



Balls & Ramps



Balls & Ramps (What's Included!)

- Introduction to the Unit of Investigation
- Materials Needed for Activities
- Vocabulary Words
- Guiding Questions
- Songs to Sing
- Books to Read
- Tips to Reinforce the Unit in Everyday Experience
- Know Wonder Learn (KWL) Chart
- Word Web (Expansion of Concepts Relative to Unit of Investigation)
- Expanded Play with Unit of Investigation
- 12 Activities (Including Materials Needed, Directions to Follow, and Targeted Learning Objectives)



Introduction: Balls & Ramps

Time to rock and roll, and have a ball - literally! Balls can drastically range in size, weight, texture, and use, that naturally fosters scientific, mathematical, and creative exploration. By scaffolding your child through our guided questions, coupled with hands-on exploration, your child will be inspired to think more critically about everyday objects, such as balls, while formulating ideas and drawing conclusions.

This exploration is more of a “two-part” experience, as children will simultaneously look at something relative to balls; ramps! Ramps are excellent machines to pair with ball play, testing concepts of speed, incline, friction, etc. While we can and will pair balls with ramps, we'll also combine ramps with other objects and materials to dive deeper into concepts of engineering, encompassing science and mathematics.

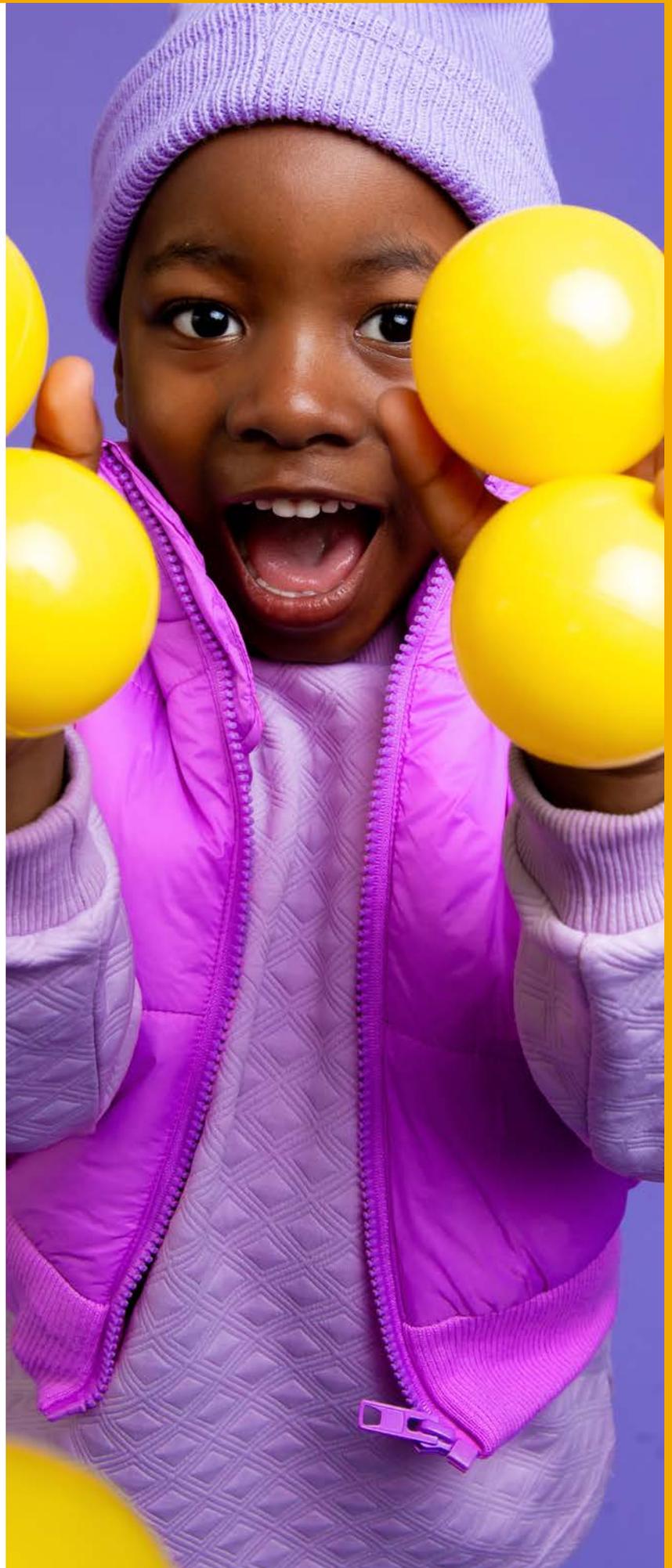
When administering activities, it's important to re-offer the same activities several times over. This allows children the opportunity to make deep connections, comprehend uses and properties, while contributing to mastery and memory recall. And keep in mind that learning is not confined to a specific time, place, or activity. It's an ongoing journey where connections are woven through daily interactions and engagement with the people, places, and materials that surround us.



Materials

Our suggested list of materials are items that will supplement the activities and experiences in your packet.

- A variety of balls to explore - the more the merrier! Consider & choose from:
 - Baseball, basketball, beach ball, handball, tennis ball, soccer ball, football, golf ball
- Cotton balls
- Pack of marbles
- An assortment of round materials that are not balls (to compare/contrast). Consider:
 - Wood slices, metal rings, rocks, empty paper towel rolls, caps, pinecones, blocks, etc.
- Loose parts and materials your to try and make their own balls. We recommend:
 - A handful of rubber bands
 - Aluminum foil
 - rope/string with scissors
- Clay or play dough
- Tempera paint
- Watercolors
- White paper or butcher paper
- Watercolor paper
- Dropper/pipettes
- 1 large container or shallow box
- Large sheets of cardboard boxes to make ramps



Vocabulary Words

New & relative vocabulary words to incorporate in everyday experiences: In addition to incorporating the vocabulary words provided below, try to speak as you go! Talking to children as you go is one of the most powerful ways to expand upon receptive and expressive language development. The more language children are exposed to (when used in meaningful and relative context) the greater it contributes to language and future literacy skills.

- Ball
- Ramp
- Gravity
- Incline
- Roll
- Momentum
- Velocity
- Acceleration
- Speed
- Friction
- Slope
- Curve
- Bounce
- Energy
- Kinetic
- Potential
- Collision
- Path
- Angle
- Obstacle
- Rotation
- Trajectory
- Diameter
- Circumference
- Spin
- Surface
- Rebound
- Force
- Impact
- Drop
- Zigzag
- Loop
- Groove
- Hollow
- Sphere
- Cylinder
- Parabolic
- Projectile
- Arc
- Momentum



Guiding Questions

Guiding questions play a vital role in emergent curriculum as they spark curiosity, promote inquiry, and guide the direction of learning experiences based on children's interests and developmental needs. By posing open-ended questions that encourage exploration and discovery, we can tap into children's natural curiosity and foster a deeper understanding of concepts. These questions serve as a catalyst for meaningful learning experiences, empowering children to actively engage with their environment, make connections, and construct knowledge.

Guiding questions also help scaffold learning opportunities, providing a framework for observation, assessment, and reflection on children's interests, skills, and growth. They promote collaboration and dialogue, fostering a dynamic learning community where ideas are shared, perspectives are valued, and creativity thrives. Guiding questions honor children's voices, interests, and agency in shaping their learning journey.

