Active Learning Community Partnership

STEM Ball Play

STEM Focus Area: Scientific Process Skill Development

Learning Goal: Youth will develop skills of observation, sorting, and classifying.

LEARNING ENVIRONMENT

Activity Duration: 30 minutes

Class Size: Small

Type of Space: Indoor or Outdoor

Age of Youth: Preschool

Guiding Question: *What is the question to explore OR the problem or challenge to solve?*
What are the physical properties of balls?

Through this activity, youth will:

- Explore and observe balls as they sort and classify balls into groups with different kinds of properties.

Facilitator Checklist in the Learning Environment:

- ✓ **Predict and hypothesize**
  Develop and use models
  Measure materials
- ✓ **Observe**
- ✓ **Investigate**
  Record observations
- ✓ **Analyze and infer**
- ✓ **Share and communicate data**
  Interpret data
  Test and revise
- ✓ **Draw conclusions and relationships**
- ✓ **Have voice and agency, make decisions and guide their own learning**

PREPARATION

Facilitator prep:
Gather balls of different sizes, materials, and weights to build a ball collection stored in a large, clear garbage bag so youth can get a sneak peek at the ball collection before you begin the activity. Ask families and friends to help and allow several days for youth to bring their donation to add to your ball collection! Here are some suggestions of types of balls to collect:

- Baseball
- Basketball
- Beach ball
- Bowling ball
- Football
- Golf ball
- Kick ball
- Koosh ball
- Marble
- Ping-pong ball
- Pool ball
- Raquet ball
- Soccer ball
- Volleyball
- Whiffle ball
- Bouncy ball
- Wooden ball
- Playground rubber ball
- Plastic ball
- Cotton Ball
- Ball of Yarn
- Juggling Ball
- Tennis Ball
- Stress Ball

Physical science explores the energy of objects and the way they move. Because balls bounce, spin, roll in all directions, and store and transfer energy, exploring balls is a great way to learn physical science concepts and it's never too young to begin. What child can see a ball and not want to roll or bounce it? By simply rolling, throwing, or bouncing a ball youth are learning about cause and effect, developing motor control, and building eye-hand coordination. By including different types of balls in your collection for this active learning experience, youth use observation and prediction skills to investigate their properties.

Physical properties are **characteristics** that can be observed or measured without changing the composition of a substance. Kids Academy has a great, simple video that you could show your students to help them better understand properties of materials:
https://www.youtube.com/watch?v=veUUii1U8-o

A ball is a sphere. This means that a ball looks like a circle from every angle.

Literacy Connection: Great preschool books to get youth excited about investigating balls! *(available on Amazon).*

- The Ball Book: Footballs, Meatballs, Eyeballs & More Balls! By Joshua David Stein
- How Far Will It Bounce? – My Blue Ball by DC Swain
- Pete the Cat: Play Ball! By James and Kimberly Dean
- A Ball for Daisy (Caldecott Award Winner) by Chris Raschka

Materials

- A Ball Collection with as many varieties of balls as you can find

- Plastic wading pool *(to hold the balls)*

Room: This activity is best done in a gym or a large mostly empty room as it needs a lot of open floor space to allow the children to sit around the plastic wading pool filled with balls. You'll also need plenty of space the youth to organize and sort the balls.

Content: A ball is a round or nearly-round object with observable properties like shape, color, size, weight, etc.

Vocabulary:

- Ball
- Color
- Size
- Shape (circle, round)
- Roll
- Bounce

Inquiry:
Your primary goal as facilitator is to encourage youth to talk about balls. You can prompt those discussions with questions like the following:

- What do you notice about the balls?
- How are some of the balls the same?
- How are they different?
- How could you organize these balls into groups?
- What shape are balls?
- Do all balls bounce?
- Does the size of the ball affect how high it will bounce?
- Tell me what you notice about these balls.
- How are some of these balls the same?
- How are some of these balls different from each other?
- What could we do with these balls?
- How could we organize these balls into groups?

Facilitator Checklist for Preparation:

- ✓ Organization: I practiced the activity/technology, prepared materials/extras/place to record youth ideas, completed an activity (including timings).
- ✓ Materials: Materials are appropriate for teaching the learning goals; youth will be able to use them and will think they are appealing.

- ✓ Space Utilization: The space is set up appropriately for the activity and there will be no safety issues or distractions.
- ✓ Relevance: I have researched why the content matters to youth's everyday lives.
- ✓ Content Learning: I have become familiar with the content.
- ✓ Inquiry: I have become familiar with how authentic, age-appropriate inquiry practices look in this activity.

