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?

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

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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.

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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
SECTION: FRICTION: A FORCE THAT OPPOSES MOTION
1. The force of friction causes a ball to stop rolling.
2. friction
3. The two forces are (1) the force pushing the surfaces together and (2) the roughness of the surfaces.
4. Pavement is rougher than ice.
5. The weight of the larger book on the table creates more friction than the smaller book.
6. The friction is less when the surface is less rough.
7. Kinetic friction is friction between two moving surfaces.
8. Two types of kinetic friction are sliding kinetic friction and rolling kinetic friction.
9. Sliding kinetic friction is usually greater than rolling kinetic friction.
10. Static friction occurs when force applied to an object does not cause the object to move.
11. static friction
12. kinetic friction
13. B
14. A
15. C
16. D
17. Answers will vary. Sample answer: Friction harms the engine of a car by creating heat between moving parts and causing the parts to wear down.
18. Answers will vary. Sample answer: Without friction, you would slip and fall when you tried to walk.

SECTION: GRAVITY: A FORCE OF ATTRACTION
1. gravity
2. Astronauts on the moon bounce when they walk because the moon has less gravity than the Earth does.
3. As the masses become greater, the force of gravity increases.
4. Yes. All matter experiences gravity, because all matter has mass. Gravity is proportional to mass.
5. gravity
6. The mass of most objects is too small to cause a force large enough to move objects toward each other.
7. Earth has an enormous mass, so its gravitational force is very large. Therefore, objects are pulled by Earth’s gravity toward Earth’s center rather than being pulled by a smaller force of gravity toward its center.
8. The two questions were: (1) Why do objects fall toward Earth, and (2) what keeps the planets moving in the sky?
9. Newton proposed that the same unbalanced force that pulled an apple toward Earth was the same unbalanced force that kept the moon in orbit around Earth.
10. the law of universal gravitation
11. C
12. The gravitational force between two bowling balls is greater. The reason is that the greater the masses are, the greater the gravitational pull will be.
13. The gravitational force between them decreases rapidly.
14. The cat has less gravitational force acting on it than the elephant has, because it has less mass.
15. The sun is too far away for its gravitational force to have much of an effect on me.
16. Without the sun’s gravitational force, planets would not stay in orbit around the sun.
17. mass
18. weight
19. weight
20. W
21. W
22. M
23. W
24. M
25. M

Directed Reading B

SECTION: MEASURING MOTION
1. B
2. A
3. D
4. A
5. meters
6. time
7. distance
8. speed
9. velocity