- What makes something a ball? How do you know?
- What makes each ball different from the others?
- Can you think of new games to play with the balls?
- How can we use balls for counting, sorting, and storytelling?
- How would different sizes of balls behave on the same ramp?
- How might changing the ramp's height affect the ball's movement?
- What materials would you choose for a ramp, and why?
- How might a ramp's steepness affect the ball's speed?
- How could we arrange multiple ramps to create various paths for the ball?
- What could we do to make the ball go faster down the ramp?



Songs to Sing

Singing with children is a multifaceted tool for development, enhancing language skills through exposure to varied vocabulary and rhythms. The rhythmic and melodic nature aids memory, making learning engaging. Beyond cognitive benefits, singing promotes emotional expression, fostering a holistic growth experience.

Featured Songs:

Take Me Out to the Ball Game

Take me out to the ball game,
Take me out with the crowd.
Buy me some peanuts and Cracker Jack,
I don't care if I never get back.

Let me root, root, root for the home team,
If they don't win, it's a shame.
For it's one, two, three strikes, you're out,
At the old ball game.

Bouncing Ball Song

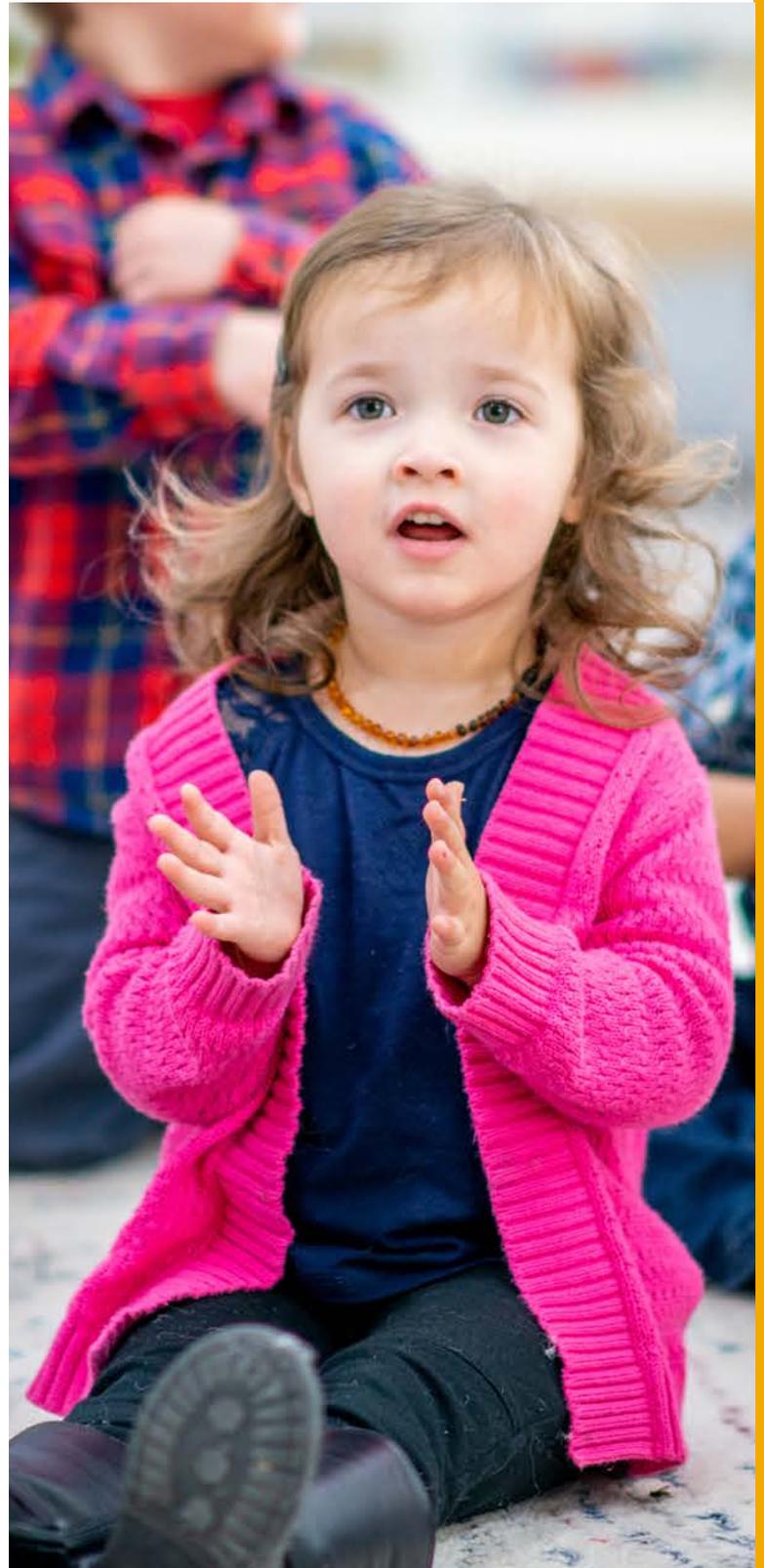
Bounce, bounce, bounce the ball,
Up and down, we have a ball.
On the ground, against the wall,
Bouncing ball, we love it all.

Bouncing ball, bouncing high,
In the air, it touches the sky.
Bouncing ball, so much fun,
We could play until the day is done.

With a dribble and a hop,
The ball goes up, it doesn't stop.
Bouncing fast, bouncing slow,
Where it goes, we love to go.

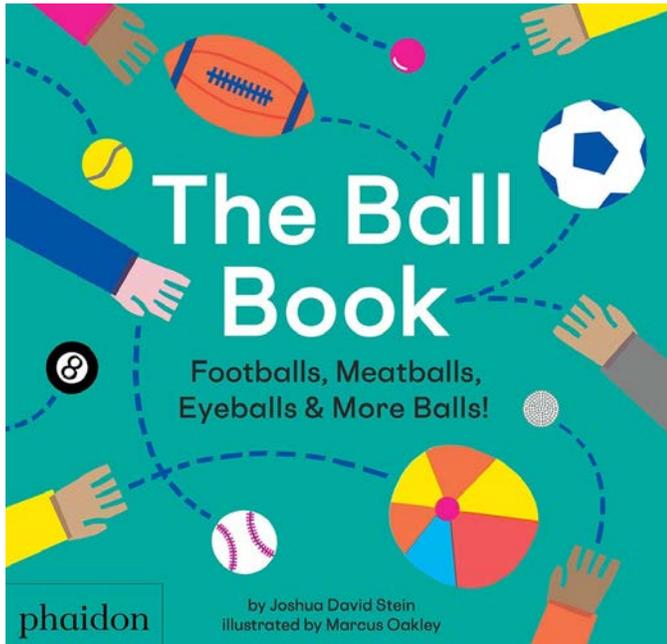
Bouncing ball, bouncing high,
In the air, it touches the sky.
Bouncing ball, so much fun,
We could play until the day is done.

Disclaimer: We Skoolhouse does not own the lyrics to any of the songs provided.

