

7. What is kinetic friction?

8. What are two types of kinetic friction?

9. Which type of kinetic friction is usually greater?

10. What is static friction?

11. If you try to drag a heavy suitcase along the floor and the suitcase doesn't move, which type of friction opposes the motion?

12. As soon as an object starts moving, which type of friction opposes motion?

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

_____**14.** a crate resting on a loading ramp

_____**15.** wheeled cart being pushed

a. kinetic friction

b. static friction

FRICTION: HARMFUL AND HELPFUL

_____**15.** Which of the following is NOT a way to reduce friction?

- **a.** Use a lubricant.
- **b.** Make rubbing surfaces smoother.
- **c.** Push surfaces together.
- **d.** Change sliding kinetic friction to rolling kinetic friction.

_____**16.** Which of the following is NOT a way to increase friction?

- **a.** Wear textured batting gloves.
- **b.** Press harder while sanding wood.
- **c.** Increase the force between two surfaces.
- **d.** Wax skis before skiing down a slope.

17. How does friction harm the engine of a car?

_____

_____

_____

_____

18. In what way do you need friction to walk?

_____

_____

_____

Name _____ Class _____ Date _____

Pages 20-25

Chapter 1 section 4 GRAVITY / 28

Section: Gravity: A Force of Attraction

1. The force of attraction between two objects that is due to their masses is the force of _____.

2. Why do astronauts on the moon bounce when they walk?

_____

_____

3. As mass becomes greater, what happens to the force of gravity?

_____

_____

_____

THE EFFECTS OF GRAVITY ON MATTER

4. Does all matter experience gravity? Explain your answer.

_____

_____

_____

5. The force that pulls you toward your pencil is the force of _____.

6. Since all objects are attracted toward each other because of gravity, why can't you see the objects moving toward each other?

_____

_____

_____

_____

7. How are objects around you affected by the mass of Earth?

_____

_____

_____

NEWTON AND THE STUDY OF GRAVITY

8. What were the two questions that Sir Isaac Newton realized were actually two parts of the same question?

9. What connection did Newton make between the moon and a falling apple?

10. Newton summarized his ideas about gravity in a law now called

_____.

THE LAW OF UNIVERSAL GRAVITATION

_____**11.** Newton's *law of universal gravitation* involves the relationships between all of the following EXCEPT

a. distance.
b. mass.
c. heat.
d. gravitational force.

12. Which would be greater, the gravitational force between two feathers or two bowling balls, assuming the distance between them is equal? Explain your answer.

13. What happens to the gravitational force when two objects are moved away from each other?

14. Why is a cat easier to pick up than an elephant?

15. Why doesn't the sun's gravitational force pull you off Earth?

16. What would happen to Earth and other planets in the solar system without the sun's gravitational force?

WEIGHT AS A MEASURE OF GRAVITATIONAL FORCE

17. The measure of the amount of matter in an object is the _____ of the object.

18. The measure of Earth's gravitational force on an object is the object's _____.

19. When gravitational force changes, _____ changes to the same degree.

Identify each of the following statements as describing mass or weight. In the space provided, write M for mass and W for weight.

_____ **20.** different on the moon than on Earth

_____ **21.** expressed in newtons

_____ **22.** expressed in kilograms

_____ **23.** a measure of gravitational force

_____ **24.** a value that does not change

_____ **25.** the amount of matter in an object