

Puffball: A Game of Force and Motion

Main Ideas:

1. When **BALANCED** forces act on an object at rest, it will remain at rest.
2. An object in motion with **BALANCED** forces acting on it will continue in a steady, straight motion.
3. An **UNBALANCED** force will cause an object at rest to **start moving** and an object in motion to **speed up, slow down, or change direction**.

Materials: a playing area of approximately 1 meter x 1.5 meters, 2 goal areas, a light small ball, 2 players.

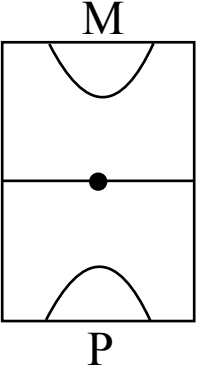
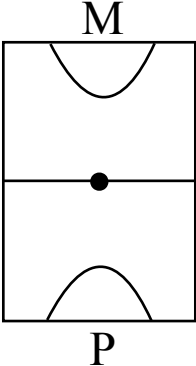
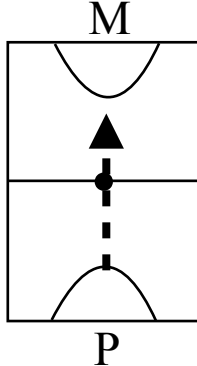
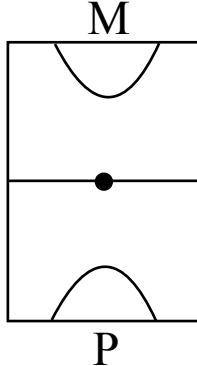
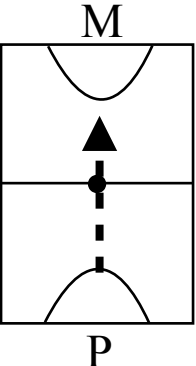
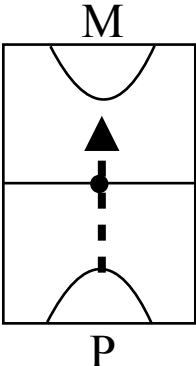
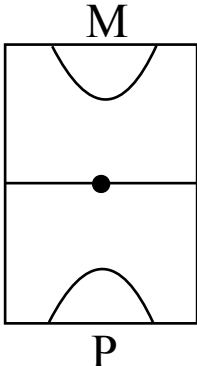
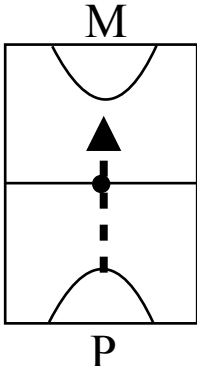
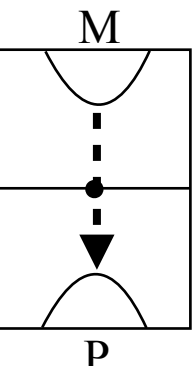
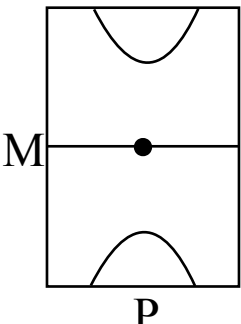
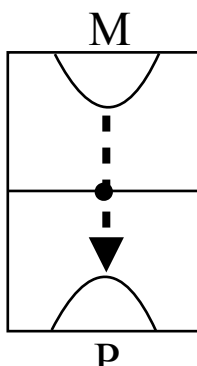
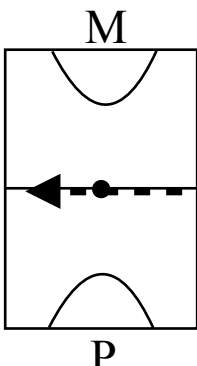
The object of the game is to blow a light ball into your opponent's goal. You may not touch the ball, and your hands cannot touch the table.

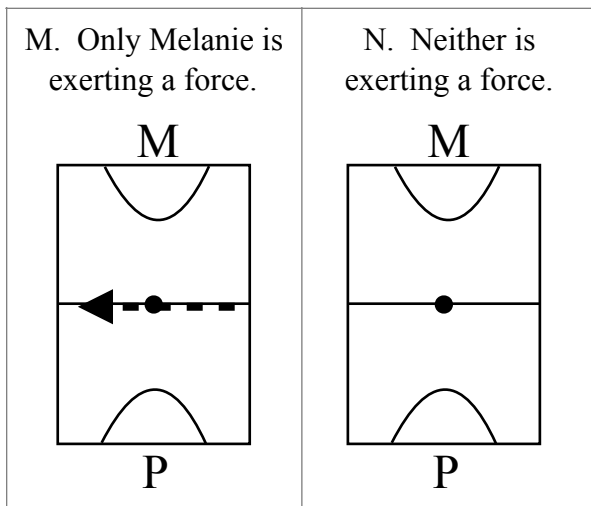
OBSERVE the ball as the game is played. Watch for the following things:

- When does the ball speed up?
- When does the ball slow down?
- When does the ball stop?
- When does the ball change direction?
- What has to happen for the ball to not move at all?

CONCLUSIONS:

1. Work through the situations below.
 - a. A **DOTTED ARROW** beside the ball indicates the direction in which the ball is moving **BEFORE** Melanie (M) or Pauline (P) begins to blow.
 - b. **NO DOTTED ARROW** means that the ball is at rest.
 - c. The placement of "M" or "P" indicates the direction the force is coming from.
2. Your first task is to show the **SIZE** and **DIRECTION** of the forces.
 - a. Fill in the diagrams below using **SOLID ARROWS** to show the forces that Melanie and Pauline exert on the ball.
 - b. **PREDICT** whether a point is going to be scored and, if so, who will score. Circle the letter of the girl (M or P) to show your prediction. If no one will score, do not circle either.

<p>A. Only Melanie is exerting a force</p> 	<p>B. Both are exerting a force Pauline's is greater.</p> 	<p>C. Both are exerting an equal force. Note that the ball is already moving.</p> 	<p>D. Only Pauline is exerting a force.</p> 
<p>E. Only Melanie is exerting a force.</p> 	<p>F. Both are exerting a force. Melanie's is greater.</p> 	<p>G. Both are exerting an equal force.</p> 	<p>H. Only Pauline is exerting a force.</p> 
<p>I. Both are exerting a force. Melanie's is greater.</p> 	<p>J. Both are exerting an equal force.</p> 	<p>K. Neither is exerting a force.</p> 	<p>L. Both are exerting an equal force.</p> 



QUESTIONS: For all of the questions below, ignore the fact that GRAVITY & FRICTION are always present in the situation.

1. In which of the situations are there **no forces** on the puffball? List the letters on the line below.

2. In which of the situations are there **single forces** on the puffball? List the letters on the line below.

3. In which of the situations are there **balanced forces** on the puffball? List the letters on the line below.

4. In which of the situations are there **unbalanced forces** on the puffball? List the letters on the line below.

5. In which of the situations is the ball **at rest** set into motion? List the letters on the line below.

Why does it start moving?

6. In which of the situations does the ball **at rest** stay at rest? List the letters on the line below.

Why does it stay at rest?

Name _____ Period _____ Date _____

7. In which of the situations does the ball **in motion** remain in constant motion? List the letters on the line below.

Why does its motion stay the same?

8. In which of the situations does the ball **in motion** change its motion? List the letters on the line below.

Why does its motion change?