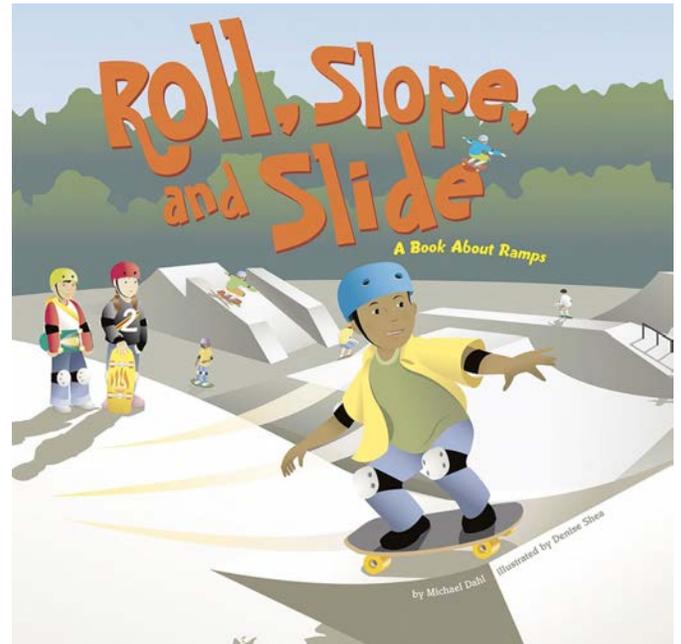


Books to Read

We select two books to support your unit of investigation - it's important to go slow and re-read the same books several times for greater comprehension and connection building. You can read the recommended book before they begin the hands-on work. We understand all children have different preferences and interests when it comes to books (and everything else), so please find our supplemental reads that can replace or add to the suggested books below:

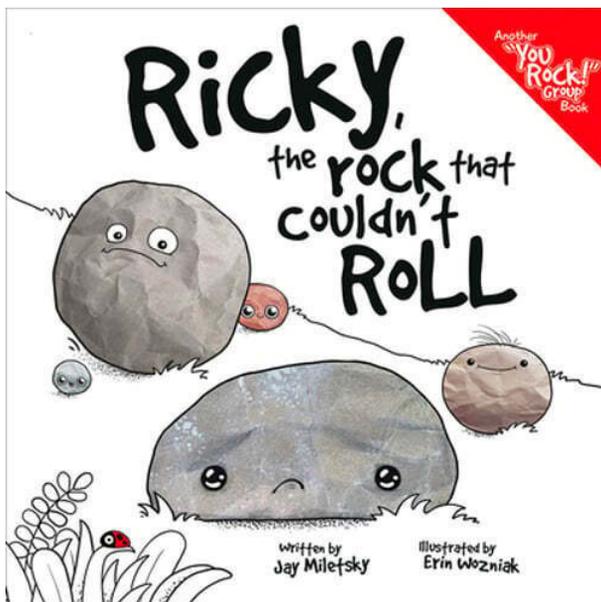


The Ball Book, by Joshua David Stein

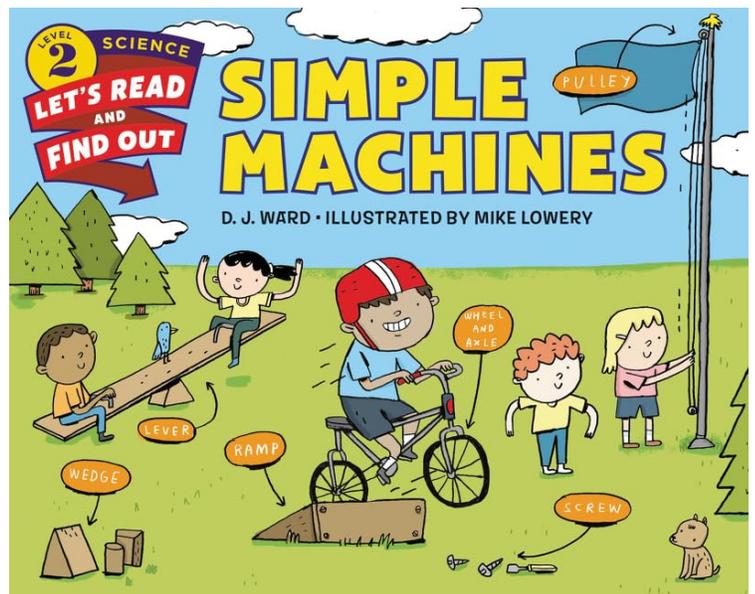


Role, Slope, and Slide, by Michael Dahl

Supplemental Reads:



Ricky the Rock that Couldn't Roll, by Jay Milefsky



Simple Machines, by D. J. Ward

Tips to Reinforce the Unit in Everyday Experiences:



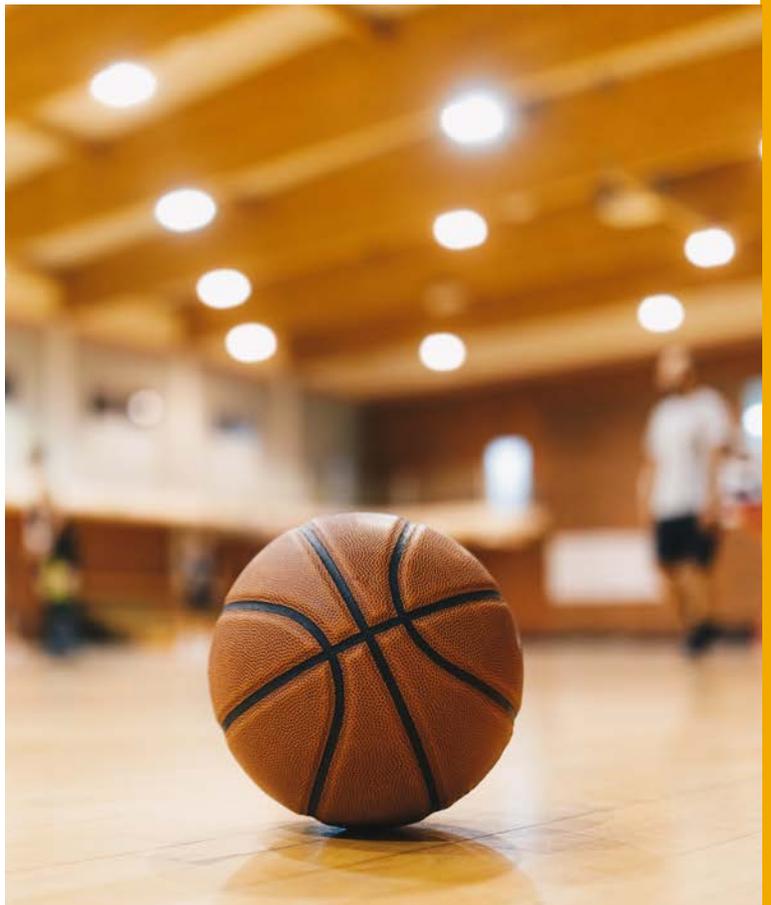
- **Bring balls to the park & playground for deeper exploration**
 - The park provides the most space to test concepts, while exploring and pairing balls with basketball hoops, tennis nets, slides (to roll balls down).
- **Eat food in the shape of balls**
 - Getting cooking in the home or classroom, or bring in different foods that are round, such as:
 - Matzah ball soup, rice balls, meatballs, cake pops, etc.)

- **Visit a local sports store, facility, and attend a sport's game.**

- **Sports store:** Examine a broad range of balls in which they can make comparisons and draw conclusions.
- **Sports facility:** Bowling alley, batting range, mini golf course, arcade or play-space (may have a ball pit and games that involve balls)

- **Attend a sporting event**

- Local games at a nearby park (e.g. baseball, soccer, etc.)





KWL (**K**now, **W**onder , **L**earn) Chart

When kicking off a new investigation, it's recommended to create a large KWL (Know, Wonder, Learn) Chart for you and your children's reference (example below).

You can draw one up on a large sheet of oaktag or easel paper. Introduce a topic by prompting "what do you know about _____?" Once children have shared their prior knowledge, invite them to consider what they'd like to learn about the topic.

