

# From Bouncing Balls To Bandages: Using Purpose to Choose Materials

Sample "Mini-Unit"



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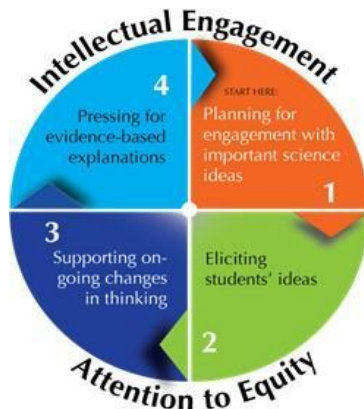
Adapted From: April Mitchell "Making It Bounce" and Thornburgh, W., McFadden, J. and Robinson, B "The Sixth E: In the 5E Learning Cycle on Matter."



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### UNIT OVERVIEW

This sample unit plan follows the four core teaching practices of the Ambitious Science Teaching Framework. This phenomena(observable event) based learning approach to science teaching, leverages students’ existing personal experiences and current understanding about the physical world around them, to then revise their own explanations of specific, contextualised scientific phenomena over time. This approach to teaching science, allows students to use investigations, authentically, to build knowledge and make meaning of the various science ideas.



This sample unit centres on a familiar phenomenon (observable event) of “bouncy balls” and focuses on investigating the question “What *makes a bouncy ball so bouncy?*” Through this phenomenon based learning, students realise that different balls have different purposes. As well, through testing rubber, students describe the properties of materials required to make a bouncy ball. Students then apply their understanding to a different context to further test different materials in order to design a bandage for a company that fulfils properties of the material required that students identified (able to be shaped, strong, and absorbent).

The connection of the KUSPs in both organizing ideas of Matter and the Scientific Methods facilitates a context for students to test various materials for an authentic purpose.

As with all resources, teachers are free to modify and adapt to their particular teaching context.

[Slides to Online Session](#)



### CURRICULAR CONNECTIONS

**Organizing Idea:** Matter

**Learning Outcome:** Students investigate properties of materials and relate them to a purpose.

**Related KUSPs** Taught and formatively assessed in this lesson series:

Knowledge	Understanding	Skills and Procedures
Properties of materials that can be tested include <ul style="list-style-type: none"> <li>• if water is absorbed</li> <li>• if the material can be shaped (malleability)</li> </ul> Various properties of materials can be measured, including length and weight (mass).	Materials have unique properties.	Test properties of various materials.  Measure various materials using non-standard measurements.

Knowledge	Understanding	Skills and Procedures
Knowledge of the properties of materials and their purposes is important in many occupations and roles, such as <ul style="list-style-type: none"> <li>• engineer</li> <li>• designer</li> </ul>	The purpose of an object influences the choice of materials used to produce it.  Some materials are more suitable than others for making a product for a specific purpose.	Compare the properties of materials to determine what material is best suited for a specific purpose.  Explain the relationship between suitability of materials and purpose.  Select a material and use it to create an item for a specific purpose.  Discuss the choice of material based on availability and purpose.

Knowledge	Understanding	Skills and Procedures
Materials are used to make objects.	Materials can be combined in a variety of ways to make objects.	Identify the materials used to make various objects.  Combine materials to create an object for a specific purpose.

\*Note: not all KUSPs from the grade two organizing idea, matter, will be incorporated in this series of lessons.

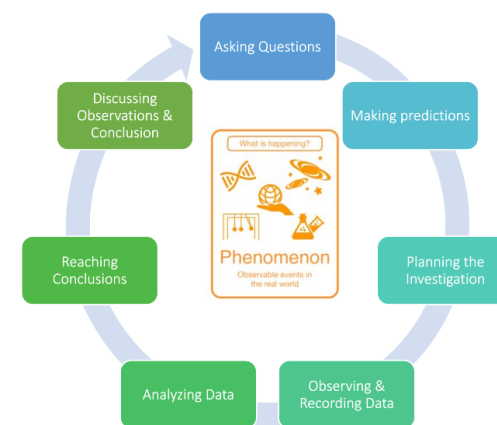
Teachers are responsible to ensure the remaining KUSPs will be completed.



**Organizing Idea:** Scientific Methods**Learning Outcome:** Students examine investigation and explain how it is influenced by purpose.**Related KUSPs:** Formatively taught and assessed in this lesson series

KNOWLEDGE	UNDERSTANDING	SKILLS & PROCEDURES	KNOWLEDGE	UNDERSTANDING	SKILLS & PROCEDURES
Investigations are conducted for purposes such as <ul style="list-style-type: none"> <li>answering questions</li> <li>building knowledge</li> <li>satisfying curiosity</li> <li>problem solving</li> </ul> Procedures scientists use to guide investigations include <ul style="list-style-type: none"> <li>asking questions</li> <li>making predictions</li> <li>planning the investigation</li> <li>observing and recording data</li> <li>analyzing data</li> <li>reaching conclusions</li> <li>discussing observations and conclusions</li> </ul>	Investigations involve carrying out procedures for a purpose.	Explore various purposes for conducting an investigation.  Describe procedures of an investigation.  Develop questions for the purpose of an investigation.	Data should relate to the purpose of an investigation.  Observations and data should be similar if the investigation is repeated.  Repetition of an investigation includes performing the same procedures in the same way.  Data collected by people performing the same investigation can be combined.	Investigations can involve comparing data.	Determine if observations relate to the purpose of the investigation.  Collaborate to combine recorded data into a single list or chart.  Compare observations and data with others.

## Procedures for an investigation

**Integrating ELAL:**

The goal in developing a series of lessons is for students to make meaning of the science ideas (concepts) they are learning. ELAL provides the opportunity to help students participate in sense making. Most lessons incorporate student conversations and development of tier 2 and 3 vocabulary. It is strongly encouraged to weave the associated KUSPs from the **Organizing Ideas** into these lessons:

- Vocabulary
- Oral Literacy

As well, using the additional time of approximately 15 minutes per lesson from your ELAL minutes to allow for adequate time to include these aspects in the science lessons.

See Marzano's [6 Steps To Effective Vocabulary Instruction](#)

**Integrating Math:**

Some expectations in this unit connect to the learning outcome from the following organizing ideas in math:

- Measurement - properties of materials can be measured including **length** and weight (mass)
- Statistics - collecting, and representing data

Teachers may want to look at the KUSPs to teach and assess these areas for grade level expectations.



