

## **Balls and Ramps**

NCSCOS

Kindergarten

**COMPETENCY GOAL 3: The learner will build an understanding of the properties/movement of common objects and organisms.**

### **Objectives**

3.01 Describe objects in terms of the materials they are made of (clay, metal, cloth, paper, etc.) their physical properties (color, size, shape, weight, texture, flexibility), and how they are used.

3.02 Describe how objects look, feel, smell, taste, and sound using all the senses.

3.03 Describe motion when an object, a person, an animal, or anything goes from one place to another.

Grade 1

**COMPETENCY GOAL 4: The learner will build an understanding of the actions of objects.**

### **Objectives**

4.01 Observe the ways in which things move:

- Straight.
- Zigzag.
- Round and round.
- Back and forth.
- Fast and slow.

4.02 Describe motion of objects by tracing and measuring movement over time.

4.03 Observe that movement can be affected by pushing or pulling.

4.04 Observe that objects can move steadily or change direction.

### **The BIG IDEA**

Objects move in a variety of ways and at a variety of speeds. The way things move and the speed at which they move is dependent upon a number of factors such as mass, slope, and interaction with other objects.

Students participating in Balls and Ramps can be expected to utilize the following science process skills:

- Observing  
using their senses to gather information about balls, ramps, movement and inertia.
- Classifying-  
grouping balls and ramps in a systematic way.
- Communicating-  
verbally giving or exchanging information based on their experiences during the lab.
- Inferring-  
developing ideas about balls, ramps, movement and inertia based on their observations and from their past experiences.
- Predicting-  
based on their inferences, children can be expected to develop additional ideas about balls, ramps movement and inertia.
- Space/time relations-  
developing ideas about balls and ramps and what affects speed and movement through space.
- Defining operationally-  
stating specific information about balls, ramps and movement based on their experiences.
- Formulating models-  
developing a physical and mental representation to explain balls and movement.

### **Activities**

**Making a Ball**

**Roller Coasters**

**Raceways**

**Old Fashioned Marble Game**

**Can Cans?**

**Balls and Ramps**

**Labyrinths**

## Materials:

scrap materials (cloth, paper, ribbon, cardboard...junk!)

string

tissue tubes

index cards

tape

scissors

"Blocks n' Marbles" set

Marble Raceway set

marbles, both regular size and a 'shooter'

variety of canned goods-some of the same size but different weights, some with solid contents, some with liquid contents

2' X 2' ramp

books or bricks to prop up one end of ramp

tape for finish line

several feet of Hot Wheels track

bricks, blocks of wood or books

ping pong balls

golf balls

mazes such as the wooden Labyrinths

small steel ball bearings

student instructions (See end of document)

Procedure: Each activity can be set up and done separately or you can set them up all at once. Enlarge the font of the student instructions, make copies and laminate.

## Making a Ball

materials

scrap materials (cloth, paper, ribbon, cardboard...junk!)

string

tape

scissors

1. Set out all scrap materials at a supply table or other central location. Each group of students should have scissors, tape and string. Allow only small amounts of tape or you'll end up with a solid ball of tape.
2. Start a discussion about what characteristics make a ball a **ball**. Show students several different types of balls. What do they all have in common? In what ways are they different.
3. Write down student responses on the board. Decide on a general definition of a **ball**.
4. Challenge children to use the materials to create a ball. After the balls have been constructed, let students test them to see if they meet the criteria of a ball.

## Roller Coasters

materials

tissue tubes

index cards

tape

scissors

marbles

1. Set out lots of tissue tubes and index cards. Each group of students should have tape, scissors and a dish of marbles
2. Challenge kids to make the longest continuous tube through which to roll a marble. Cards can be used to tape tubes together and to form curves.
3. Make sure students test the roller coasters as they construct them to make sure the marble can roll freely.
4. Help students understand that they can alter the speed of the marble by raising or lowering the starting end of the tube. What else can they change?

## Raceways

## Raceways

materials

“Blocks n’ Marbles” set  
Marble Raceway set  
marbles

1. Set out “Blocks and Marbles” and plastic “Marble Raceway” set. Put out a dish of marbles for testing.
2. Each raceway set has its own challenge.
  - The task with the “Blocks n’ Marbles” wooden raceway is to make the longest track for the marble to run through. What strategies should they use?
  - The task with the plastic raceway is to make the tallest raceway for the marbles. What strategies should they use?
3. Discuss solutions with students. Are the solutions different for the different types of challenges?