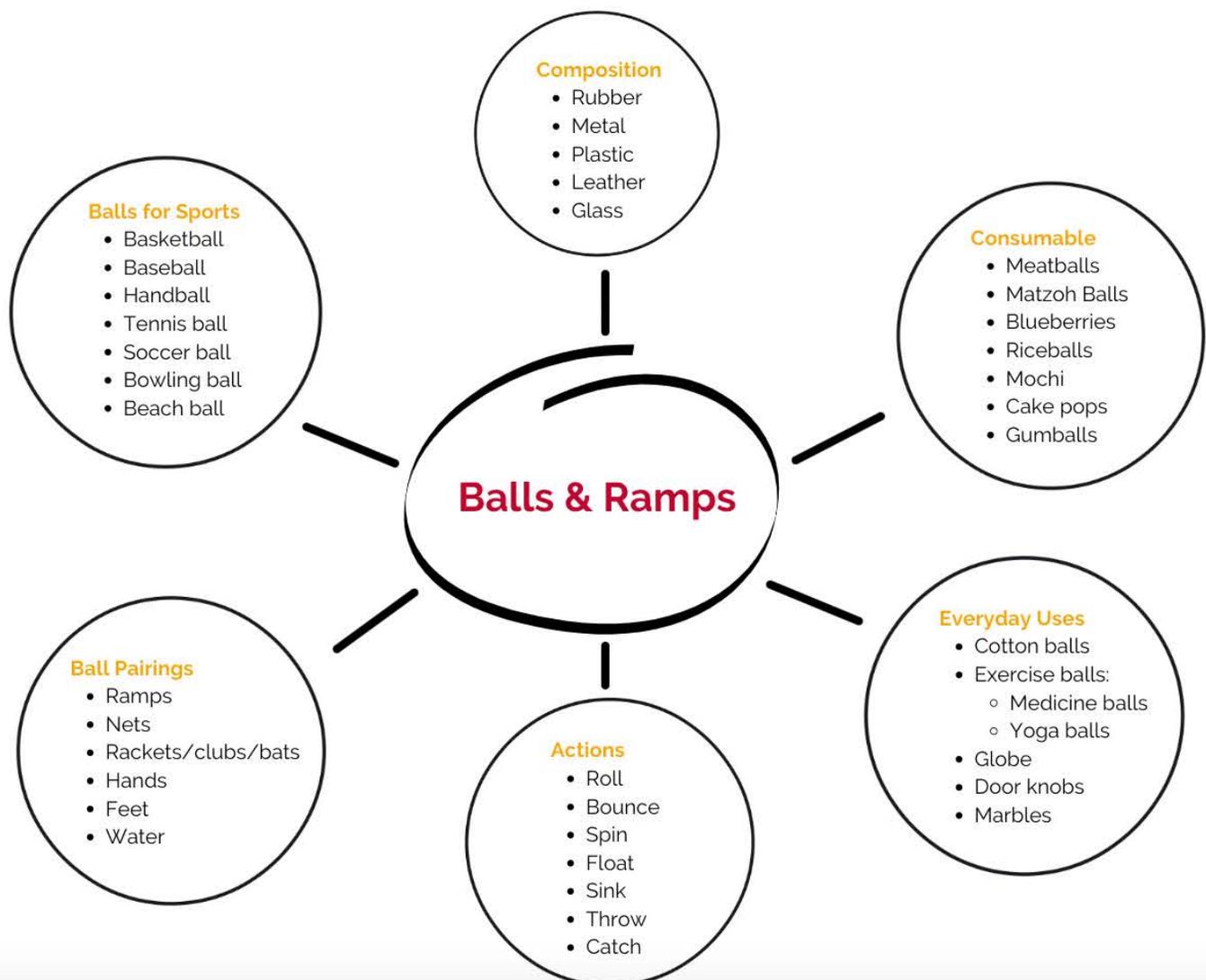
This running document is a place to guide your learning, prompting children to think more critically about the subject, while also formulating their own theories and ideas. Learning is not limited to one time and space, but rather, is an ongoing event. Add to this chart as thoughts, questions & revelations emerge over time.

Know	Wonder	Learn



Word Web: Balls & Ramps

Word webs are another powerful tool to support connection-making, and connection-making is the core of learning! Word webs invite adults and children to think more critically about a specific topic, all while expanding upon research and ideas. While the below is an example of different directions your investigations may go, it is not limited to only these subcategories, but rather, just meant to get the wheels turning - see what else you and your children can come up with and expand upon!



Expanded Play

Learning concepts are best adopted when children can make everyday and tangible connections. Support your child's emergent knowledge and experiences by incorporating the topic in different areas of play and exploration.



- Sensory table filled with water beads/"orbeez"
 - Compliment play with measuring cups, spoons, containers, scoopers, and/or small toy figurines.
- Water table play with balls: Add different balls to water to see them float, or sink.
- Create balls with materials like rubber-bands & clay
- Large, hopper balls
 - (Children sit & bounce on)
- Ball pit play
- Add small balls to dramatic play, block, and art area

- Create your own ball game! Have children consider rules, point systems, and how players will win.
- Bring balls out to play at the park
- Bring your balls to playground and roll them down different slides; which balls roll the fastest? the slowest?
- Bounce balls over different surfaces (e.g. grass, cement, rocks, etc.). How do different surfaces affect bouncing?



- Explore a local park and catch a neighborhood game of baseball, basketball, soccer, etc.
- Purchase tickets to a stadium game
- Visit a local sporting goods store
- Visit a local batting or golfing range, bowling alley, stay and play for a while

ACTIVITIES





Critical Thinking: Balls!

MATERIALS

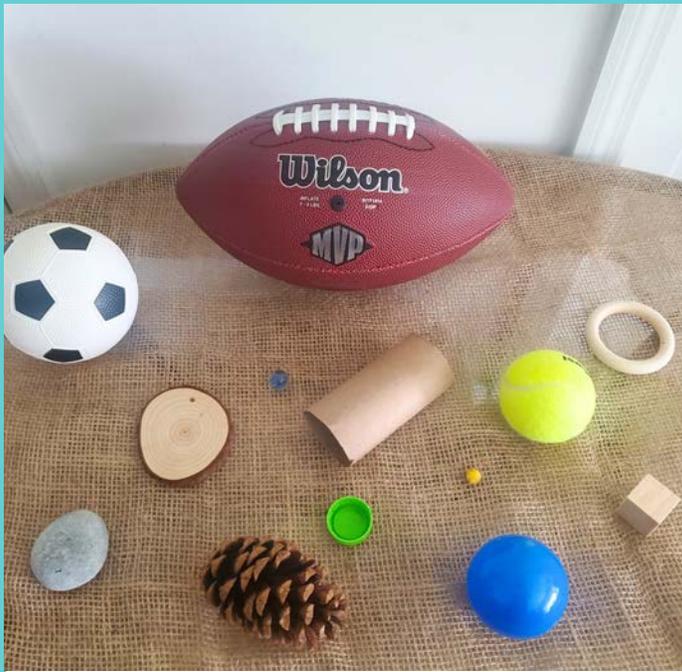
- Various balls - Ideally 3-5 different balls to compare/contrast
 - Consider: basketball, baseball, golf ball, handball, tennis ball, soccer ball, football, dodgeball, beach ball, volley ball
- Notepad /board & pen for you to jot down their responses

DIRECTIONS

- Consider taking the investigation outside if weather permits!
- Today we want to welcome your child to think more about balls, considering what they know about balls and what they wonder about balls. You may lead with some guiding questions such as:
 - "What do you know about balls?"
 - "What makes something a ball?"
 - "What do you think balls are made from?"
 - "What do you think is inside of a ball?"
- You do not have to ask all of these questions. Start with one to gauge responses, and take it from there.
- While having this conversation, invite them to explore various balls to trigger some thoughts and make tangible connections to the subject.
- You can also begin exploring some balls to model some interactions; forcefully bouncing, rolling, kicking, throwing, etc .

