

Lesson: Science Grades 2-3

Topic: The Motion of Objects



Hey Batter, Batter!

Overview: Hey batter, batter! This common chant at ball games comes to life as students practice hitting a variety of balls off a t-ball stand in an unconventional way. This investigation will help students identify and explain the motion of balls once they are hit by another object representing the bat.

Learning Outcomes:

National Standards:

1. Explain the motion of objects (bat and ball).
2. Organize and evaluate observations during an investigation of motion.
3. Changes in speed or direction of motion are caused by forces. The greater the force is, the greater the change in motion will be. The more massive an object is, the less effect a given force will have.
4. How fast things move differs greatly. Some things are so slow that their journey takes a long time; others move too fast for people to even see them.

Ohio Strands:

1. Describe an object's position by locating it to another object or background.
2. Describe an object's motion by tracing and measuring it over time.
3. Identify contact/noncontact forces that affect motion of an object (e.g., gravity, magnetism, collision).
4. Predict changes when an object experiences a force (e.g., push, pull, weight, friction).

Getting Started:

Materials:

- Modified outdoor playground swing (see diagram, remove regular seat and replace with a 4 inch diameter log)
- T-ball stand
- 6 foot or shorter step ladder
- Metric measuring tape
- Variety of balls (different sizes, construction, and mass) numbered beginning with 1,2,3, etc.
- Chart paper
- Construction paper markers with ball numbers on them
- Digital camera

Technology:

Videotape each swing, replay tape to see and discuss the motion of the swing, the contact with the ball, and the movement of the ball once hit. Take digital camera pictures of each ball to use for the graph.

Vocabulary:

- Distance

- Mass
- Motion
- Force

Handouts: none

Lesson:

Orientation activity:

1. Take children outdoors & preset area with multiple t-ball stands, bats, balls.
2. Each student has an opportunity to take swings at the ball on the tee.
3. Students observe the path that balls take when they are hit.
4. Discuss the differences with the students, work toward differences in swings, individual student strength and knowledge as variables that influence the results.

Learning activity

1. Students record qualitative and quantitative observations of each ball selected to use in the investigation. This data is recorded on a large sheet of chart paper displayed in the classroom (see Data Collection Chart attached). Provide materials for students to record the diameter of the balls by wrapping a string or yarn once around the ball, cutting it, and then measuring it with the metric tape measurer. Provide balances for the students to determine the mass of each selected ball.
2. Explain that each ball will be hit by the modified swing. Make predictions as to which ball will travel the farthest/shortest distance, straightest line, or fall off of the tee. Record these observations on chart paper to return to later for comparison with the actual results.
3. Set up the swing, ladder, and t-ball stand per the diagram and move students to this area. Be sure that the t-ball stand is at the appropriate height for the modified swing to make contact with the ball that is on the tee. Set the ladder on one side of the swing so that the modified swing rests on the tool rest of the ladder. This will serve as the release area for the swing. The ladder and the t-ball stand will remain in the same location until the investigation is complete.
4. Review with students safety precautions including distance to stay away from release area and the landing zone.
5. Place ball number 1 on the tee and one student on the ladder with a spotter. The student picks up the modified swing, pulls it back until it touches the ladder, and releases it without pushing it.
6. The modified swing will make contact with the ball on the tee, sending it into the landing zone. Another student places a marker with the number 1 on it where the ball landed.
7. Continue using different students for each job until all of the balls have been launched into the landing zone.
8. Students use metric measuring tape to measure the distance from the tee to the marker for each ball. This distance is recorded on the chart.
9. Discuss the results of the investigation. Students explain why one ball went a longer distance than another. These ideas are also recorded on the chart paper as conclusions.
Possible questions include: Why did a certain ball travel farther than another? What force caused the ball to behave in the way that it did? How could you

change it in another way? Why were students required to stand away from the release and landing zones? What comparisons can the students make between the mass and/or materials of each ball and the distance that it traveled?

10. Make a graph by placing a digital picture of each ball at the distance that it traveled from the tee. Work with the students to label each axis and create a title for the graph. Construct a statement or 2 that explains what the graph is showing.

Assessment tools and methods:

- Make observational notes of student ability to follow safety precautions, use of materials, measurement skills, and follow directions.
- Once data collection chart, graph, and discussion are complete, each student draws a diagram of the investigation with labels. They also write a couple sentences that explain what the chart and graph are showing about the investigation.

Interdisciplinary connections:

- Math: graphing skills including organization of data, labels, title, and interpretation of data, metric measurement using a balance and linear measurement tool
- Language Arts: written expression of observations and inferences, interpreting and explaining data on charts and/or graphs.

Hey Batter, Batter! Data Collection Chart

Ball number	Mass (in grams)	Descriptive observations	Distance traveled	Conclusions
One				
Two				
Three				
Four				
Five				