### Background Builder For Teachers

Properties are used to describe matter in order to understand it. In grade one students learned that objects have physical properties (weight, area, length, shape and texture) that are used to describe the object. Properties of objects are useful to describe the object but not identify it as it can change size (Adams and Feagin, 2017). In grade two students start to examine the properties of material of various objects. These properties are also physical and can be changed but also the property of material holds true for any sample size and do not change by the sample size (Transparency, absorbency and changing shape). The focus is how these properties make the material useful.

### Keeping the end in mind summative assessment: Performance Task

**Situation:** Company needs to find a suitable material for making bandages  
**Challenge:** Find material that will make a good medical bandaid  
**Roles:** Medical engineers testing various materials to design a medical bandage  
**Audience:** Company selecting the material  
**Product/Performance:** Select and suggest material to design a medical bandage

**Driving Question:** How can we find materials to help us design a medical bandage?

Bandage connects to three properties: strength, flexibility (bendable) and absorbance. Students will test materials for the three different properties in order to select the best material to design a functional bandage.

### Single Point Rubric

Grade 2 Single Point Rubric: Design a Medical Performance Task

Criteria	Yes	No
1. The student can identify the properties of materials used in the bandage.	<input type="checkbox"/>	<input type="checkbox"/>
2. The student can explain how the properties of materials affect the bandage's function.	<input type="checkbox"/>	<input type="checkbox"/>
3. The student can compare and contrast different materials used in the bandage.	<input type="checkbox"/>	<input type="checkbox"/>
4. The student can evaluate the effectiveness of the bandage design.	<input type="checkbox"/>	<input type="checkbox"/>
5. The student can communicate their findings and recommendations.	<input type="checkbox"/>	<input type="checkbox"/>

### Prior Learning Required:

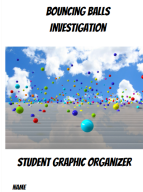
Students should have an understanding of what an object is. This connects to Kindergarten and grade 1 matter organizing ideas. However, students may benefit from reviewing this concept.



**Materials Required:**

[Bouncing Ball Investigation Booklet For Each Student](#)

[Designing A Bandage Student Booklet For each student](#)



[Teacher version of Bouncing Balls Sample Answers May Vary](#)

What Makes a Bouncy Ball So Bouncy? Investigation

Basketball, Baseball, Ping pong ball, Tennis ball, Golf Ball, Marble, Soccer ball. Sponge ball (nerf) [set for groups to investigate]

Testing Materials (Bouncy Ball and Bandage)

- Rubber band, yarn, gauze, plastic garbage bag, aluminium foil, wax paper, leather (Sham-Wow), Popsicle stick, Metal (spoon) Sandpaper, cardboard

Testing Material Optional Items if above is not available:

Cardboard	Plastic-covered	coffee stirrers	Wax paper	Paper towels
Cotton cloth	Wooden spoons	Feathers	Aluminum foil	Rubber bands
Cotton balls	Metal spoons	Pipe cleaners	Sponges	Craft stick
Paper cups	Rubber erasers	Smooth rock	Cheesecloth/gauze	Paper Bowls or plates
Plastic cups	Steel bolts	Course rocks	Yarn	
Plastic spoons	Steel washers	Sandpaper	Twizzlers	Marbles Index cards



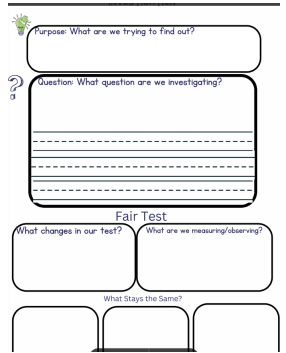
LEARNING DEVELOPMENT				
Estimated Total Time:	Learning Goal based on curriculum expectations & engagements to develop student understanding.	Inclusion of all Learners How will all learners access the learning engagements? <i>Teachers can adapt to their context</i> <a href="#">Universal Design for Learning Principles:</a>	Assessment For Learning Based on the curriculum, what do I need to <b>see or hear</b> from students that shows they are meeting the skills and procedures? <a href="#">Formative Assessment Checklist</a>	Resources
12-14 days				
<b>Lesson 1</b> 40 minutes	<p><b>Engage (Asking Questions): Elicit Student Ideas About Phenomenon:</b> The goal of this lesson is to provide a context for students to observe and develop questions to investigate how the purpose of an object determines the material used.</p> <ul style="list-style-type: none"> <li>This may work best in the gymnasium or outside</li> </ul> <p>Instruction: <b>Present context use a red rubber ball or a small bouncy ball.</b></p> <ul style="list-style-type: none"> <li>5 minutes Tell students something similar to “I was out supervising at recess and noticed groups of students playing 4 squares on the Tarmac. I was watching the ball bounce and started to think ‘what makes a ball so bouncy?’ and ‘Why do some balls bounce more than others?’”</li> </ul> <p><b>Student Observations 10 minutes</b></p> <ul style="list-style-type: none"> <li>Have students in small groups try to bounce different balls provided to them or watch as the balls are being bounced.</li> <li>Think-pair-share students share out observations with small groups - record</li> </ul>	<p><b>Vocabulary:</b></p> <p><input type="checkbox"/> Observation is noticing something using one of the 5 senses (grade 1)</p> <p><b>Sentence Stems for Observations:</b></p> <p><input type="checkbox"/> I noticed ....</p> <p><b>Scientific Models</b> - some students may benefit from a few words that they can glue onto their pictures (ex. Ball, bounce, made of,....)</p> <p><b>Sentence Stem for Model:</b></p> <p>I think what makes the ball bounce is.... Because..</p>	<p><b>Curricular Connection: Scientific Methods:</b> <b>Knowledge:</b> Investigations are conducted for purposes such as</p> <ul style="list-style-type: none"> <li>answering questions</li> <li>building knowledge</li> <li>satisfying curiosity</li> </ul> <p><b>Skills/Procedures:</b> Explore various purposes for conducting an investigation.</p> <p>Develop questions for the purpose of an investigation</p> <p><b>Assessment Look Fors:</b> This is day 1 of being introduced to the phenomenon and the curricular expectations will be fully developed in day 2</p> <p>Can the student</p> <p><input type="checkbox"/> Create questions</p> <p><input type="checkbox"/> Share ideas on their model (what ideas are they</p>	<p><b>Various types of balls</b> (basketball, ping pong ball, golf ball, soccer ball, marble, red rubber ball, tennis balls, small bouncy balls)</p> <p>Science journals or paper to sketch models.</p>