LEARNING OBJECTIVES

- **Developing Gross Motor Skills:** Practice throwing, catching, kicking, and rolling balls to enhance coordination, balance, and spatial awareness, while promoting physical fitness and active lifestyles.
- **Introducing Basic Physics Concepts:** Introduce simple physics concepts such as force, motion, and gravity by observing how balls move and interact with different surfaces.
- **Stimulating Sensory Exploration:** Provide opportunities for sensory exploration by touching, squeezing, bouncing, and listening to balls of different textures and materials.



ball	NOT a ball
tennis ball	pinecone
Football	wooden ring
marble	toilet roll
soccer ball	wood slice
plastic ball	rock
	cap

What Makes Something a Ball?

MATERIALS

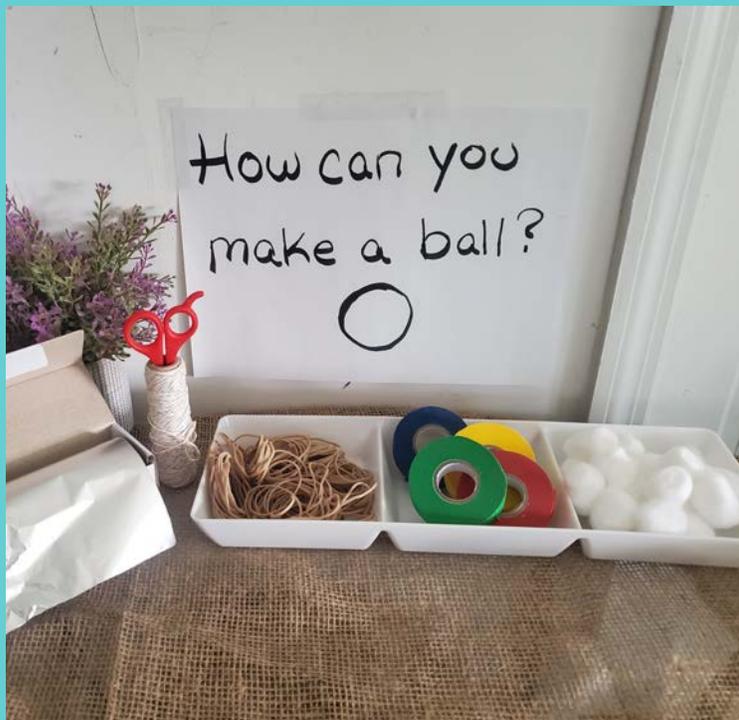
- About 3-5 balls
- About 3-5 objects that **are not** a ball, but may share similar characteristics (e.g. round, circular, comparable in size, can roll.)
 - Some suggestions include (but not limited to): wooden rings, wood slices, stones, empty paper towel/toilet paper rolls, blocks, pinecones, caps, lids, pom-poms, cotton balls)
- Optional: Large paper and marker to jot down observations

DIRECTIONS

- **Consider taking the investigation outside if weather permits!**
- Today welcome children to think more critically about what makes something a ball.
- On a large, open surface, whether table, floor, or outside, place down about 10 objects to so your child can determine what is a ball/what's not a ball, and why!
- As they explore and states "_____ is a ball!" You might respond with:
 - "How do you know?" or "what makes you think that?"
 - Repeat same questions for when they says "_____ **is not** a ball!"
- Optional: To make learning (and letters) visible, you can create a chart and list out what objects are considered a ball, If your child wants to help create some letters, let them have a ball!

LEARNING OBJECTIVES

- **Developing Critical Thinking Skills:** Encourages children to observe, analyze, and compare the properties of different materials to identify those suitable for making balls.
- **Understanding Object Characteristics:** Help children recognize that while some objects may share similar features like being round, they may differ in other essential characteristics such as texture, weight, and bounce.
- **Building Classification Skills:** Teaches children how to categorize objects based on specific criteria.
- **Enhancing Problem-Solving Abilities:** Engages children in hands-on activities where they need to determine which materials can be transformed into functional balls, fostering problem-solving and decision-making skills.
- **Promoting Scientific Inquiry:** Encourages curiosity and exploration by posing questions about why certain materials are better suited for making balls than others, sparking scientific inquiry and investigation.
- **Encouraging Language Development:** Provide opportunities for children to communicate their observations, comparisons, and conclusions using descriptive language to articulate the differences between various materials.



How Can You Make a Ball With Loose Parts

MATERIALS

- About 5 different materials, we recommend:
 - Aluminum foil, rubber bands, tape, cotton balls, string
 - Other materials to consider: Scissors, Paper towels/toilet paper, tissue paper, pom-poms, pipe-cleaners, play dough
- Optional: Sectional tray to organize materials

DIRECTIONS

- On a large open surface, organize and arrange materials.
- Some guiding questions to support and expand upon:
 - "What's the biggest ball you can make?"
 - "What's the smallest ball you can make?"
 - "What material will make a ball bounces (or roll) the best?"
 - "What made you choose those materials for your ball?"
 - "What type of game can you make for your ball?"

LEARNING OBJECTIVES

- **Encouraging Creativity:** Stimulate children's imagination and creativity by providing them with opportunities to experiment with various materials and design their own unique balls.
- **Promoting Fine Motor Skills:** Develop fine motor skills such as grasping, pinching, twisting, and manipulating small objects while assembling and shaping materials into balls.
- **Fostering Problem-Solving Abilities:** Encourage children to overcome challenges and obstacles encountered during the ball-making process, fostering problem-solving skills and resilience.
- **Enhancing Spatial Awareness:** Promote spatial awareness and hand-eye coordination as children navigate and manipulate materials in three-dimensional space to construct their balls.
- **Connecting Prior Knowledge:** Encourage children to draw upon their prior knowledge and experiences with balls, such as their understanding of how balls roll, bounce, and move, to inform their decisions and problem-solving strategies as they recreate and innovate with loose parts and open-ended materials. This objective fosters connections between past learning and current experiences, deepening children's understanding and engagement in the creative process.
- **Cultivating Mathematical Concepts:** Introduce mathematical concepts such as size, shape, symmetry, and patterns as children experiment with arranging and combining materials to create balls of varying sizes and designs.



How Can You Make a Ball From Clay?

MATERIALS

- Air dry clay or play dough
- Optional:
 - Materials to help shape the ball/s: E.g. popsicle sticks, string/rope + scissors, toothpicks, rubber bands
 - Various balls to act as a visual reference
 - Sectional tray to organize/separate materials

DIRECTIONS

- On a large open surface, organize the various materials for your child to work with.
- Some guiding questions to support expand upon:
 - "What's the biggest ball you can make?"
 - "What's the smallest ball you can make?"
 - "How many different balls can you make?"
 - "What type of game can you make for your ball/s?"

