



COMMOTION ABOUT MOTION

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Lesson Summary for Grade 2

This lesson involves a day of hands-on activities involving different kinds and sources of motion and the variables that affect moving objects. After the initial activities and discussion, the students are divided into groups to work through different stations. We used parent volunteers to facilitate these stations. Before students break into groups, introduce and review the different types of motion and demonstrate the activities so students have a chance to discuss and ask questions about each activity before beginning. This second-grade science lesson includes cross-curricular activities in social studies and art.

Science Activity 1: Spooky Spiders and Webs

Students make rolling spider toys and race them on different surfaces to investigate forces and motion. Students also make glue “spider webs” for their spiders after testing different glues and “spinning” surfaces.

Source: Sarquis, M. and Woodward, L. *Science Projects for Holidays Throughout the Year*; McGraw-Hill: New York, 1999; pp 77–89. (ISBN 0070647585)

Key Science Topics:

- friction
- physical properties
- motion

Key Process Skills:

- measuring
- predicting

Archdiocese of Cincinnati Course of Study Science Curriculum Goal IV:

305. Identifies the variables which affect moving objects.
310. Identifies various types of forces (frictional, centripetal, etc.).

Archdiocese of Cincinnati Course of Study Math Curriculum Goal II:

25. Learn strategies for mental math.
26. Understand concepts of addition.
28. Knows fact to 18.

Make the Speedway Spiders as per the Part A activity procedure on pages 79-81. While the legs are drying, design your own spider web using glue on black construction paper. Dust glitter on the glue so they resemble Charlotte’s web in the dew. Use these webs to decorate a Speedway Spider center. Make spider webs on large white roll paper and put removable discs in the center of each. Assign a value, math fact, or dollar amount to each re-usable disc. Mark the floor in the area to be used with tape every foot so the students

can tell distance. (Ahead of time, a roll of adding machine paper tape can be marked in foot distances, so it can be taped to the floor to save time.)

Borrow two spiders and ask students if they are real. Can they run? We can help them run by adding a ball shape under them. Show students a marble and ball bearing. Ask students if they think the spiders will run the same. Have students try. We also need a force that would be the person pushing. We can vary the force by how hard we push. Demonstrate various amounts of force.

Each student brings his or her spider to the center and tries a marble or a ball bearing to race the spider. Have them recall what they discovered in the demonstration. Each student takes a turn “going for distance.” The best distance out of two is recorded on a class chart. (This keeps some students busy while the others are doing this next part.) There is a large piece of roll paper with webs on it. The center of the webs have facts, dollar amounts, or values on them. The object is for each member of a group to try to have his or her spider land on a high value web. The students use mental math to add the amounts and come to a team total. This total is posted, and the other teams try to beat the highest score. Students use what they learned about varying force to get to a certain location.

Science Activity 2: Water Swinger

Students learn the term “centripetal force” and use the concept to swing a cup of water upside down without spilling.

Source: *The Rotations, Spins, Revolutions, and Orbits of Toys* (Module); Terrific Science Books, Kits, & More: Middletown, Ohio, 1999; (unpublished).

Key Science Topics:

- centripetal force
- gravity
- speed

Key Process Skills:

- brainstorming
- problem solving
- following directions

Archdiocese of Cincinnati Course of Study Science Curriculum Goal IV:
310. Identifies various types of force (centripetal).

Punch two holes in each small paper cup. A long string is tied and knotted in these holes—one cup for each student. Have small counting bears on hand to practice with first. A watering can full of water is needed at the station and possibly a roll of paper towels. The challenge is to put water into a cup and keep it there, without spilling, even when the cup is turned upside down—no lid and no plastic wrap! All you can use is a cup, string, water, and one hand. Discuss, brainstorm, and plan. Try some of the students’ ideas, but use a counting bear instead of water to see if they work first. Help students by having them think of things that spin, such as a washer, dryer, wheels, or a ball on the playground. This spinning is a kind of force. Introduce the “million-dollar word”

centripetal—any force that produces circular motion. Water moves in a straight line but the cup moves in a circle holding it in. The force has to be fast enough to overcome gravity. Each student is given a chance to try this water swinger, first with a counting bear and then with water.

Science Activity 3: Ramps and Cars

Students explore the effect of different angles of inclined planes on speed and distance.