	<p>student observations on anchor chart as they share all students to view</p> <p><b>Asking Questions 5-8 minutes</b></p> <ul style="list-style-type: none"> <li>➤ Tell students: Scientists notice things that make them ask questions such as “Hmm why is this happening?” and “What causes this?”</li> <li>➤ Students generate questions based on their observations (could be sticky notes or when partners/groups share you record on an anchor chart)</li> <li>➤ Ask students “Based on what you observed, what questions do you have?” Provide think time if they seem stuck and have them brainstorm questions as a group. Keep these stickies or anchor charts to refer back to for the investigation &amp; review the questions students were generating.</li> </ul> <p><b>Students Make a Model (Picture) 20 Minutes</b></p> <ul style="list-style-type: none"> <li>➤ Either in their science journal/notebook or on a separate paper have students draw (quick sketch of the red or bouncy ball) and share their thinking of what makes the ball so bouncy? The model should have a picture/words and encourage students to (Important to keep these model for students to refer back to)</li> </ul> <p>While students are creating their models: Circulate and get them to verbally explain to you.</p> <p><b>Question Prompts:</b> Some question prompts to ask:</p> <ol style="list-style-type: none"> <li>1) What does your model show?</li> <li>2) You have bounce, what do you think causes (makes) the ball to bounce?</li> </ol>		<p>sharing? Do they mention what the ball is made of?</p> <p><b>Discussion Checklist</b></p>	
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	3) What do you think the ball is made of?		
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Estimated Time	Learning Goal based on curriculum expectations & engagements to develop student understanding.	Inclusion of all Learners How will all learners access the learning engagements? <i>Teachers can adapt to their context</i> <a href="#">Universal Design for Learning Principles:</a>	Assessment For Learning Based on the curriculum, what do I need to <b>see or hear</b> from students that shows they are getting it?	Resources
<p><b>Lesson 2</b> 45 minutes</p> <p>*you may need/wish to split lesson 2 over 2 days.</p>	<p><b>Explore (Planning the Investigation): Lesson Continued Goal:</b> developing questions for the purpose of an investigation &amp; Plan an Investigation</p> <p><b>Intro 5 minutes</b></p> <ul style="list-style-type: none"> <li>➤ Let students know that after scientists notice something and they become curious they want to find the answer to their questions and understand more by doing an investigation. At this point students should be introduced to the term and review the meaning of investigation.</li> <li>➤ Let them know that you reviewed the questions if they handed in the stickies or if on an anchor chart review the questions and circle or place questions together that share a common topic.</li> </ul> <p><b>Review questions and group common themes together 10 minutes</b></p> <ul style="list-style-type: none"> <li>➤ This would be a good time to review the topics or questions to see if they would be something that could realistically be investigated (cost and size)</li> <li>➤ Students may generate the question or</li> </ul>	<p><b>Vocabulary:</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> <b>Investigation</b> - Following steps to find an answer or solve a problem</li> <li><input type="checkbox"/> <b>Purpose</b> - goal or reason</li> <li><input type="checkbox"/> <b>Compare</b> - What is the same between 2 or more things</li> <li><input type="checkbox"/> <b>Observe</b></li> <li><input type="checkbox"/> <b>Fair Test</b></li> <li><input type="checkbox"/> <b>Data</b> - facts, measurements, amounts</li> </ul> <ul style="list-style-type: none"> <li>• Incorporate Hand up Stand up to get students moving when doing some of the Think-Pair-Share's</li> </ul> <p><b>Sentence Stem for ideas to measure the bounciness</b></p>	<p><b>Curricular Connection:Scientific Methods</b> <b>Knowledge:</b> Investigations are conducted for purposes such as</p> <ul style="list-style-type: none"> <li>• answering questions</li> <li>• building knowledge</li> <li>• satisfying curiosity</li> </ul> <p>Data should relate to the purpose of an investigation.</p> <p>Observations and data should be similar if the investigation is repeated.</p> <p>Repetition of an investigation includes performing the same procedures in the same way.</p> <p><b>Understanding:</b> Investigations involve carrying out procedures for a purpose.</p> <p><b>Skills/Procedures:</b> Explore various purposes for conducting an investigation.</p> <p><b>Determine if observations relate to the</b></p>	<p><b>Prior to lesson review questions students generated and put them in categories</b></p> <p><a href="#">Investigation Planning Handout p. 1</a></p> 