LEARNING OBJECTIVES

- **Fine Motor Skills:** Clay manipulation requires precise hand movements, promoting the development of fine motor skills essential for tasks like writing, drawing, and self-care activities. Pinching, rolling, and smoothing the clay balls strengthen hand muscles and improve dexterity.
- **Hand-Eye Coordination:** Shaping clay balls involves visually monitoring and adjusting hand movements to achieve desired shapes and sizes. This enhances hand-eye coordination, an important skill for activities requiring accurate spatial perception and control.
- **Creativity:** Working with clay offers children opportunities to explore their imagination and experiment with different forms, textures, and embellishments. By encouraging free expression and open-ended exploration, children can develop their creative thinking and problem-solving abilities.
- **Connecting Prior Knowledge:** Encourage children to draw upon their prior knowledge and experiences with balls, such as their understanding of how balls roll, bounce, and move, to inform their decisions and problem-solving strategies as they recreate and innovate with loose parts and open-ended materials.
- **Appreciation for Artistic Process:** Engaging in the artistic process cultivates an appreciation for craftsmanship, creativity, and artistic expression. Through hands-on experience, children develop an understanding of the time, effort, and skill involved in creating art, fostering respect for artists and their work.



DIY Bowling Fun

MATERIALS

- About 6 "pins" - consider: blocks, empty bottles, empty paper towel rolls, tall action figures that can stand up, etc.
- 1 ball (heavy enough to knock down the "pins")
- Optional:
 - Tape to create a "lane"
 - Scorecard (pen & paper to document points)

DIRECTIONS

- In a large open area, organize your own "bowling lane." Set up about 6 pins (blocks, empty bottles, etc.)
- Tape off the sides to create a "lane."
- Begin to play a game of bowling! You can follow the rules of bowling, or simply give one turn each until the winner hits a desired number first (e.g. whoever gets 20 points first wins the game).
- Building upon math concept, lead with these questions:
 - How many "pins" did you knock down?
 - How many "pins" are still standing?
 - From time-to-time, read aloud the scores, "you have 16 points!" How many more points do you need until you have 20 points?" You can count together to figure it out!

LEARNING OBJECTIVES

- **Math Skills:** Through keeping score and interacting with numbers during the game, children will develop foundational math skills. This hands-on approach to math fosters engagement and provides practical application of mathematical concepts in a fun and interactive setting.
- **Sportsmanship:** The game provides an opportunity to cultivate important values such as respect, fairness, and teamwork. Additionally, turn-taking skills are emphasized, teaching children patience and the importance of waiting for their turn while encouraging positive communication and cooperation among players.
- **Physical Coordination:** Improves hand-eye coordination as children aim and roll the ball towards the "pins," refines gross motor skills through the swinging motion required for bowling, and enhances their spatial awareness by adjusting the force and direction of the ball to achieve desired outcomes. These physical skills are essential for overall development and can transfer to various other activities and sports.
- **Problem-Solving:** Throughout the game, children engage in strategic thinking and problem-solving as they analyze situations and make decisions to improve their performance. They learn to adapt their strategies based on previous throws, evaluate different approaches, and make informed choices to achieve desired outcomes. This encourages critical thinking skills and empowers children to overcome challenges and obstacles in a dynamic and ever-changing environment.



DIY Marble Run, Run, Run!

MATERIALS

- Marbles
- Some sort of adhesive based upon your materials (e.g. glue, glue gun, tape, staples, velcro strips, etc.)
- Choose from materials to create your own Marble Run!
 - Legos + Lego base (pictured)
 - Cut-up, deep, paper plates + blocks + tape (pictured)
 - Sheet of cardboard + popsicle stick glued to form ramps
 - Empty paper towel rolls taped to wall/sheet of cardboard
 - Hollow pool noodles: Cut in half and then you can cut different sized strips from the long piece.
 - Magna tiles over metal/magnetic sheet

DIRECTIONS

- Based upon the materials you have/prefer to work with, invite children to work with you on creating a marble run.
- Organize the materials and prompt creativity by having your child consider, "how can we put these materials together to make a maze for your marbles?"
 - You can review some images of various marble runs to provide some visual inspiration.
- See if some images prompt your child to formulate their own ideas on how and what they may construct with.
- Offer your child some guidance and support as needed.
- Revisit the marble run several times to change-up configurations, while allowing your child to gain stronger mastery of setting up and exploring a marble run.

LEARNING OBJECTIVES

- **Engineering Principles:** Children will explore basic engineering principles such as gravity, momentum, and kinetic energy as they design and construct their marble runs.
- **Problem-Solving Skills:** Through trial and error, children will develop problem-solving skills as they experiment with different configurations of ramps, tunnels, and obstacles to create functional marble runs.
- **Critical Thinking:** Children will engage in critical thinking as they analyze the effects of various design choices on the marble's trajectory and adjust their designs accordingly to optimize performance.
- **Spatial Reasoning:** Building marble runs requires spatial reasoning skills as children visualize and plan the layout of the run, considering factors such as height, angle, and spacing of components.
- **Fine Motor Skills:** Assembling the marble run involves manipulating small parts and pieces, helping children develop fine motor skills such as grasping, pinching, and placing objects with precision.
- **Persistence and Resilience:** Building a marble run may involve encountering challenges and setbacks. Children will learn the importance of persistence and resilience as they persevere through obstacles and continue to iterate and improve their designs.



Off To The (Marble) Races

MATERIALS

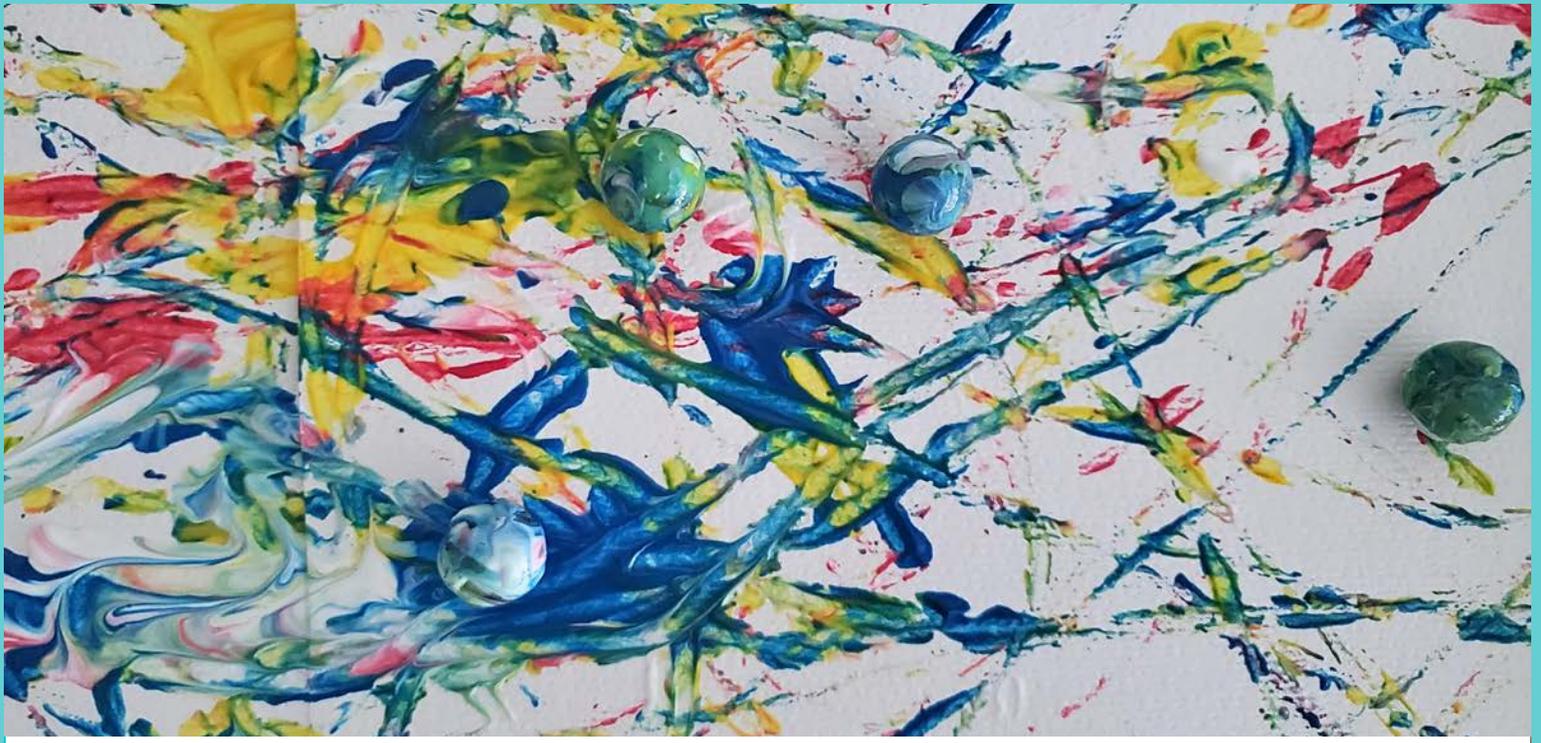
- Marbles
- Choose from many different materials to create your own marble race. Consider blocks or a small cardboard box
- Black Marker
- 1 Sheet of Construction Paper
- Scissors
- Paper and pen (to keep score)
- Optional: Tape

