

Name: _____ Date: _____

Student Exploration: Weight and Mass

Vocabulary: balance, force, gravity, mass, newton, spring scale, weight

Prior Knowledge Questions (Do these BEFORE using the Gizmo.)

- Your **weight** is the pull of **gravity** on your body. Suppose you step on a bathroom scale on the Moon. How would your weight on the Moon compare to your weight on Earth?
 A. greater on the Moon B. less on the Moon C. same on Earth and the Moon
- Your **mass** is the amount of matter, or “stuff,” in your body. How would your mass on the Moon compare to your mass on Earth?
 A. greater on the Moon B. less on the Moon C. same on Earth and the Moon

Gizmo Warm-up

On the *Weight and Mass* Gizmo™, you can use a **balance** to compare the masses of objects.

- Place the **dog** on the right pan of the balance. What happens? _____
- Place the **5-kilogram (kg) mass** on the other pan. Which has more mass, the dog or the 5-kg mass?



- Use this process of adding and subtracting other masses from the left pan until the two pans are balanced. Add up all the masses on the left pan. This is equal to the mass of the dog. What is the mass of the dog?

Introduction: A **spring scale** is used to measure **force**. Since weight is a type of force, a spring scale can measure weight. The metric unit of force is the **newton** (N).

Question: Will an object’s weight change on different planets?

- Measure:** Place the **pumpkin** on the spring scale. Move the cursor over the red line on the scale to see its weight measured to the nearest newton.

What is the weight of the pumpkin? _____

- Predict:** If you take an object to a different planet, do you think its weight will stay the same or be different? (Circle your answer.)

Same

Different

3. Collect data: Measure the weights of the following objects on Earth, the Moon, Mars, and Jupiter. Record your measurements in the data table below.

| | Pumpkin | Dog | Watermelon |
|-------------------|----------------|------------|-------------------|
| Weight on Earth | | | |
| Weight on Moon | | | |
| Weight on Mars | | | |
| Weight on Jupiter | | | |

4. Analyze: Does the weight of an object change when it is moved to a different planet?

5. Extend your thinking: Which celestial body had the strongest gravity, Earth, the Moon, Mars, or Jupiter?

Explain how you know. _____

Question: How do weight and mass change on different planets?

1. Predict: If you take an object to a different planet, do you think its mass will stay the same or be different? (Circle your answer.)

Same

Different

2. Collect data: Use the balance to measure the masses of the following objects on Earth, the Moon, Mars, and Jupiter. Record your measurements in the data table below.

| | Pumpkin | Dog | Watermelon |
|-----------------|----------------|------------|-------------------|
| Mass on Earth | | | |
| Mass on Moon | | | |
| Mass on Mars | | | |
| Mass on Jupiter | | | |

3. Analyze: Does the mass of an object change when it is moved to a different planet?

4. Draw conclusions: Based on what you have learned about mass and weight, why do you think the mass did *not* change but the weight did? _____
