Lesson Overview

This lesson sets the context for students’ explorations in Chapter 4: how to make a moving pinball change direction. Students rewatch the Pinball video and make new observations that set the purpose for their investigations. Then, they explore how to make a tennis ball and the rugball change direction, articulating what they observed during their exploration. The lesson concludes with pairs working to find and visualize examples of balls changing directions in the Forces in Ball Games book. The purpose of this lesson is to allow students to investigate and describe reasons why an object changes direction, using their own language. These initial activities set a foundation for discussing the forces that cause a moving object to change direction later in the chapter.

Anchor Phenomenon: Pinball machines allow people to control the direction and strength of forces on a ball.
Design Problem: Design a pinball machine.
Everyday Phenomenon: A moving ball changes direction.

Students learn:

- Moving objects change direction when you push them, or when they hit something.
Visualizing Changing Direction

Pairs read the reference book, *Forces in Ball Games*, to find and visualize examples of changing directions in ball games.

Instructional Guide

1. **Lead an Embodied Forces Routine to practice changing direction.** Ask students to stand up and spread out. Point to one direction of the room and explain that students will tiptoe in that direction. Provide directions such as the following:

   - Tiptoe five steps in this direction.
   - Ask a student to point in a new direction.
   - Change directions! Tiptoe three steps in that direction.

   Repeat this so that several students have an opportunity to decide in which direction the class should move. Have students return to the discussion area.

2. **Set the purpose for rereading the reference book.** Point to the cover of the *Forces in Ball Games* big book. Remind students they have looked at pictures in books before and have visualized how the objects in those pictures are moving.

   - What does it mean to visualize?  
     [To make a movie in your mind.]

   - Today, you are going to look in *Forces in Ball Games* and find places where balls are changing directions. We will need to visualize the balls moving to help us figure out when the balls changed direction. That will help us better understand why the balls changed direction, too.

3. **Model browsing for an interesting example.** Point out that there are many interesting examples in the book.

   - With this reference book, remember that you do not have to read about the ball games in order. You can look for an example of a ball changing direction that is interesting to you.
Flip through the book slowly, stopping when you come to the baseball section on page 6.

This picture looks like an example of a ball changing directions.

4. **Invite students to visualize with you.** Point to the picture of the baseball player hitting the baseball.

Let’s visualize together. What do you think might be happening in this picture? What do you think this baseball player is doing?

[He is hitting the ball.]

What makes you think that? What is your evidence?

[His arms are pushed out from his body and the ball is moving away from him.]

Invite students to pantomime the movement of swinging a bat with you.

5. **Demonstrate how to trace the movement you visualize.** Trace a path with your finger along the picture on page 6 as you narrate.

I can visualize the ball starting here when the pitcher threw it, and then moving this way in the direction of the batter.

What do you think happened to the ball when it got to the batter?

[He swung the bat. He hit it and it moved back to the pitcher.]

Right! I can visualize him swinging the bat, and then the ball changing direction when it hit the baseball player’s bat.

6. **Set expectations for Partner Reading.** Refer to the Partner Reading Guidelines as you review the three expectations: sit next to you partner, put the book between you, and take turns reading and listening.

Remind students that they will work with a partner to read the book and find examples of balls changing direction. Remind them that they will need to visualize the ball’s movement to help them figure out what happened and why the ball changed direction.

7. **Assign partners and distribute books.**

8. **On-the-Fly Assessment: Students read and visualize change of direction.** Circulate as students look at the photographs with their partners. Make note of which examples students are looking at so that you can reference them in the upcoming Shared Reading activity in Lesson 4.2.

9. **Gather students’ attention.** Collect books or have students return them to a designated area.
10. Discuss examples in the book. Ask one or two students to share an example from the book of a ball changing direction. Turn to that page in the big book so that the class can see. For each example, ask students whether the moving ball was pushed by something (for example, a bat or a foot) or if it hit an object (for example, the floor, a striped stick, or the ground).

Moving objects change direction when you push them or when they hit something.

11. Collect books and conclude the lesson. Explain that students will continue to work through examples of changing direction in the reference book in the next lesson.

Embedded Formative Assessment

On-the-Fly Assessment 10: Visualizing and Discussing Change of Direction

Look for: The focal comprehension strategy in this unit is visualizing by using information read or seen in books. In the Partner Read, students are specifically asked to refer to the photographs in Forces in Ball Games to visualize how and why the balls changed direction. As you circulate, observe students as they pantomime or talk about how and why the ball started to move in one direction and then changed to move in a different direction. Note if students are able to use clues from the pictures, as well as their prior knowledge, to help them as they discuss.

Now what? If students are unsure of the how the ball changed direction or how to describe how it changed direction, ask them to describe what they see in the photograph and invite them to pantomime how the ball started to move. Then, ask students in what direction the ball moved and have them trace (on the photograph) that direction. Continue with this line of questioning, asking what happened next to change the direction in which the ball moved and to specify the direction in which it moved. If students do not have the language to describe how the ball changed direction, note the difficulty and encourage students to pantomime playing each step of the game.