INTRODUCTION TO ACTIVITY (5 MINUTES)

The introduction is done while youth are sitting and observing the balls (before any physical exploration of the balls begins). Start by asking youth what they already know about balls and write their comments out on chart paper or a chalk board. Youth might tell you things like this:

- *Balls are round.*
- *Balls come in lots of different sizes.*
- *Balls come in different colors.*
- *Balls bounce.*
- *Balls are made of different things.*
- *You can play with balls.*

Ask the group what they want to know about balls. Tell them that scientists begin their experiments by asking questions. "What do you all think we should try to learn about balls during our exploration of balls?"

Youth might answer with questions like these:

- *What's inside a ball?*
- *Do all balls bounce?*
- *Which balls bounce better than others?*
- *How far can I throw different kinds of balls?*
- *Which balls roll the fastest?*
- *Can I make a ball?*

Write their questions out on chart paper or a chalk board. As the youth are telling you their questions, be sure to model your own curiosity by wondering aloud. Something like…*I wonder how far this beach ball will roll.*

Reinforce youth asking their own questions with positive comments like, "*That's a good question, Jeremy. Let's write it on our chart and we'll try to figure out the answer."*

Lastly, ask youth how some of these balls might be used.

Facilitator Checklist for Introduction to Activity:

- ✓ Space Utilization: I will use the space informally avoiding the lecture hall format.
- ✓ Purposeful Activities: This intro section gets youth on track for the learning goal.
- ✓ Content Learning: If age appropriate, I will accurately present content.
- ✓ Inquiry: In this or another section of the activity, youth carry out one or more inquiry practices.
- ✓ Relationships: I will make each youth feel welcome.
- ✓ Relevance: In this or another section, I will guide the youth in a sustained discussion of how the activity relates to their everyday lives.
- ✓ Youth Voice: In this or another section, I will allow youth the opportunity to make decisions about their learning experiences.

ACTIVITY ENGAGEMENT (20 MINUTES)

If it's possible to take the class outdoors to explore the balls, that allows maximum freedom for exploration, but this activity can also be done indoors in a large space like a gym. If you're going outside, you can ask each child to carry a ball outside.

Once outside, encourage youth to put all of the balls on the ground in a big pile and begin exploring the balls by touching, throwing, kicking, or however they choose to examine the ball for about 10 minutes. Ask youth to use words to describe the balls to each other as they do this open exploration of balls.

Next ask the youth to sort and categorize the balls. If you have more than six youth in your group, you may want to divide them into small groups of 3 and instruct them to choose five balls to sort. Let the youth determine what their ball categories are. They might decide to sort by size, by color, by weight, by how well they bounce, or by yet another property.

Pay close attention that each child is actively involved in the sorting and classifying process and if some youth are not involved, intercede and directly ask them what they're observing about the balls to encourage their participation in the activity.

Facilitator Checklist for Activity Engagement:

- ✓ Space Utilization: I will use the space informally avoiding the lecture hall format.
- ✓ Participation: All youth will have access to the activity.
- ✓ Purposeful Activities: This core section helps youth to move toward the learning goal.
- ✓ Engagement: This activity has youth physically engaged with their hands and their minds.
- ✓ Inquiry: In this or another section of the activity, youth carry out one or more inquiry practices.
- ✓ Reflection: If appropriate, I will ask youth questions during the core activity that will help them make sense of what they are learning.
- ✓ Relationships: I will take steps to share my enthusiasm and create a nurturing, safe learning environment.

- ✓ Relevance: In this or another section, I will guide the youth in a sustained discussion of how the activity relates to their everyday lives.
- ✓ Youth Voice: In this or another section, I will allow youth the opportunity to make decisions about their learning experiences.

FINAL REFLECTION AND RELEVANCE (5 MINUTES)

Ask each youth to describe to the entire group something about how they organized the balls. Be sure to prompt each child to get involved in discussing the way they have classified the balls.

Lead a discussion about how balls are used in everyday life and prompt youth to share their experiences with balls. Be sure to allow the last 2 minutes for clean-up.

Facilitator Checklist for Activity Reflection & Relevance:

- ✓ Space Utilization: Again, I will use the space informally.
- ✓ Participation: I will prompt youth who do not have access to the activity to participate.
- ✓ Purposeful Activities: The closing section helps youth to reach the learning goal.
- ✓ Content Learning: I will help youth make connections between different ideas. I will create opportunities for youth to ask questions/provide ideas that show a deeper level of understanding.
- ✓ Inquiry: In this or another section of the activity, youth carry out one or more inquiry practices.
- ✓ Reflection. I will provide youth with a sustained opportunity to make sense of their learning.
- ✓ Relevance: In this or another section, I will guide the youth in a sustained discussion of how the activity relates to their everyday lives.
- ✓ Youth Voice: In this or another section, I will allow youth the opportunity to make decisions about their learning experiences.