	<p>something similar to “What makes a ball so bouncy?” or “why do some balls bounce and others don't seem to?”</p> <ul style="list-style-type: none"> <li>➤ Students write question on Investigation Handout</li> </ul> <p><b>Plan Investigation: 20 minutes</b></p> <p>Ask students: How could we measure the bounciness of a ball? What could we do with the balls we have to find out how bouncy they are?</p> <ul style="list-style-type: none"> <li>➤ Students Think-Pair-Share out some ideas - Remind students that they observed the balls bouncing last lesson. Were there differences? To get data, how could we count or measure?</li> <li>➤ If students are not familiar with the term data, introduce them to data: what scientists use to find answers to questions.</li> <li>➤ If students don't come up with counting how many times each ball bounces, ask some guiding questions: “Do you think some balls will bounce more than others? What could we do to find out how we could find out which ones bounce more and compare them?”</li> <li>➤ Model dropping ball from either waist or shoulder height and counting the bounces.</li> </ul> <p><b>Planning Fair Test (repetition of an investigation includes performing the same procedures in the same way)</b> A fair test ( everything stays the same except for the 1 thing we are trying to find out) ensures that results will be similar when other groups perform the investigation. Verbally Provide non-examples to illustrate this concept to students for example:</p>	<p>I think we could measure the bounciness of the ball by.....</p>	<p>purpose of the investigation.</p> <p><b>Assessment Look Fors:</b> <b>Does the student</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Express how counting the bounces (during observation) of the different types of balls helps to find out which ball is the bounciest (purpose of investigation)?</li> </ul>	
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	<ul style="list-style-type: none"> <li>➤ “Would it be a fair test if we bounced one ball on the carpet and another ball on the tile?”</li> <li>➤ “Would it be a fair test if we dropped one ball from shoulder height and another ball from the top of the stairs?”</li> <li>➤ “If some groups bounced the ball on the carpet and others on the floor would we have similar results?”</li> <li>➤ “What would happen if each group dropped the ball from different heights?”</li> <li>➤ We should all be testing exactly the same.</li> <li>➤ Students work with partners or small groups to complete a fair test section of the handout.</li> </ul> <p><b>Circulate and prompt with questions, such as:</b></p> <ol style="list-style-type: none"> <li>1) “What does counting the number or bounces tell us?”</li> <li>2) “What is the one thing we want to find out that will change?”</li> <li>3) “What stays the same?”</li> </ol> <ul style="list-style-type: none"> <li>➤ The three parts that stay the same on handout students may need a guided practice approach to discuss and write as a class.</li> <li>➤ Provide the remaining 5 minutes for students to write predictions and they can share with others to get ideas for the reasons.</li> </ul>			
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Estimated Time	Learning Goal based on curriculum expectations & engagements to develop student understanding.	<b>Inclusion of all Learners</b> How will all learners access the learning engagements? <i>Teachers can adapt to their context</i> <a href="#">Universal Design for Learning Principles:</a>	<b>Assessment For Learning</b> Based on the curriculum, what do I need to <b>see or hear</b> from students that shows they are getting it?	<b>Resources</b>
<b>Lesson 3</b> 30-40 minutes	<p><b>Explore: Observing &amp; Recording Data</b></p> <ul style="list-style-type: none"> <li>➤ 5 minutes - review the purpose of the investigation and the agreed upon parts that will stay the same.</li> <li>➤ Model dropping the ball again to remind students that throwing or pushing the ball will change the results for every group.</li> <li>➤ 15 minutes - Students work in groups of 3 and record count on the Data Chart in the handout. (Investigation Booklet)</li> </ul> <p><b>Whole Class Graph</b></p> <ul style="list-style-type: none"> <li>➤ 10 minutes - Depending when you teach this you may need to guide students on how to graph the results.</li> <li>➤ Explain to students that representing data on a chart allows us to see patterns or trends easier.</li> <li>➤ Students complete a graph.</li> </ul>	<p><b>Consider grouping students and assigning roles such as:</b></p> <ul style="list-style-type: none"> <li>● Ball dropper</li> <li>● Bounce counter</li> <li>● Data recorder</li> </ul>	<p><b>Math Connection: Statistics Knowledge:</b>                      Data can be recorded using tally marks, words, or counts.</p> <p>A graph includes features such as</p> <ul style="list-style-type: none"> <li>● a title</li> <li>● a legend</li> <li>● axes</li> <li>● axis labels</li> </ul> <p><b>Understanding</b>                      Data can be represented in various ways.</p> <p><b>Math Skills/Procedures:</b>                      Record data in a table                      Construct graphs to represent data.</p>	<p><b>Each group needs a set of balls:</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Basketball</li> <li><input type="checkbox"/> Baseball</li> <li><input type="checkbox"/> Ping pong ball</li> <li><input type="checkbox"/> Students</li> <li><input type="checkbox"/> Tennis ball</li> <li><input type="checkbox"/> Golf Ball</li> <li><input type="checkbox"/> Marble</li> <li><input type="checkbox"/> Soccer ball</li> <li><input type="checkbox"/> Sponge ball (nerf)</li> <li><input type="checkbox"/> Bouncy Ball</li> </ul> <p><a href="#">Investigation Handout</a>                      p.2 &amp; 3</p>





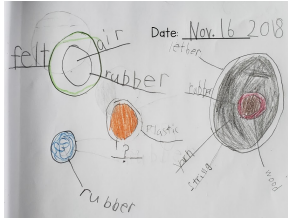
	<p>together and come up with reasons. This begins the journey of students examining different materials.</p> <ul style="list-style-type: none"> <li>➤ 5-8 minutes - Remind students that graphs help us look for patterns (similarities).</li> <li>➤ Have the class graph up or students look at their graphs discuss the following:</li> <li>➤ Think Pair Share these questions:             <ul style="list-style-type: none"> <li>○ Which ball had the most bounce?</li> <li>○ The least bounce?</li> <li>○ What <b>causes</b> some balls to bounce higher than others?</li> </ul> </li> </ul> <p>Students may come up with a number of reasons (size, weight, squishiness, air inside the ball, what the ball is made of (material))</p> <ul style="list-style-type: none"> <li>➤ Tell students we will look for patterns and differences between the low, and high bouncers</li> </ul> <p><b>Sort balls 15 - 20 minutes</b></p> <ul style="list-style-type: none"> <li>➤ Have students work in small groups of three to sort the balls and record similarities and differences on a Venn diagram in the investigation handout.</li> <li>➤ If students are not familiar with Venn diagrams, model an example as a whole class.</li> <li>➤ Collaborate and compile results as a class on to one Venn diagram.</li> <li>➤ Ask groups to share what they noticed about the low bouncers and high bouncers. (Low bouncers are hard except golf ball, high bouncers are soft or squishy.)</li> </ul> <p><b>Question prompts 5 minutes</b></p>	<p>that repeats or is the same in the data</p> <p><b>Sentence Stem For Interpreting Graph</b></p> <p>The ball with the most bounce was...</p> <p>The ball with the least bounce was...</p> <p>I think ..... causes some balls to bounce higher than others because...</p>	<p>Compare observations and data with others</p> <p><b>Assessment Look Fors:</b></p> <p>Can the student</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Identify similarities when comparing observations and data with others?</li> </ul>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Basketball</li> <li><input type="checkbox"/> Baseball</li> <li><input type="checkbox"/> Ping pong ball</li> <li><input type="checkbox"/> Tennis ball</li> <li><input type="checkbox"/> Golf Ball</li> <li><input type="checkbox"/> Marble</li> <li><input type="checkbox"/> Soccer ball</li> <li><input type="checkbox"/> Sponge ball (nerf)</li> <li><input type="checkbox"/> Bouncy Ball</li> </ul>  <p>Class size venn diagram to review results or slide</p>
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	<p>- What would make low bouncers hard and high bouncers squishy?</p> <ul style="list-style-type: none"> <li>➤ Students will talk about what the ball is made of.</li> <li>➤ Introduce vocabulary Material if it hasn't been brought up and the definition.</li> <li>➤ Students can write the definition in their glossaries or post on your science word wall.</li> <li>➤ Ask students: "Do all bouncy balls have the same material or rubber inside them? How could we find out?"</li> </ul> <p>Let students know we will be looking inside to observe what the balls are made of (material) in our next lesson.</p>			
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Estimated Time	Learning Goal based on curriculum expectations & engagements to develop student understanding.	Inclusion of all Learners How will all learners access the learning engagements? <i>Teachers can adapt to their context</i> <a href="#">Universal Design for Learning Principles:</a>	Assessment For Learning Based on the curriculum, what do I need to <b>see or hear</b> from students that shows they are getting it?	Resources
Lesson 5	<p><b>Explore &amp; Explain: Observe the different materials of various balls and create scientific diagrams and Draw Conclusions about Materials.</b> Students can either rotate to observe different materials of balls that are cut in half or watch the video.</p> <p><b>Goal:</b> Students begin to notice what materials the different balls are made of and consider the purpose for each ball.</p> <p>Note: Consider your students familiarity with different sports. Survey your class to see what</p>	<p><b>Vocabulary: Have a pre-made list of materials for students to choose from. List will vary depending on what each ball type is made of.</b></p> <p><b>Example</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Felt</li> <li><input type="checkbox"/> Yarn</li> <li><input type="checkbox"/> Rubber</li> <li><input type="checkbox"/> Cork</li> <li><input type="checkbox"/> Plastic</li> </ul>	<p><b>Science: Matter</b> <b>Knowledge:</b> Materials are used to make objects.</p> <p><b>Understanding:</b> Materials can be combined in a variety of ways to make objects.</p> <p><b>Skills/procedures:</b> Identify the materials used to make various objects.</p> <p><b>Assessment Look Fors:</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Can the student correctly identify the materials used?</li> </ul>	<p><b>Preparation Required to cut balls</b></p> <p><b>Option 1)</b> take to hardware stores such as Home Depot to cut a sample of most of the balls or use a PVC cutter (students will be better able to make observations).</p> <p><b>Option 2)</b> video</p>




