

GRAVITY

Gravitational Attraction

(grav i tā' shən əl ə trak' shən)
the force that attracts any two
objects, based upon their mass
and the distance between them

Using SCIENCE Words

1. Gravitational attraction
exists between two objects
with _____.
A. force
B. attraction
C. mass

- 1 In the 1600s, scientists debated the movements of the sun, Earth, and the moon. Some thought there was an invisible shield wrapped around the solar system. They believed this shield held the planets together and in orbit.
- 2 Isaac Newton was the first person to explain the effect of gravity upon our universe. He used mathematical formulas to prove that gravity is what keeps the planets in orbit.
2. Isaac Newton _____.
- believed that a shield was wrapped around the solar system
 - explained the effect of gravity upon the universe
 - discovered a planet
- 3 Since Newton's discoveries, we have learned a great deal about the effects of gravity. We know that, because of gravity, the moon orbits Earth. And, also because of gravity, Earth revolves around the sun.
3. Because of gravity, _____.
- Earth orbits the moon
 - the sun revolves around Earth
 - Earth orbits the sun
- 4 Gravity is the attraction between two objects. Every object on Earth is attracted toward the center of Earth. Gravity is what keeps us on the ground. Without it, we would drift into space.
- 5 To better understand gravity and how it affects the planets, it is important to discuss mass and weight. **Mass** is the amount of matter in an object. **Weight** is a measurement of gravitational attraction on an object.
4. Mass is the _____.
- amount of matter in an object
 - attraction between two objects
 - measurement of how hard gravity pulls on an object
- 6 Wherever you go, your mass stays the same. It doesn't matter if you are on Earth or the moon, your mass does not change. Your weight is a different story. Weight is a measure of the force of gravity on an object. The force between Earth and you is greater than the force between the moon and you. You would weigh less on the moon.

- 7 Objects with larger masses attract objects with smaller masses. Because the moon has less mass than Earth has, the moon is attracted toward Earth. The force that exists between Earth and the moon is **gravitational attraction**. This force keeps the moon orbiting Earth. Because Earth's gravitational field is greater than the moon's, the moon revolves around Earth.
5. On the moon your _____.
a. weight and mass would be the same
b. mass would change
c. weight would be less
- 8 Gravity affects all the planets in the solar system as well as the sun. If you could combine the masses of all nine planets, the total mass would not come close to the sun's enormous mass. Objects with the larger mass have the greater gravitational force. This is why every planet in the solar system revolves around the sun.
- 9 Does the moon revolve around the sun? It does, but there is more to the explanation. The path the moon travels is around Earth. Because the moon is closer to Earth, the moon is affected most by Earth's gravitational attraction.
6. Which sentence is true?
a. The moon revolves around Earth.
b. The total mass of all the planets in the solar system is more than the mass of the sun.
c. both a and b

LEARN ABOUT WORDS

You can often tell the meaning of a word by reading the words around it. Look at each number in parentheses. Find the paragraph in the reading with the same number. Then find the word that fits the given meaning. Write the word.

7. discussed, questioned, or argued (1)
8. the path an object in space follows around another object (1)
9. Earth's satellite (3)
10. a force that attracts objects toward the center of Earth (4)
11. the force of gravity on an object (5)
12. moves around another object (7)
13. energy such as a push or a pull (7)
14. large objects in space that revolve around the sun (8)
15. the amount of matter an object has (8)
16. the star closest to Earth (9)



Read the following, and answer the question.

After studying gravity, Marni conducted an experiment. She used paper plates, yarn, and washers. In what order should she complete these steps?

1. Develop a conclusion based on findings.
 2. Gather materials needed.
 3. Follow procedure.
 4. Record observations.
17. A. 3, 4, 1, 2
B. 2, 3, 1, 4
C. 2, 3, 4, 1
D. 3, 2, 4, 1

Using SCIENCE Words

1. C

Comprehension

2. b
3. c
4. a
5. c
6. a

Learn About Words

7. debated
8. orbit
9. moon
10. gravity
11. weight
12. revolves
13. force
14. planets
15. mass
16. sun

Think About It

17. C

Writing About Science

Write one thing you do not understand about the role gravitational attraction plays between Earth and the moon and Earth and the sun.