DIRECTIONS

- Based upon the materials you choose to work with, set up a DIY marble race!
- The objective is to create three passageways for the marbles to run through.
- Over each passageway, add numbers "1," "2," and "3."
 - Optional (for added difficulty): You can make the opening for "number 1" the widest, the opening for "number 2" the second widest, and opening "number 3" the most narrow (greater difficulty).
- You can formulate the game in a couple of ways:
 - See how many points your child can get within a minute
 - See who gets 20 points first
- As points are accumulated, jot them down and invite your child to continue to count them up throughout the game.

LEARNING OBJECTIVES

- **Creativity and Resourcefulness:** Children will exercise creativity and resourcefulness as they use everyday materials to design and construct their marble race track. By repurposing common household items, children will explore innovative ways to create a unique and functional track layout. This objective encourages imaginative thinking, problem-solving, and experimentation with materials, fostering a sense of creativity and innovation in design and construction.
- **Math Skills:** Children will engage in mathematical calculations as they tally points earned during the marble race, reinforcing addition, subtraction, and possibly multiplication skills depending on the complexity of the scoring system.
- **Hand-Eye Coordination:** Releasing marbles at the right time to achieve desired outcomes requires hand-eye coordination and fine motor skills. Children will refine these skills as they practice controlling the release of their marbles.
- **Persistence and Resilience:** Overcoming obstacles and setbacks during the race encourages persistence and resilience. Children will learn to persevere through challenges, adapt their strategies, and continue striving towards their goals.



Marble Art Run

MATERIALS

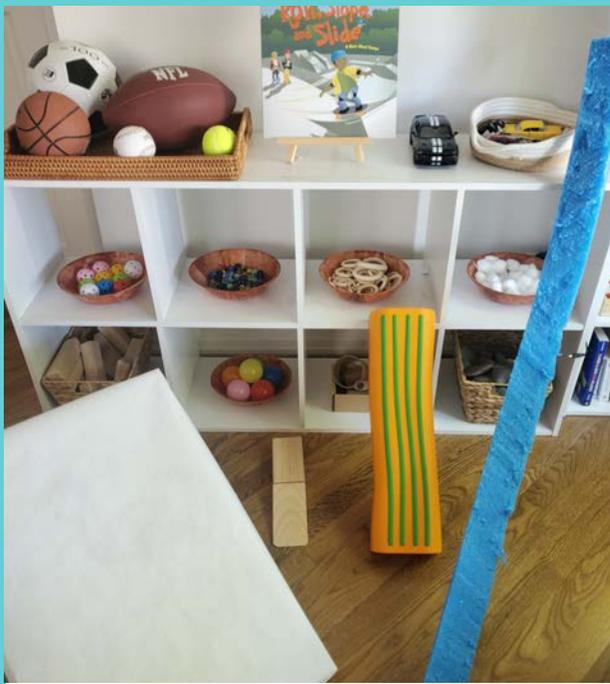
- Marbles
- Large tray / baking pan / container / cardboard box
- White construction paper
- Paint (approximately 2-5 colors)

DIRECTIONS

- Line a large tray with white paper
- Provide paint and marbles next to the tray with paper
 - For a less-mess experience, you can add the paint directly on the paper and allow children to drop the marbles on top and move around the tray.
- Allow children to dip the marbles into the paint and roll them around the tray. See how they initially approach the experience. They may:
 - Roll the marbles with their hands
 - Push the marbles along
 - Lift the tray and explore different levels of steepness
 - Drop the marbles to see the marks (trajectory), etc.
- When finished you may ask:
 - "What happened when you combined the paint and the marbles?" "What did you notice happened?"

LEARNING OBJECTIVES

- **Sensory Exploration:** Marble art provides a sensory-rich experience as children engage with the tactile sensations of paint and marbles rolling on paper. This sensory exploration stimulates their senses and promotes sensory integration.
- **Cause and Effect:** Children will learn about cause and effect as they observe the outcomes of their actions during marble art. They can experiment with varying the force and direction of the tray's movement to see how it affects the paint splatters created by the marbles.
- **Spatial Awareness:** Moving the tray to spread the paint-covered marbles requires spatial awareness as children coordinate their movements and judge distances. They will develop a sense of spatial orientation and understand how their actions impact the arrangement of colors on the paper.
- **Experimentation and Inquiry:** Marble art encourages children to engage in experimentation and inquiry as they explore different techniques and effects. They can ask questions, make predictions, and test hypotheses about how changes in their approach affect the final artwork.



Introduction to Ramps

MATERIALS

- 1-3 ramps to explore
 - A ramp can be any long & flat portable object.
 - Consider:
 - long plank of wood, large storage lid, large sheet of cardboard, large/long blocks, pool noodle cut in half
- A handful of materials to combine with the ramps:
 - Consider balls and toy cars
- Optional: Blocks to alter incline

DIRECTIONS

- In an open space, provide a ramp or two for children to explore, along with some balls and/or cars.
- Allow children to play with the ramps and materials for a bit on their own for greater familiarity and experimentation.
 - Ideally children can explore their ramp/s around their environment, experimenting with different **inclines**. For example, they may lean a ramp over a small block (**gentle slope**), then bring the ramp and lean it against something big and tall, such as a shelving unit or chair (**steep slope**).
- With the ramp and materials at hand, you can challenge children with some of these questions to consider:
 - What object do you think will roll down the ramp the fastest?
 - What makes the object roll the fastest?
 - What object do you think will roll down the ramp the slowest?
 - What makes this object roll the slowest?
 - Can we make these objects roll faster/slower? How?

