

4 Walls Get in the Way

Build Knowledge

INTRODUCTION

What Students Do in this Activity

Students place a wall on their playfield and note how they need to adapt their launches to avoid the wall. They explore how the wall affects the places that the pinball can travel and determine if there are areas on the playfield that are difficult or impossible to reach.

Objectives

Students will:

- Investigate the arc made by a ball rolling up and then down on an inclined plane
- Make careful observations
- Share their results and discuss any conflicting results, as do scientists

Time

30–40 minutes

Materials

For the teacher:

- 1 pinball playfield
- 1 launch ramp
- 1 pinball (marble)
- 1 wall
- 1 piece of removable adhesive putty
- Chart paper or whiteboard
- Markers

A-Ha

The addition of a wall makes the height from which the pinball is launched a much more crucial variable as the ball can no longer be aimed to hit a target.

For each team:

- 1 copy of **Where Does the Pinball Roll?, Reproducible Master 7**
- Their pinball playfield
- 1 launch ramp
- 1 pinball (marble)
- 1 wall
- 1 piece of removable adhesive putty

For each student:

- 1 pencil
- Science notebook (see Introduction, page 27, for more information)

Preparation for the Activity

Set up a playfield with a target on it. Have a wall available so that you can show students how to add it to the playfield.

Have your playfield in a central location for *Discussing and Interpreting*.

CLASSROOM ACTIVITY

Presenting the Activity – Whole Group

1. **Review with students the explorations they did in Activities 2 and 3.**
Discuss how the ramp affected how the pinball traveled.
2. **Remind students of the Venn diagram they created in Activity 3.**
3. **Point out the differences in the launch ramp.**
4. **Explain to students that they will be adding some new parts to their playfields for testing.**
5. **Show students the length of wood that you will be adding as a wall and demonstrate how to place it on the playfield, as shown in the picture, using the removable adhesive putty.**

Choose a student to launch the pinball and to try to hit the target with the wall in place.

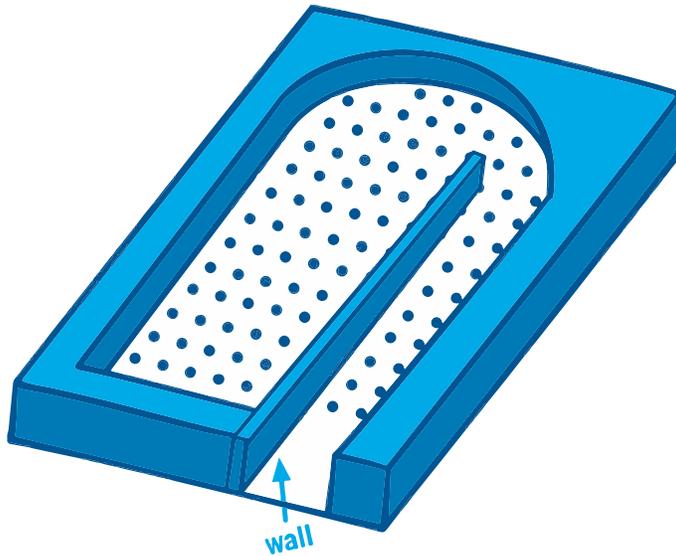


Teacher Tip:

Refer to the Introduction section (page 26) for ideas on helping students remember previous work if a lengthy period passes between activities.

6. **Discuss how the wall changed the way the game can be played.**

With the wall in place, students will have to use the speed of the pinball (based on the height from which it is launched) to change the pinball's trajectory. Prior to the addition of the wall, the launch ramp could be aimed to help the pinball hit the target.



Facilitating Student Exploration – Teams

7. **Break students into their teams. Have them explore where on the playfield the pinball is most likely to roll.**

Choose one team member to launch the pinball each time, while the others watch and note where the pinball does and doesn't roll.

Have team members take turns launching the pinball until everyone on the team has had the opportunity to launch the pinball 8–10 times.

8. **Hand out one wall, some putty, and a copy of Where Does the Pinball Roll?, Reproducible Master 7, to each team. Provide each team member with their science notebook.**

Assign roles to students. Explain that the recorder will use this sheet to keep track of where the pinball rolls.

9. **Have teams set up their playfields and add the walls using the putty.**
10. **Have students take turns launching the pinball onto the playfield.**

Encourage students to launch the pinball from different points on the launch ramp.



Teacher Tip:

Students may have difficulty recording the exact paths that the balls are taking. Encourage them to do the best they can, concentrating most on where the ball does not go.

WHERE DOES THE PINBALL ROLL

Name _____

Draw where the pinball rolls on the picture of the playfield.

Circle the places where the pinball rolled the least.

