

Gravitation & Orbital Motion

Student Activity
Marbles in Orbit

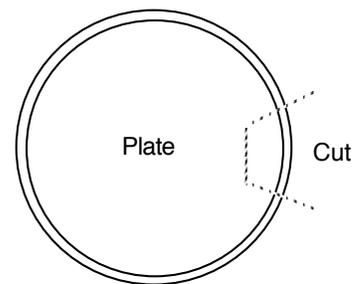
Marbles in Orbit

Question: Can we predict the direction the Moon would travel if the force of gravity were to suddenly disappear?

Materials: Sturdy paper plates (must have firm, high edges), dominoes, marbles.

Preparation:

Cut a small section of paper plate away (an arc of about 3-4 inches) as shown in the diagram at right. Paper plates with relatively high edges will work best for this activity.

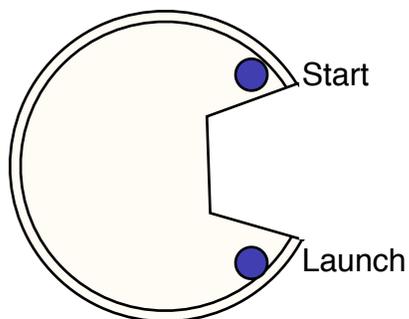


Exploration:

You are going to use the plate to aim a rolling marble at a target (standing domino) placed some distance away on a flat surface (important!). Your goal is to knock the target over with the marble. The plate can be rotated until you think the marble will strike the target. Roll gently. This may require some practice.

 Target

Explain your strategy **BEFORE** your first attempt:



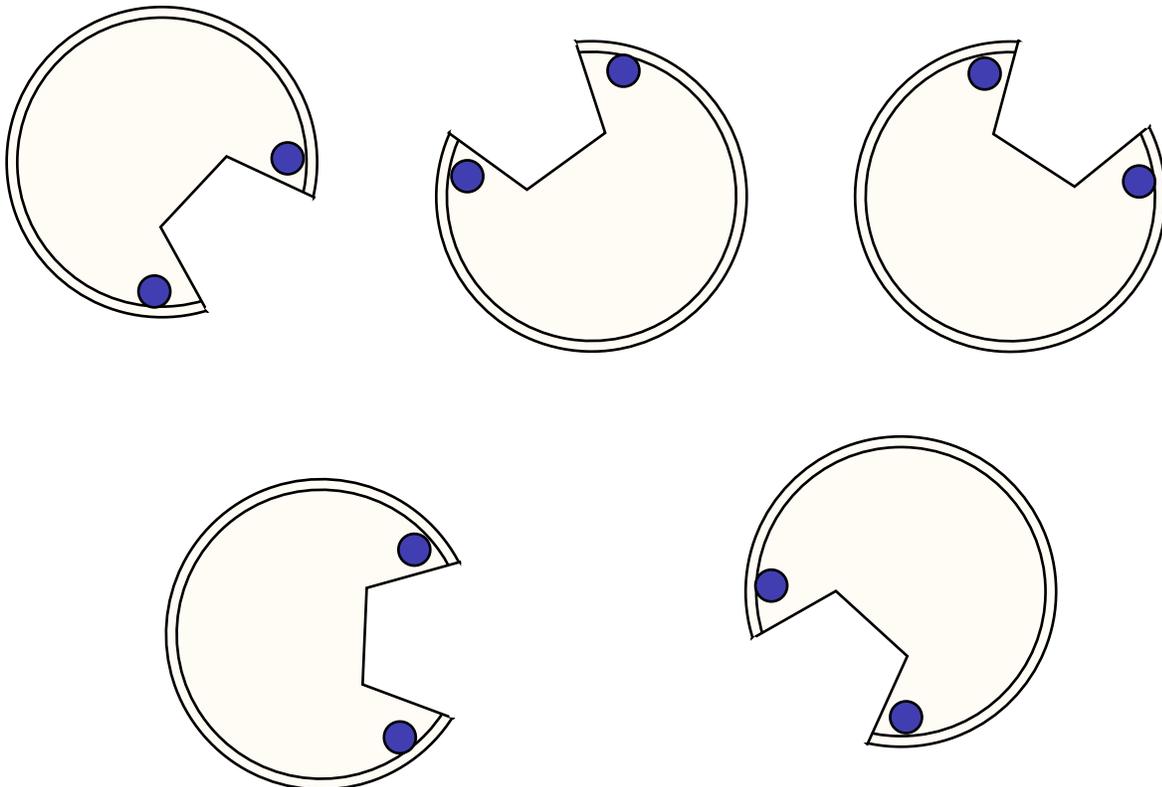
Explain any adjustments you made in your second attempt:

Continue to practice from different distances and at different angles. Be observant.

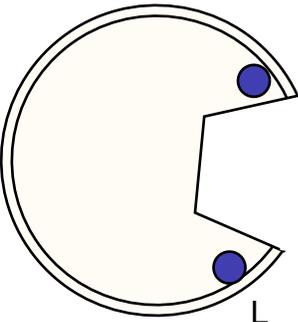
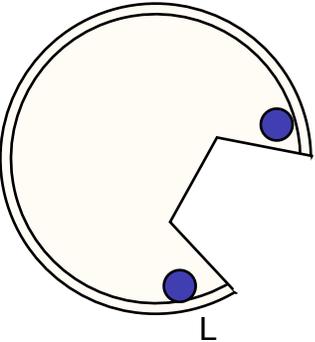
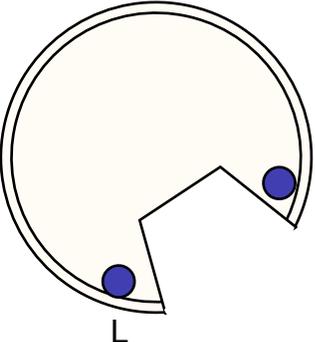
Observations and Questions

1. How would you describe the motion of the marble after leaving the plate?
2. What determines the direction the marble will travel after leaving the plate?

In each of the situations below, draw the path of the ball and decide which of the targets the launched marble is likely to hit. Draw a line to represent the path the marble will follow between the launch point and the target. Label the START (S) and LAUNCH (L) points for the marble (you can decide which of the points represent the launch point).



In each of the situations below, draw the path of the marble after leaving the plate and decide which of the targets on the right the launched marble is likely to hit. Draw a line to represent the path the marble will follow between the launch point and the target.



Additional Questions:

1. The marble moving in a circle around the edge of the plate can be compared to the Moon or a planet in its orbit.

What force holds the Moon and planets in their orbits?

2. What force holds the marble in its "orbit" around the edge of the plate?
3. Describe the motion of the marble after leaving the plate. Be as specific as possible.
4. Describe what would happen to the Moon as it orbits Earth if the force of gravity were to suddenly disappear. Include a simple drawing with your explanation.