LEARNING OBJECTIVES

- **STEM Concepts:** Children will gain an understanding of fundamental STEM (Science, Technology, Engineering, and Mathematics) concepts such as gravity, motion, and force through hands-on experimentation with ramps.
- **Problem-Solving Skills:** Through trial and error, children will develop problem-solving skills as they experiment with different materials to create ramps. They will learn to identify challenges and obstacles and devise solutions to overcome them.
- **Critical Thinking:** Children will engage in critical thinking as they analyze the effectiveness of different materials and designs for ramps. They will evaluate factors such as slope, surface texture, and stability to determine the best configurations for their ramps.
- **Scientific Inquiry:** Children will engage in scientific inquiry as they observe the effects of different materials and designs on the performance of their ramps. They will develop hypotheses, make predictions, and conduct experiments to test their ideas and gather data.



Let's Rock and Roll!

MATERIALS

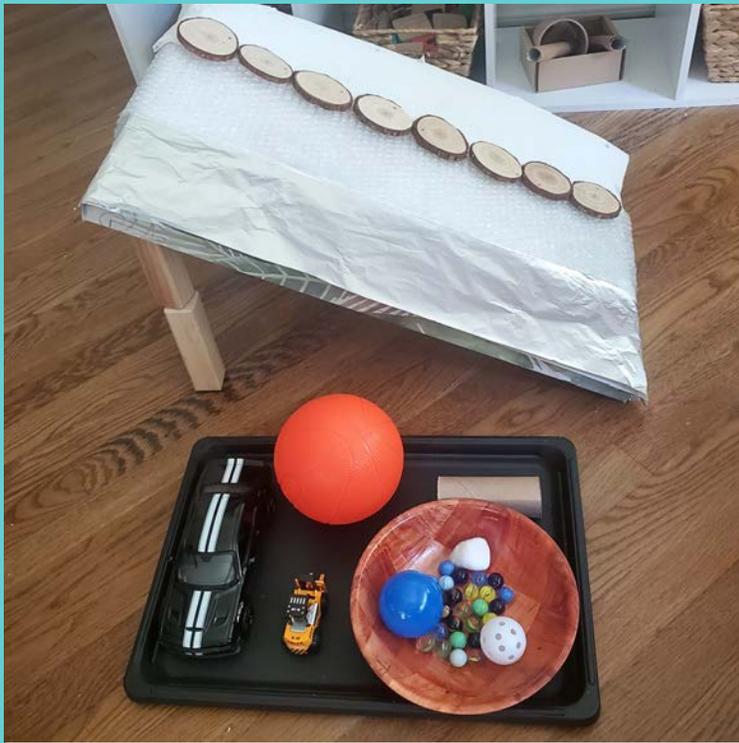
- One large ramp
- About 5 objects
 - Choose a couple that you know won't roll
- Optional:
 - Blocks to adjust the incline
 - Notepad to jot down notes & observations
 - Tray to keep items contained

DIRECTIONS

- Set up a ramp with about 5 specific materials in front of it.
- Before beginning, have children consider any or all of these questions:
 - Do you think all of these materials will roll down the ramp?
 - What makes you think that?
 - Which object will roll the fastest/slowest? Why?
 - Why won't this object roll?
 - Which object will travel the furthest?
 - What makes you think that?
- Explore and experiment with different inclines as you go!

LEARNING OBJECTIVES

- **Scientific Inquiry:** Children will engage in scientific inquiry as they observe the effects of different materials on their ability to roll down a ramp. They will develop hypotheses about which materials will roll and test their predictions through experimentation.
- **Critical Thinking:** Through observation and analysis, children will develop critical thinking skills as they evaluate the properties of different materials and their impact on rolling behavior. They will identify factors such as shape, weight, and surface texture that influence rolling ability.
- **STEM Concepts:** By exploring the properties of different materials and their behavior on the ramp, children will gain an understanding of fundamental STEM concepts such as gravity, friction, and inertia. They will learn how these principles affect the motion of objects down the ramp.



Ramps & Friction

MATERIALS

- One large ramp
- About 3 - 4 different materials to create a varied texture surface
 - Consider: aluminum foil, paper towels, bubble wrap, glued down rocks, wood slices, branches, sticks, etc.
- Various objects to roll down, e.g. balls and cars
- Some sort of adhesive to securely attach the different textures to the ramp (e.g. glue, glue gun, tape, staples, etc.)
- Optional: blocks to explore varying inclines

DIRECTIONS

- Divide your ramp into 3-4 sections, in which each section has a different texture.
- Before beginning, have children consider:
 - What do you notice about the surface of the ramp?
 - How will these different surfaces affect the objects coming down?
 - What surface will allow objects to travel fastest? Why?
 - What surface will allow objects to travel slowest? Why?
- Welcome children to begin experimenting!

LEARNING OBJECTIVES

- **Predictive Skills:** Children will practice making predictions based on their observations and prior knowledge of textures. They will formulate hypotheses about which textures will facilitate or inhibit rolling down the ramp and develop reasoning to support their predictions.
- **Scientific Inquiry:** Children will engage in scientific inquiry as they observe the effects of different textures on the rolling behavior of objects down the ramp. They will develop hypotheses about how texture influences rolling ability and test their predictions through experimentation.
- **STEM Concepts:** By exploring the properties of different textures and their effects on rolling behavior, children will gain an understanding of fundamental STEM concepts such as friction, surface tension, and material properties. They will learn how these principles influence the motion of objects down the ramp.
- **Appreciation for Scientific Process:** Engaging in the scientific process of observation, experimentation, and analysis fosters an appreciation for scientific inquiry and discovery. Children will learn that experimentation is a valuable tool for understanding the world around them and solving real-world problems.



Ramps, Balls, And Paint

MATERIALS

- One large ramp
- Long sheet of butcher paper (or several sheets of construction paper. You may also consider long strips of cardboard)
- About 1 -3 colors of paint
- A few balls
- A large, shallow tray to hold the paint
- Optional: Add or alternate this activity with toy cars

DIRECTIONS

- If the weather permits, bring the investigation outside for an easier, messy-play (and easier clean-up) experience.
- Line the ramp with butcher paper, and have the paper extend a couple of feet onto the floor.
- Add the paint to the tray and bring the balls close.
- Welcome children to dip the balls in the paint and roll them down the ramp.
- You can also welcome them to dip the ball in the paint and bounce it over the level surface to explore velocity.
- Revisit this experience several times, while also inviting children to replace balls with cars on different days.

LEARNING OBJECTIVES

- **Creativity and Exploration:** Experimenting with different movements and techniques for applying paint encourages creativity and exploration. Children will have the opportunity to try out new ideas, test hypotheses, and discover unexpected outcomes through hands-on exploration.
- **Critical Thinking:** Through observation and analysis, children will develop critical thinking skills as they evaluate the impact of paint on the rolling and bouncing behavior of the balls. They will identify factors such as surface friction, paint thickness, and ball material that influence motion and behavior.
- **Motor Development:** Children will enhance their motor skills through the activity, including both gross motor skills as they roll or bounce the paint-dipped balls down the ramp or on a surface, and fine motor skills as they manipulate the balls and dip them into the paint.
- **Hand-Eye Coordination:** The activity promotes hand-eye coordination as children aim and release the paint-dipped balls onto the ramp or surface. They will refine their ability to coordinate visual input with motor movements to achieve desired outcomes, enhancing their overall hand-eye coordination skills.
- **Collaboration and Communication:** Working on the experiment collaboratively fosters communication skills as children share ideas, discuss observations, and collaborate to conduct the investigation. They will learn to express their thoughts and findings clearly and work together to solve problems.



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