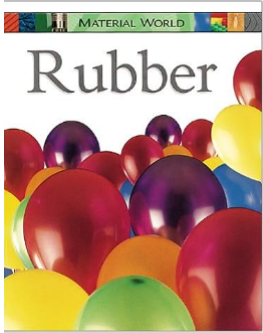
	<p>sports students have not seen or played and show pictures and or quick snippet video. Slides have pictures of people playing sports.</p> <ul style="list-style-type: none"> <li>➤ Ask students: “What is the question we are investigating?” Have them share with you. Let them know we are</li> <li>➤ 5-8 minutes - Model drawing a sample ball that has been cut in half. Quick sketch must include:             <ul style="list-style-type: none"> <li>○ Name of ball above diagram</li> <li>○ Sketch of the parts - outside inside</li> <li>○ Label the parts (material) of part</li> </ul> </li> <li>➤ Have word list of materials on board for students or cards at the location of each</li> <li>➤ 15-20 minutes - Students observe each type of ball in small groups or partners.</li> <li>➤ Students draw scientific diagrams of each type of ball.</li> <li>➤ Tell students to consider the materials used in the high bouncers and those used in the low bouncers.</li> </ul> <p>If students are watching the video more guidance will be required to observe the materials. Pause and discuss allow time to draw diagrams.</p> <p><b>10 minutes Whole Class Make Conclusions Using Data: Claim &amp; Support to support</b></p> <ul style="list-style-type: none"> <li>➤ Gather students together.</li> <li>➤ Think-Pair-Share “What makes the bounciest ball bouncy?”</li> <li>➤ Students share answers choose 1 to write the answer to the question</li> <li>➤ Let students know that when scientists find an answer to their question they need to provide proof or use the data to</li> </ul>	<p><input type="checkbox"/> Leather or vinyl (fake leather)</p> <p><b>Sentence Stems Observing Materials:</b></p> <p>I think the.....ball’s material is ..... Because</p> <p>Ex: I think the tennis ball material is cloth and rubber because the the ball bounces but is also covered with fuzzy material.</p>	<p>This is the first time students may be identifying different materials and if students are struggling this is a good time to teach the material that students are having trouble identifying.</p>	<p>demonstrates cutting various balls. Students can see what is inside the ball but not feel it.</p> <p><a href="#">Sports Balls vs Waterjet</a></p> <p><b>Option 3</b> - cut some of the easier balls such as: tennis, bouncy ball, Nerf ball and watch the video for the others.</p>  <p>Anchor Chart for</p> <p><a href="#">Claim &amp; Support Investigation hand out</a> p. 9. First column support from data</p>
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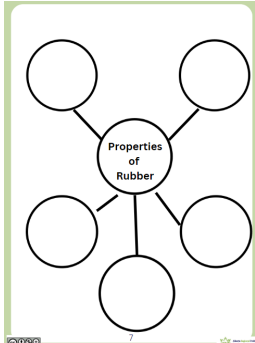
	<p>support it.</p> <ul style="list-style-type: none"> <li>➤ What data from observing the high bouncers did we gather? (They are made with rubber.)</li> <li>➤ Ask students: “why do you think each ball is made with different material(s)?”</li> <li>➤ Students share responses.</li> <li>➤ If students are not connecting to purpose, ask students to think about what the ball is used for and “would a really bouncy ball be helpful in soccer?”</li> </ul>			<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td colspan="3" style="padding: 2px;">Claim: Bouncy balls are bouncy because _____</td> </tr> <tr> <td style="width: 33%; padding: 2px;">Support from data:</td> <td style="width: 33%; padding: 2px;">Support from data:</td> <td style="width: 33%; padding: 2px;">Support from data:</td> </tr> <tr> <td style="height: 100px;"></td> <td style="height: 100px;"></td> <td style="height: 100px;"></td> </tr> <tr> <td colspan="3" style="padding: 2px;">Reasoning: The properties of rubber make it useful for different things. The rubber helps the rubber ball bounce because _____</td> </tr> <tr> <td colspan="3" style="height: 40px;"></td> </tr> </table>	Claim: Bouncy balls are bouncy because _____			Support from data:	Support from data:	Support from data:				Reasoning: The properties of rubber make it useful for different things. The rubber helps the rubber ball bounce because _____					
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Lesson 6	<p><b>Explain: Read Informational Text about Rubber.</b> After investigating the various balls and their materials, students are still thinking of their main investigation question “What makes bouncy balls so bouncy?” Students are now ready for formal vocabulary and explanations.</p> <p><b>5-8 minutes - Prior learning</b></p> <ul style="list-style-type: none"> <li>➤ Review with students the question they are investigating and the claim (statement or answer) they made with the data to support from investigation</li> <li>➤ Let students know that scientists also confirm their thinking by doing some research to read more about the topic.</li> </ul>	<p><b>Vocabulary</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Properties</li> <li><input type="checkbox"/> Stretch</li> <li><input type="checkbox"/> Waterproof</li> <li><input type="checkbox"/> Object</li> <li><input type="checkbox"/> Material</li> </ul> <p><b>Instructional Strategies:</b> <b>Reading Strategies Approaches:</b> The approach you take to help students work through reading the texts depends on your students. Some options are:</p>	<p><b>ELAL Connections: Vocabulary Knowledge:</b> Vocabulary development includes academic words (tier 3 words) from a variety of texts.</p> <p><b>Skills/Procedures:</b> Examine meanings of words from subject content areas (tier 3 words).</p> <p><b>ELAL Comprehension: Knowledge:</b> Questioning includes asking or answering questions regarding</p> <ul style="list-style-type: none"> <li>● <b>How?</b></li> <li>● <b>What?</b></li> </ul> <p><b>Skills/Procedures</b> Answer questions requiring literal recall and understanding of evidence, details, or facts from texts</p>	<p><b>Books About Rubber</b></p> <p><b>Acorn Exploring Materials: Rubber</b> By Valerie Akerson and Nancy Harris</p> <ul style="list-style-type: none"> <li>● This is a very simple text</li> <li>● Available on Amazon</li> </ul>



