Name _____

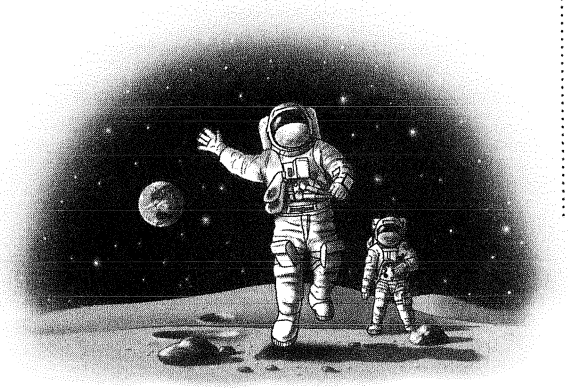
Daily Science
Big Idea 4
WEEK 1

Weekly Question

Day 1 Why do we weigh more on Earth than on the moon?

If you've ever seen videos of astronauts walking on the moon, then you've probably noticed the way they seemed to float from footstep to footstep. That's because everything weighs less on the moon than it does on Earth. The reason for this has to do with gravity. Gravity is the force of attraction that exists between all objects in the universe, including Earth and the moon. It's what makes all things that go up come down. And it's the reason we stay on Earth's surface instead of floating off into space.

Not all objects, however, have the same amount of gravity. Earth pulls us and all the things on the planet toward its center with a strong **gravitational force**. The gravitational force on the moon is not as strong as it is on Earth.



Vocabulary

gravitational force
grav-ih-TAY-shun-ul FORSS
the force of attraction between any two bodies in the universe

A. Write *true* or *false*.

1. Gravity pulls us toward Earth's center. _____
2. The moon's gravitational force is stronger than Earth's gravitational force. _____
3. Gravitational force is what keeps us from floating off the planet. _____
4. All bodies in the universe have gravity. _____

B. Explain in your own words why astronauts appear to float when they walk on the moon. Use the term *gravitational force* in your answer.

_____

_____

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WEEK 1

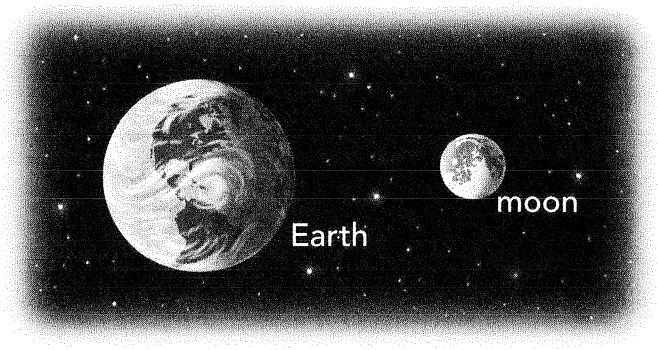
Day 2

Weekly Question

Why do we weigh more on Earth than on the moon?

What makes one object have a stronger gravitational force than another? There are two factors that determine gravitational force. The first is an object's **mass**. An object with a large amount of mass will exert more gravitational force than an object with a small amount of mass. Since Earth has more mass than the moon—about six times as much—it exerts more gravitational force.

Gravitational force also depends on the distance between objects. If we were standing on the moon, we'd be pulled by Earth's gravitational force. Even though Earth has a greater mass than the moon, the moon's gravity would be stronger than Earth's because we would be so much closer to the moon. Similarly, while standing on Earth, we are being pulled by the moon's gravity. However, it doesn't have much effect on us because the moon is so far away.



Vocabulary

mass
mass
the amount of matter in an object

A. Check the box next to the object in each pair that has more mass.

1.	❒ bowling ball	❒ basketball	**3.**	❒ toothpick	❒ nail
2.	❒ paper towel	❒ washcloth	**4.**	❒ leaf	❒ quarter

B. All objects have gravitational force, including people. We pull on Earth just as it pulls on us. Why, then, doesn't Earth fall toward us when we jump? Use the word *mass* in your answer.

_____

C. The sun has 300,000 times more mass than Earth, yet we don't get pulled off Earth and into the sun by its gravitational force. Explain why.

_____

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Day 3

Weekly Question

Why do we weigh more on Earth than on the moon?

Mass and **weight** are not the same thing. Mass measures how much matter something has. It doesn't make a difference whether you are on the moon or on Earth—your mass doesn't change. Your weight, on the other hand, is measured by the pull of gravity on your mass. With less gravity on the moon, you weigh less. With more gravity on Earth, you weigh more.

We don't generally notice the difference between mass and weight when we weigh ourselves on Earth, however. That's because the gravitational force is nearly the same no matter where you go on Earth, so your weight doesn't vary.

Vocabulary

weight
wayt
measurement of the effect of gravity on a given mass

A. Use the chart to answer the questions.

	Weight on Earth	Weight on the Moon
Child	65 lbs	10.8 lbs
Adult	150 lbs	25 lbs

1. How many fewer pounds does the child weigh on the moon than on Earth? _____

2. Which is greater, the adult's weight on the moon, or the child's weight on Earth? What is the difference between them in pounds?

_____

3. Who has more mass on the moon, the child or the adult? Explain.

_____

B. If you go on a diet, do you change your weight or your mass? Explain.

_____

_____

Name _____

Daily Science

Big Idea 4

WEEK 1

Day 4

Weekly Question

Why do we weigh more on Earth than on the moon?

Remember that all objects in the universe have gravity. Every object's gravitational force is different, depending on its mass. That means that your weight would be different on any planet or star.

If a person who weighed 150 pounds on Earth stepped onto a neutron star, he would weigh 21 trillion pounds! A neutron star is a star that has about the same mass as our sun, but is much smaller. All of its mass is concentrated into an area the size of San Francisco. If the 150-pound person were to set foot on Phobos, a tiny moon of Mars, his weight would barely register. That's because Phobos has very little mass, although it, too, is about the size of San Francisco.

A. The chart below shows approximately how much a 150-pound person on Earth would weigh on each planet in our solar system. Use the chart to answer the questions.

Mercury	57 lbs	**Jupiter**	381 lbs
Venus	137 lbs	**Saturn**	140 lbs
Earth	150 lbs	**Uranus**	120 lbs
Mars	57 lbs	**Neptune**	180 lbs

1. On which planet would you weigh the closest to what you weigh on Earth? _____

2. Which planet exerts the strongest gravitational force? _____

3. On which two planets is gravity the weakest? _____

B. Which of the following statements are true? Check all that apply.

- ❒ The size of an object determines how much mass it has.
- ❒ An object's mass determines its gravitational force.
- ❒ The farther a planet is from the sun, the less gravity the planet has.
- ❒ The gravitational force of Phobos is weaker than the gravitational force of a neutron star.

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Day 5

Weekly Question

Why do we weigh more on Earth than on the moon?

A. Use the words in the box to complete the sentences.

gravitational force	mass	weight

1. The _____ exerted by Earth keeps the moon in orbit around us.
2. An object's _____ would be different on Mars than it would be on Jupiter.
3. A feather is bigger than a marble but has less _____.

B. Answer the questions.

1. What is the difference between mass and weight?

_____

_____

2. Why don't we notice a difference between mass and weight on Earth?

_____

_____

C. What are two factors that determine an object's gravitational force on another object?

1. _____
2. _____