## Old Fashioned Marble Game

materials

string  
marbles, both regular size and a ‘shooter’

1. Cut a piece of string about five feet long. Tie ends together to make a circle. Lay circle on the floor. Place small marbles in the circle. The rules of the game are as follows:
  - Each player kneels outside of the circle.
  - First player aims the shooter at the marbles in the center and flicks the marble towards the middle. Any marbles that go outside of the circle become his for the duration of the game.
  - Next player uses the shooter to try to get other marbles out of the circle.
  - When the circle is empty, the game is over. Player with the most marbles wins.
  - **ALL marbles must be returned to the game when play is completed.**
2. Discuss with students which strategies worked, which didn’t and why the shooter marble is so much bigger. What would happen if the shooter was MUCH bigger? What would happen if it was the same size?

## Can Cans?

materials

variety of canned goods-some of the same size but different weights, some with solid contents, some with liquid contents  
2’ X 2’ ramp  
books or bricks to prop up one end of ramp  
tape for finish line

1. Set the ramp up so that it is about 12” high on one end. Use tape to make a finish line several feet away from the bottom of the ramp.
2. Put students in teams of two. Two teams will compete against each other.
3. Each team will pick the can they think will make it over the finish line first.
4. One team member will be at the start to let the can go, one will be at the finish to retrieve it. On the count of three, let go.
5. Run many trials and then discuss what made the winning can win.
  - Heavy or light?
  - Liquid or solid?
  - Small or large?
6. Ask students if it would make a difference if the slope of the ramp was changed. Try any ideas kids come up with. Discuss results.

## Balls and Ramps

materials

several feet of Hot Wheels trax  
bricks, blocks of wood or books  
ping pong balls  
golf balls

1. Use Hot Wheels Trax to make at least two ramps. Make sure that one ramp is much higher than the other (use a table edge or a chair) and tape ends down to secure.
2. Set up bricks or blocks few feet away from the end of the trax to stop the balls from rolling too far.
3. Challenge kids to race balls down the trax. Which race track is fastest? Which ball rolls furthest? Which is more important-the weight of the ball or the height of the ramp?

### **Labyrinths**

materials

mazes such as the wooden **Labyrinths**  
small steel ball bearings

1. Set up Labyrinths. Use steel ball bearings for ball.
2. Challenge students to move the ball from beginning of the labyrinth to the end.
3. What are the difficulties with moving the ball from one place to the end? How did students solve the difficulties?

### **Make a Ball**

1. Look at the materials on the tables. You can use any of them to make a ball about the size of your fist.
2. Try to roll your ball. Does it roll?
3. Try to bounce your ball. Does it bounce?

**Is it a ball?**

### **Roller Coasters**

1. Use the cardboard tubes and tape to make a marble roller coaster.
2. Tape several of the tubes together and test it with a marble. Does it work?
3. Use the index cards to help create a curved roller coaster. Remember to test at each step.
4. How long is your roller coaster?

### **Marble Raceways**

Each raceway set has its own challenge.

1. Blocks and Marbles: try to build the **longest** raceway you can that still allows the marble to travel from beginning to end.
2. Marble Roller Coaster: try to build the **tallest** raceway you can.
3. Test both of the raceways with a marble as you construct the raceway.

### **Old Fashioned Marble Game**

1. Play with a friend. The object of the game is to collect the most marbles.
2. Divide the small marbles into two sets. Each player gets one set and a large 'shooter' marble.
3. Place all of the small marbles into the center on the circle.
4. Take turns flicking the shooter at the small marbles. Any that go out of the circle go into that player's pile until the end of the game.
5. When all of the marbles are out of the circle, count up how many each player has. Highest number wins.

### **Can Can?**

1. With your partner, choose a can you think will go down the ramp the fastest. Race against another team.
2. Set the cans at the top of the ramp and let go. Which can wins?
3. Try again with a different set of cans. Why are some cans faster than others?

## **Balls and Ramps**

1. There are several types of balls and several ramps to try.
2. Experiment to find which combination of ball and ramp produces the fastest run.

Is there any difference between the balls?

Between the ramps?

## **Labyrinths**

1. The object of the game is to get the marble from the START to the FINISH. Use the knobs on the sides of the box to tilt the surface and guide the ball.
2. What strategies work to get the ball to the finish line?