Teacher Support

Instructional Suggestion

Diverse Learners: Providing Additional Reading Support
You may wish to provide an additional support for students during the Partner Read. Consider some of the following suggestions:

- Gather a small group to work together in the discussion area.
- Have students trace the path of the ball with their fingers.
- Provide students with photocopies of pages from the book so they can draw the ball’s path.
- Provide video examples showing balls changing direction in ball games.
Visualizing Changing Direction

Pairs read the reference book, *Forces in Ball Games*, to find and visualize examples of changing directions in ball games.

### Instructional Guide

1. **Lead an Embodied Forces Routine to practice changing direction.** Ask students to stand up and spread out. Point to one direction of the room and explain that students will tiptoe in that direction. Provide directions such as the following:

   ¡Caminen de puntitas cinco pasos en esta dirección.

   Ask a student to point in a new direction.

   ¡Cambiense de dirección! Caminen de puntitas tres pasos en esa dirección.

   Repeat this so that several students have an opportunity to decide in which direction the class should move. Have students return to the discussion area.

2. **Set the purpose for rereading the reference book.** Point to the cover of the *Forces in Ball Games* big book. Remind students they have looked at pictures in books before and have visualized how the objects in those pictures are moving.

   ¿Qué significa visualizar?
   [Hacer una película en tu mente].

   Hoy vamos a mirar en *Las fuerzas en los juegos con pelota* y encontrar lugares en donde las pelotas están cambiando de dirección. Necesitamos visualizar las pelotas moviéndose para ayudarnos a averiguar cuándo cambiaron de dirección las pelotas. Eso también nos ayudará a entender mejor por qué las pelotas cambiaron de dirección.

3. **Model browsing for an interesting example.** Point out that there are many interesting examples in the book.

   Con este libro de referencia, recuerden que no tienen que leer sobre los juegos con pelota en orden. Pueden buscar un ejemplo de una pelota cambiando de dirección que sea interesante para ustedes.
Flip through the book slowly, stopping when you come to the baseball section on page 6.

4. **Invite students to visualize with you.** Point to the picture of the baseball player hitting the baseball.

   Visualicemos juntos. ¿Qué piensan que podría estar sucediendo en esta foto? ¿Qué piensan que está haciendo este jugador de béisbol? [Está golpeando la pelota].

   ¿Qué les hace pensar eso? ¿Cuál es su evidencia? [Tiene los brazos extendidos y la pelota se está alejando de él].

Invite students to pantomime the movement of swinging a bat with you.

5. **Demonstrate how to trace the movement you visualize.** Trace a path with your finger along the picture on page 6 as you narrate.

   Puedo visualizar la pelota comenzando aquí cuando el pitcher la lanzó, y luego moviéndose hacia acá en la dirección del bateador.

   ¿Qué piensan que le sucedió a la pelota cuando llegó al bateador? [Él balanceó el bate. La golpeó y esta se movió de regreso al pitcher].

   ¡Cierto! Puedo visualizarlo balanceando el bate, y luego la pelota cambiando de dirección cuando golpeó el bate del jugador de béisbol.

6. **Set expectations for Partner Reading.** Refer to the Partner Reading Guidelines as you review the three expectations: sit next to you partner, put the book between you, and take turns reading and listening.

Remind students that they will work with a partner to read the book and find examples of balls changing direction. Remind them that they will need to visualize the ball’s movement to help them figure out what happened and why the ball changed direction.

7. **Assign partners and distribute books.**

8. **On-the-Fly Assessment: Students read and visualize change of direction.** Circulate as students look at the photographs with their partners. Make note of which examples students are looking at so that you can reference them in the upcoming Shared Reading activity in Lesson 4.2.

9. **Gather students’ attention.** Collect books or have students return them to a designated area.
10. **Discuss examples in the book.** Ask one or two students to share an example from the book of a ball changing direction. Turn to that page in the big book so that the class can see. For each example, ask students whether the moving ball was pushed by something (for example, a bat or a foot) or if it hit an object (for example, the floor, a striped stick, or the ground).

Los objetos en movimiento pueden cambiar de dirección al ser empujados o al golpear algo.

11. **Collect books and conclude the lesson.** Explain that students will continue to work through examples of changing direction in the reference book in the next lesson.

**Embedded Formative Assessment**

**On-the-Fly Assessment 10: Visualizing and Discussing Change of Direction**

**Look for:** The focal comprehension strategy in this unit is visualizing by using information read or seen in books. In the Partner Read, students are specifically asked to refer to the photographs in *Forces in Ball Games* to visualize how and why the balls changed direction. As you circulate, observe students as they pantomime or talk about how and why the ball started to move in one direction and then changed to move in a different direction. Note if students are able to use clues from the pictures, as well as their prior knowledge, to help them as they discuss.

**Now what?** If students are unsure of the how the ball changed direction or how to describe how it changed direction, ask them to describe what they see in the photograph and invite them to pantomime how the ball started to move. Then, ask students in what direction the ball moved and have them trace (on the photograph) that direction. Continue with this line of questioning, asking what happened next to change the direction in which the ball moved and to specify the direction in which it moved. If students do not have the language to describe how the ball changed direction, note the difficulty and encourage students to pantomime playing each step of the game.

**Teacher Support**

**Instructional Suggestion**

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- Provide video examples showing balls changing direction in ball games.