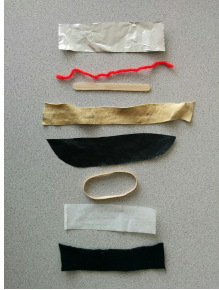
	<ul style="list-style-type: none"> <li>➤ Revisit the question “Why are the balls made from different materials?”</li> <li>➤ Think pair share</li> <li>➤ Introduce the word Properties - features, characteristics describe materials to better understand them. <b>Grade 1 objects</b></li> <li>➤ Tell students: “We are going to read a non-fiction book(s) about rubber to find out more about this material.”</li> <li>➤ We need to see/listen how the author describes rubber to find out the properties of rubber</li> </ul> <p>Predict: What words do you think the author might use to describe rubber?</p> <ul style="list-style-type: none"> <li>➤ Elicit a few responses from students</li> <li>➤ Read the section of book or books out loud to class</li> <li>➤ See suggested strategies in the next column - “Reaching All Learners” for ways students can work with the text to complete the concept map.</li> </ul> <p><b>10-15 minutes Students Complete Concept Map “Properties of Rubber”</b></p> <ul style="list-style-type: none"> <li>➤ Early finishers can read more about rubber to find out more information.</li> </ul> <p><b>10 Minutes Whole Class Discussion</b></p> <ul style="list-style-type: none"> <li>➤ Partners share results and it is recorded on class concept map</li> <li>➤ Ask students "Look over the properties of rubber.Which property do you think would be the most important to make a ball bounce?" Students share and teacher pushes for reasoning: “Because...”</li> <li>➤ Think-pair-share</li> <li>➤ Rubber can be bent out of shape but it also returns to its original shape after.</li> </ul>	<ul style="list-style-type: none"> <li>➤ Teacher reads aloud for the first time and then students are partnered to reread and complete the concept map. Partners are strategically selected to help support each other.</li> <li>➤ <b>Pre-front guided reading</b> with a small group of struggling readers, <b>before</b> reading to the whole class so they can be partnered with other students to complete the concept map.</li> <li>➤ If you have both books you may provide Material World: Rubber to at or above level readers &amp; Acorn Rubber to other partners</li> </ul> <p><a href="#">Concept Map Strategy</a></p> <p><b>Sentence Stem discussing most important property to make a ball bounce</b></p> <p>I think the property of _____ is the most important to make a ball bounce because....</p>	<p><b>Assessment Look Fors:</b> <b>Can the student</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Locate details where the author describes rubber?</li> <li><input type="checkbox"/> Identify the properties (description) of rubber from the text?</li> </ul> <p><b>Science: Matter</b></p> <p><b>Understanding:</b> Materials have unique properties.</p> <p><b>Knowledge:</b> An object can be made from different materials; e.g., a canoe can be made from wood or aluminum.</p> <p><b>Understanding:</b> Natural and processed materials are used to make objects that serve a variety of purposes.</p>	 <p><b>Material World:</b> <b>Rubber</b> by Claire Lewllyn</p> <ul style="list-style-type: none"> <li>• Grade 3 Level Scaffolding required</li> </ul> <p>American Amazon will ship to CanadaAmazon.ca sells used and new but sells out quickly</p>  <p>Concept Map For <a href="#">Rubber Investigation handout p. 7</a></p>
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	<ul style="list-style-type: none"> <li>➤ How could we gather observable, measurable data to find out if our ideas are correct?</li> <li>➤ Discuss with students</li> <li>➤ Let students know Material Scientists would test the properties of materials to find out</li> <li>➤ Ask: “How could we measure or test the ‘stretchiness’?”</li> <li>➤ “How could we show that stretching is important for a ball to bounce? Do balls stretch when bounced?”</li> </ul>			 <p>Also create a slide or anchor chart for whole class for concept map</p>
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Estimated Time	Learning Goal based on curriculum expectations & engagements to develop student understanding.	Inclusion of all Learners How will all learners access the learning engagements? <i>Teachers can adapt to their context</i> <a href="#">Universal Design for Learning Principles:</a>	Assessment For Learning Based on the curriculum, what do I need to <b>see or hear</b> from students that shows they are getting it?	Resources
<b>Lesson 7</b>  <b>40 minutes</b>	<p><b>Explore:</b> To answer the first question “How could we measure the observable property of stretchiness of rubber?” Students will stretch and measure rubber as well as other materials for comparison. To answer the second question of whether rubber balls stretch or change shape, students observe a slow motion video of a ball bouncing to see if the ball changes shape.</p> <p><b>Note:</b> If you have not taught measuring length</p>	<p><b>Vocabulary:</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Unit</li> <li><input type="checkbox"/> Length</li> <li><input type="checkbox"/> Tile</li> <li><input type="checkbox"/> Can be shaped (ensure students know what this means)</li> </ul>	<p><b>Scientific Methods:</b></p> <p>Knowledge Investigations are conducted for purposes such as</p> <ul style="list-style-type: none"> <li>• answering questions</li> </ul> <p><b>Skills Procedures:</b> Develop questions for the purpose of an investigation.:</p> <p><b>Science: Matter</b></p>	<p><b>Tiles or other Non-standard unit to measure length with</b></p> <p><b>Materials to measure stretch with. Some suggestions</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Rubber band</li> <li><input type="checkbox"/> yarn,</li> </ul>



