

Testing Balanced and Unbalanced Forces PART 1

Directions: Follow the procedures below. Write down the title, purpose, and background information.

Purpose: How does an unbalanced force act differently from a balanced force?

Background Info:

Inertia: Objects will not change their motion until an unbalanced force acts on them.

Balanced forces: Forces that are the same but pull or push in opposite directions. Balanced forces do not change the motion of an object.

Unbalanced forces: Forces that cause a change in the motion of an object.

Newton (N): A unit force in physics.

Procedure:

1. Place the white paper in the bottom of the plastic box. Put the metal ring on top of the paper as if you were putting the metal ring onto a jar. Trace the **outside** of the ring onto the paper. Remove the metal ring from the paper. Mark 4 points at an equal distance around the circle. Number the places 1 to 4 going clockwise, like in the image on the right.
2. Place the metal ring on the circle as you did before. Now place the marble inside the metal ring. **Without** moving the metal ring, describe the motion of the marble.
 - a. How is the marble moving right now? (Don't over think your answer)
 - b. Is this a balanced or unbalanced force? (moving or not moving)
 - c. Why is this a balanced force?
3. Now make the marble move in a clockwise circle (inside the ring). Keep the ring on the paper **at all times** and inside the bucket. Discuss your observations:
 - b. What is happening to the marble as you move the metal ring?
 - c. How does the metal ring produce an unbalanced force that influences the marble's motion?
 - d. Why is the marble not moving to the sides of the plastic container?
4. Discuss as a group what would happen if you lifted the ring while the marble was moving inside. Move the marble in clockwise circle again by lifting the ring.
 - e. What happened to the marble?
 - f. Is this a balanced or unbalanced force?
5. While having the marble move in a clockwise circle, try to pick up the ring when the marble at mark #2.
 - g. Did the Marble continue to circle when the ring was removed?
 - h. How did the marble leave? (straight line, curved line, ect...)

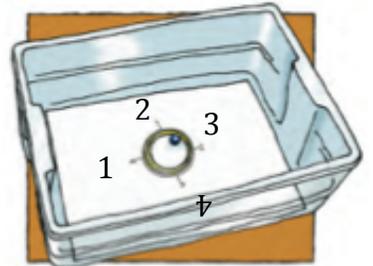
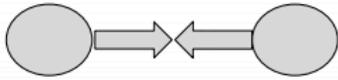
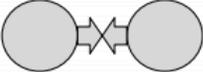
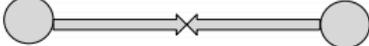


Figure 13.2 Mark the outline of the circle with 1, 2, 3, and 4 at quarter intervals.

6. Discuss what you noticed about the path of the marble as it left the drawn circle.

- i. What is the unbalanced force that keeps the planets in orbit?
- j. What do you think the marble represented in this lab?
- k. What do you think the ring or plastic cup represented this
- l. What would happen to the planets without this unbalanced force?
- m. What evidence do you have to support your answer to the question above?
- n. REWRITE and answer the questions below (no you don't have to draw just answer)

	What Does This Tell Us?
	As the mass of the interacting objects increases, the gravity _____.
	As the mass of the interacting objects decreases, the gravity _____.
	As the distance between the interacting objects decreases, the gravity _____.
	As the distance between the interacting objects increases, the gravity _____.

- o. What object governs (is in control of) the movement of the celestial bodies (objects) in our solar system?
- p. Explain.
- q. What happens if the distance between objects of the same mass increases?
- r. Gravitational attraction exhibited by an object increases with increasing mass. What does this mean?
- s. How does the model we created with the bed sheets and the balls relate to the law of universal gravitation and its effects on objects in our solar system?
- t. Why do you think that objects that are too far away from the Sun do not orbit it. Explain why this occurs.