Source: Taylor, B.A.P., Poth, J., and Portman, D.J. *Teaching Physics with TOYS*; McGraw-Hill: New York, 1995; pp 25–32. (ISBN 007064721-6)

Key Science Topics:

- distance
- gravity
- inclined planes
- motion
- speed

Key Process Skills:

- predicting
- controlling variables

Archdiocese of Cincinnati Course of Study Science Curriculum Goal IV:

305. Identify variables which affect moving objects.
310. Identify various types of force.

Archdiocese of Cincinnati Course of Study Math Curriculum Goal VII:

228. Create a graph.
232. Collect and organize data by making a bar graph.

Archdiocese of Cincinnati Course of Study Social Studies Curriculum Goal VI:

308. Recognize the need for cooperation with and among groups.
317. Develop an understanding of group functioning.

Gather the materials listed on pages 25-26 of *Teaching Physics with TOYS* as well as 1/4-inch graph paper. Make TEAM Cards on index cards. (T=put ramp on block, E=go to end to see where car stops, A=launch car, M=record distance on graph paper.) Note that the graph paper could be lined and organized the day before in math class to save time.

Recalling what they already know about motion and speed, students answer the question “Will a toy car move on the track by itself?” No. “What is needed?” Force. “What else can we do to make it go faster?” Incline the plane.

Show students the blocks and track. Explain how each team is going to pick a car, set their track up on one block, predict how far it will travel, write the prediction, test the car two times and record the best distance, then repeat the process with two and then three blocks and the same car. Each team member is given a card with his or her job on it. A station is preset according to “Getting Ready” on page 27 and each team follows the process listed in the demonstration. At the end, the team is asked what they found out about how speed and distance are affected by inclining the ramp.

Science Activity 4: Balloon on a String

Students discover that an object can be pushed or pulled by an invisible force.

Source: Taylor, B.A.P., Poth, J., and Portman, D.J. *Teaching Physics with TOYS*; McGraw-Hill: New York, 1995; pp 33–38. (ISBN 007064721-6)

Key Science Topics:

- force
- motion

Key Process Skills:

- observing
- predicting

Archdiocese of Cincinnati Course of Study Science Curriculum Goal I:

5. View science as inquiry, process, change.
8. Observe objects.

Archdiocese of Cincinnati Course of Study Science Curriculum Goal IV:

310. Identify various types of force.

Prepare for the activity by tying the string to a stationary object above students, precutting the string to the desired length of flight, tearing the lengths of tape and sticking them to something close to shorten time, and pre-stretching the balloons. Inflate the balloon. Ask what will happen when you let go. Release. Observe. Why is air pushed out of the balloon? *The stretched balloon exerts a force on the air inside, causing the air to be pushed out of the hole.* Why does the balloon move forward if the air goes out the back? *Air expelled backward exerts an equal force on the balloon, pushing it forward.* Each student launches his or her balloon airship. You could put up two lines for races, depending on help available. Question: Would a smaller balloon travel as far?

Art Activity

Students create a picture of a wheeled transportation.

Have students design and illustrate a type of transportation that uses wheels. This can be from the past, present, or future. Students can use the end of toilet paper rolls dipped into black poster paint to print wheels. Have them draw and color the rest with crayon.

Archdiocese of Cincinnati Course of Study Art Curriculum Goal I:

- B2. Make different kinds of lines and areas with crayons.
- B72. Make art from found materials.

Archdiocese of Cincinnati Course of Study Art Curriculum Goal II:

135. Recognize that artists often mix materials.

Archdiocese of Cincinnati Course of Study Language Arts Curriculum Goal III:

- 26e. Participate in activities extending reading through art.

Reading Activity

Students listen to Charlotte's Web.

As a class, read *Charlotte's Web* by E.B. White.

Archdiocese of Cincinnati Course of Study Language Arts Curriculum Goal III:

- Read a variety of materials, including fictional work.

Writing Activity

Students express their opinions in writing.

At the end of the Commotion About Motion science day, have students write what activity they liked best and why.

Archdiocese of Cincinnati Course of Study Language Arts Curriculum Goal VI:

- Write descriptive pieces.

Social Studies Activity

Students investigate transportation past and present and design a future means of transport.

Link motion to transportation and discuss ways people went from place to place in the past and in the present. Have students design a means of transportation that will be used in the 21st century. Then have them draw a picture and write a description that includes the force that powers it.

Archdiocese of Cincinnati Course of Study History Curriculum Goal III:

130. Recognize the difference in customs and lifestyles of the past, present, and future.