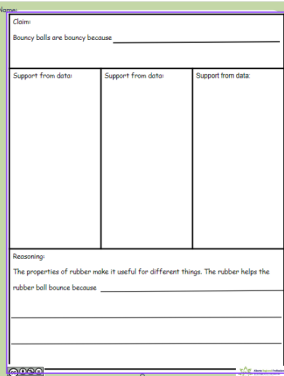
	<p>with tiles or non-standard units this would be a great time to build some capacity with students.</p> <p><b>5 minutes - Activate Prior Learning</b></p> <ul style="list-style-type: none"> <li>➤ Ask students “What property did we think we could observe and measure that gave a ball its bounce?”</li> <li>➤ Students can turn and talk with shoulder partners.</li> </ul> <p><b>5 minutes - Plan the Investigation: Develop a question for the purpose of an investigation</b></p> <ul style="list-style-type: none"> <li>➤ Ask students “If we are going to measure the length of material before and after we stretch it, what should be observed about material that has the most stretch?”</li> <li>➤ Think-Pair-Share students should share the material will become longer or something similar</li> <li>➤ Ask: “What are we trying to find out today?”</li> <li>➤ “What would be a good question for our investigation?”</li> <li>➤ Students discuss with their shoulder partners.</li> <li>➤ Circulate to listen and prompt.</li> <li>➤ Ask a question similar to “Which material can stretch the farthest?”</li> </ul> <p><b>Fair Test with Measuring</b></p> <ul style="list-style-type: none"> <li>➤ Tell students when we measure the before and after stretching different materials we should have the same measurements.</li> <li>➤ How could we measure the length?</li> </ul> <p><b>15 minutes - Demonstrate with tiles or another non-standard unit</b></p> <ul style="list-style-type: none"> <li>➤ Ask students: “If I measured the length with a few tiles and something else</li> </ul>		<p><b>Knowledge:</b> Properties of materials that can be tested include</p> <ul style="list-style-type: none"> <li>• if the material can be shaped (malleability)</li> </ul> <p>Various properties of materials can be measured, including length</p> <p><b>Understanding:</b> Materials have unique properties.</p> <p><b>Skills/Procedures</b></p> <ul style="list-style-type: none"> <li>• Test properties of various materials</li> <li>• Measure various materials using non-standard measurements.</li> <li>• Compare the properties of materials to determine what material is best suited for a specific purpose</li> </ul> <p><b>Assessment Look for:</b> Science</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Compare the properties of the materials to express which material changes shape (change of length)to stretch the most?</li> </ul> <p><b>Math Connection: Measurement Knowledge:</b>Tiling is the process of measuring a length by using many copies of a unit without gaps or overlaps.</p> <p>Iterating is the process of measuring a length by repeating one copy of a unit without gaps or overlaps.</p> <p><b>Understanding:</b> Length is quantified by measurement.</p> <p>Length is measured with equal-sized units that themselves have length</p> <p><b>Skills/Procedures:</b> Measure length with non-standard units by</p>	<ul style="list-style-type: none"> <li><input type="checkbox"/> plastic garbage bag,</li> <li><input type="checkbox"/> aluminum foil,</li> <li><input type="checkbox"/> wax paper,</li> <li><input type="checkbox"/> leather (Sham-Wow)</li> <li><input type="checkbox"/> Popsicle stick</li> <li><input type="checkbox"/> Metal (spoon or</li> <li><input type="checkbox"/> Sandpaper</li> <li><input type="checkbox"/> Cardboard</li> </ul>  <p><a href="#">Investigation Handout p. 9 Recording Data for Support</a></p> <table border="1" data-bbox="1705 1084 1890 1323"> <thead> <tr> <th>Material</th> <th>Length Before Stretching</th> <th>Length After Stretching</th> </tr> </thead> <tbody> <tr><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td></tr> </tbody> </table>	Material	Length Before Stretching	Length After Stretching																														
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	<p>would we all get the same measurement?" (No.)</p> <ul style="list-style-type: none"> <li>➤ Model lining up the tiles or non-standard unit from one end to another.</li> <li>➤ Ask "If some of us line our tiles and some do not, would we get the same measurement?" (No.)</li> <li>➤ Model with one material measuring with a tile before and after - get some student volunteers to help.</li> <li>➤ "What is the unit we are all measuring in? Tiles so we need to write that down."</li> <li>➤ Model recording the measurement with a unit.</li> </ul> <p><b>20 minutes Students Measure the stretchiness of different materials</b></p> <ul style="list-style-type: none"> <li>➤ Groups of 3 help stretch and measure.</li> <li>➤ Circulate and ask prompting questions             <ul style="list-style-type: none"> <li>○ "What material can be shaped or not shaped?"</li> <li>○ "Does the length change with materials that can be shaped or not shaped?"</li> </ul> </li> </ul>		<p>tiling, iterating, or using a self-created measuring tool.</p> <p><b>Assessment Look Fors:</b> Can the student Math</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Line the non-standard unit correctly without any gaps to measure the length?</li> <li><input type="checkbox"/> Record the measurements?</li> </ul>	<p>Tiles or non-standard tool to measure</p> 
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Lesson 8	<p><b>Explain: Analyze data</b></p> <p><b>10-15 Minutes - Review previous lesson</b></p> <ul style="list-style-type: none"> <li>➤ In partners or small groups have students review and compare their</li> </ul>	<p>Scientific Explanatory Models are representations of students thinking about the inquiry or phenomenon they are investigating. Models are</p>	<p><b>Scientific Methods:</b> <b>Knowledge:</b> Observations and data should be similar if the investigation is repeated.</p> <p><b>Skills/Procedures:</b> Compare observations and data with others.</p>	<p><a href="#">Slow Motion Rubber Ball Video</a></p> <p><a href="#">Slow Motion Tennis Ball Video</a></p>

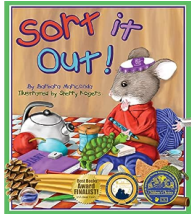


	<p>data, results, and investigations, thinking of the questions:</p> <ul style="list-style-type: none"> <li>○ “Which material was the stretchiest?”</li> <li>○ “What from the data shows this?”</li> <li>○ “Look at the measurements. Which materials could change shape but return back to its original shape “elasticity?”</li> </ul> <p>➤ Record as the second piece of data to support the claim that rubber makes the bounciest ball, using the data from measurements to record. On the Claim &amp; Support p. 9 in Investigation Handout.</p> <p><b>10 Minutes - Second Question: “Do rubber bouncy balls bend or change shape?”</b></p> <ul style="list-style-type: none"> <li>➤ Remind students of the second question</li> <li>➤ Balls bounce so quickly it is hard to see</li> <li>➤ Let them know they will watch a slow motion video to observe if a ball can be shaped when it bounces?</li> <li>➤ Students add this third data to their data to support their claim</li> </ul> <p><b>15-20 minutes - Revise Models</b>  <b>Have students re-read the driving question: “What makes a bouncy ball so bouncy?”</b></p> <p>Option 1) hand back initial models that students drew and ask them to add with stickies or pencil crayon new information they learned to answer the question. Students can also take off information that is not correct</p> <p>Option 2) Provide a fresh sheet of paper. As a class, discuss what symbols to use to show that</p>	<p>not scientific diagrams. Models are representations of students' understanding at a particular time and should reflect changes as their learning deepens. These models provide insight to you as a teacher.</p>	<p><b>Assessment Look Fors:</b>          Does the student</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Identify similarities in the data between the two data sets?</li> <li><input type="checkbox"/> Have similar data to other groups?</li> </ul> <p>Science: Matter</p> <p><b>Knowledge:</b>          Properties of materials that can be tested include</p> <ul style="list-style-type: none"> <li>● if the material can be shaped (malleability)</li> </ul> <p><b>Understanding</b>          Natural and processed materials are used to make objects that serve a variety of purposes.</p>	<p><a href="#">Investigation Handout Claim &amp; Support p. 9</a>  <a href="#">Second column for “Support From Data”</a></p>  <p>The screenshot shows a worksheet titled 'Investigation Handout Claim &amp; Support p. 9'. It has a 'Claim' section with the text 'Bouncy balls are bouncy because _____'. Below this is a table with three columns, each labeled 'Support from data'. At the bottom, there is a 'Reasoning' section with the text 'The properties of rubber make it useful for different things. The rubber helps the rubber ball bounce because _____' followed by two blank lines for writing.</p>
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	<p>a ball changes shape when it bounces and returns back. Students draw picture add symbols such as two way arrows etc. and words to explain.</p>			
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**Elaborate : Apply Understanding to New Context (Transfer of Learning)**

