**Matter**

**Lesson #1:** **Properties of Balls**

**Time Frame:** 60 minutes

**Learning Standards:**

*Science*

Physical Science: Observable Properties of Objects

1. Sort objects by observable properties such as size, shape, color, weight, and texture.

Skills of Inquiry

1. Select and use appropriate tools and technology in order to extend observations.
2. Keep accurate records while conducting simple investigations or experiments.
3. Recognize simple patterns in data and use data to create a reasonable explanation for the results of an investigation or experiment.
4. Record data and communicate findings to others using graphs, charts, maps, models, and oral and written reports.

**Student will be able to:**

1. Describe, record, and measure the different physical properties of balls.
2. Explain how balls can be grouped according to size, color, weight, bounce height, texture, and buoyancy.

**Resources and Materials:**

|  |  |
| --- | --- |
| **Item** | **Amount** |
| Science notebooks |  |
| Ball properties chart student handout | 50 (in bin) |
| Ball properties station instructions | 1 per station (in bin) |
| Different types of balls | 10 balls (2 sets) (in bin) |
| Clear container with lids | 2 (in bin) |
| Water (not provided) | (in classroom) |
| Retractable tape measures | 3 (in bin) |
| Meter sticks (not provided) | (in classroom) |
| Paper towels (not provided) | (in classroom) |
| Made balances  Washers and paper clips  Hooks and pins (to hang balances) | 3 (in bin)  1 container (in bin)  1 container (in bin) |

**Focus Activity:** Show students the container with the different types of balls to the class.  Ask the students to write down in their science notebooks different ways that the balls could be grouped.  How are the balls similar?  How are the balls different?  What else could we do to the balls to test them for differences and similarities?  Make a big list on the board of all of the ball properties that the students come up with.  The list should include the following: size, color, weight, bounce height, texture, and sinking or floating in water.  Discuss the meanings of any of these terms if necessary.

**Introduction:** Introduce the term **property** to the class.  Explain that objects of the same type have properties that they all share, such as color, size, and shape, and we can tell these objects apart by observing their specific characteristics.  Discuss this idea with the class.  Discuss the properties of other objects such as books, trees, flowers, stuffed animals, or cars.  For the experiment today, explain that the class will be looking at the properties of balls.  Make sure to familiarize your class with how to use the balance and how to measure the circumference of the ball.

**Activity:**

1. Before class, set up 6 different stations (with spots for 2-3 student pairs at each station) around the room, one station for each property.  Organize the materials and the station instruction cards at each station.  At the different stations students will do the following:
2. Observe the color
3. Observe the texture (you may want examples of different textures and what they are called)
4. Measure the circumference of the ball (in centimeters)
5. Weigh the ball using a made balance and washers and paper clips (weight will be measured in # of washers and/or paper clips)
6. Use a meter stick to determine how high each ball can bounce.
7. Determine if the ball will sink or float in water (with paper towels to dry the ball). **Note:** The box of balls that get wet should stay at this station.  This may be difficult to organize so consider this station optional.
8. **Note:** Set up additional stations if the students have other properties that they want to observe.
9. Pass out the Ball Properties Chart to each student.  Students will work in pairs to complete the activity, but each student should fill out their own chart.
10. Give each group one type of ball.  Let them test the ball at all of the different stations.  When they are done, check their chart and then give them another ball.  This way, groups can work as quickly or as slowly as they need to.  Students that test more than 6 balls can get an additional chart.
11. While the students are observing the properties of different balls, work with individual pairs of students to measure the properties.  Ask them questions about what they think will happen and what they observe.
12. Ask each group to choose one ball to present to the class.  Each group will describe the properties of the ball to the class, but they should exclude color in their description to make it more challenging for other students to guess their ball.  Once students have guessed the correct answers, ask questions and encourage discussion about the differences and similarities between the balls.
13. Discuss the following questions as a class.  Why did some balls bounce and some balls not bounce?  Why were some balls heavier than others?  What makes some objects heavy and some light?  Why did some balls sink and some float?  What do you think the different balls are made of?  How does this affect their properties?

**Closure:** Ask the students to answer the following questions independently in their science notebooks: What is a property of an object? List the properties of dogs that could be used to tell them apart. (Examples include color, size, type of fur, length of tail, etc.) Ask the students to share their responses with the class and discuss.

**Assessment:** Science notebook responses, ball chart, ball presentations to the class, participation in class discussions

**Color**

What color is your ball?

* Record the color in your chart.

**Texture**

How does your ball feel?

Rough? Smooth?

Bumpy? Soft? Hard?

* Record the texture in your chart.

**Size**

How big around is your ball?

* Use the measuring tape to measure around your ball in centimeters.
* Record the measurement in your chart.

**Weight**

How much does your ball weigh?

* Place your ball in a cup on the balance.
* Slowly add washers and/or paper clips to the other cup until the balance is even.
* Record the number of washers and paper clips in your chart.

**Bounce Height**

How high does your ball bounce?

* Use the meter stick taped to the wall.
* Hold the ball at the very top (100 cm) and drop the ball.
* Measure how high the ball bounces in centimeters.
* Record the measurement in your chart.

**Sink/Float**

Does your ball sink or float?

* Get your same ball from the basket.
* Drop the ball in the water and see if it sinks or floats.
* Dry the ball and put it back in the basket.

Record if your ball sinks or floats in your chart.