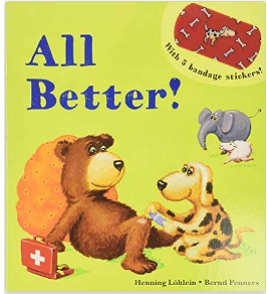
Estimat ed Time	Learning Goal based on curriculum expectations & engagements to develop student understanding.	Inclusion of all Learners How will all learners access the learning engagements? <i>Teachers can adapt to their context</i> <a href="#">Universal Design for Learning Principles:</a>	Assessment For Learning Based on the curriculum, what do I need to <b>see or hear</b> from students that shows they are getting it?	Resources
<p><b>Lesson 9</b> Day 1: 40 minutes Day 2: 40 minutes</p>	<p><b>Engage Part 2 Goal:</b> In partners or small groups of 3, students are provided with several objects and materials and encouraged to sort (classify) these objects into groups that are the same in the same way (features, characteristics).</p> <ul style="list-style-type: none"> <li>• Students are not told how to sort or classify the objects.</li> <li>• This provides teachers with an opportunity to pre-assess what students know about sorting and properties.</li> <li>• As you circulate and ask questions “How did you put the objects in groups? Why?”</li> </ul> <p><b>Instructions:</b></p> <ul style="list-style-type: none"> <li>➤ 5-8 minutes - Read <i>Sort It Out</i> to students</li> <li>➤ The idea is not to guide students how to sort but to think about how things are the same (features, properties etc.) without naming these things.</li> </ul>	<p><b>Sentence Stem:</b></p> <p>We should sort the items by similar....</p> <p>Or</p> <p>We can sort items that have the same....</p> <p><b>Vocabulary:</b></p> <ol style="list-style-type: none"> <li>1. Sort</li> <li>2. Label</li> </ol>	<p><b>Matter:</b> <b>Various properties of materials can be measured, including length and weight (mass).</b></p> <p><b>Question Prompts:</b></p> <ol style="list-style-type: none"> <li>1. “Were there items that didn’t fit your sort? What did you do with them?”</li> <li>2. “What did you use to decide how to sort each group? What is similar about each item in the group?”</li> <li>3. “How are the groups the same or different?”</li> </ol>	<p><a href="#">Book: Sort It Out by Barbara Mariconda</a></p>  <p><b>Available on Amazon &amp; Get Epic as well.</b></p> <p><b>ELAL Connection</b></p> <ul style="list-style-type: none"> <li>• Rhyming book</li> <li>• Use ELAL organizing</li> </ul>




	<ul style="list-style-type: none"> <li>➤ 15 minutes After reading, tell students they are going to decide how to sort the items they observed last lesson.</li> <li>➤ Provide each group with stickies to label their sorts</li> <li>➤ 5 minutes - Have some groups share their sorts. (Choose groups that have at least one sort based on properties.)</li> </ul> <p>Day 2</p> <ul style="list-style-type: none"> <li>➤ 5-8 minutes - Talk to groups that did not share any sorting on physical properties and focused on use.</li> <li>➤ Ask them how Pack Rat sorted? (By how the items look.)</li> <li>➤ Tell students they will watch a sorting materials: <a href="#">Video Arranging objects and materials by properties.</a></li> <li>➤ 15 minutes - Provide an additional 15 minutes for students to re sort and classify their items.</li> <li>➤ 5 minutes - groups share how they re-sorted their items</li> </ul> <p>Optional Share Out - 15-20 minutes</p> <ul style="list-style-type: none"> <li>➤ Groups don't label their sort and class rotates, with stickies, to each groups (or most groups) to identify how the groups sorted the items.</li> </ul>		<p>4. "Can you make smaller groups within larger groups?"</p> <p><b>Assessment Look Fors:</b></p> <p>Can the student</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Group like items by physical properties: length, area, height, color, texture, shape.</li> <li><input type="checkbox"/> Group items by other physical properties: malleability (shape can bend), hard/soft, absorbs/does not absorb, reflective/non reflective.</li> </ul>	<p>ideas &amp; KUSPs</p> <p><b>Tray of various objects for each partner/group</b></p>
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<p><b>Estimated Time</b></p>	<p>Learning Goal based on curriculum expectations &amp; engagements to develop student understanding.</p>	<p><b>Inclusion of all Learners</b> How will all learners access the learning engagements? <i>Teachers can adapt to their context</i> <a href="#">Universal Design for Learning Principles:</a></p>	<p><b>Assessment For Learning</b> Based on the curriculum, what do I need to <b>see or hear</b> from students that shows they are getting it?</p>	<p><b>Resources</b></p>
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<p><b>Lesson 10</b></p>	<p><b>Explain Goal: Introduce Assessment Task</b></p> <p><b>10 minutes - Video</b></p> <ul style="list-style-type: none"> <li>➤ Ask students: “What materials are windows made from?” And introduce the term transparent.</li> <li>➤ Ask students to think of reasons why we would want materials that are transparent.</li> <li>➤ Let students know they are going to watch another video about materials and their properties.</li> <li>➤ Discuss how they will use connect/extend/challenge to think about different materials and their properties while watching the video.</li> <li>➤ Tell students connect is information we already know.</li> <li>➤ Extend is new information we will learn.</li> <li>➤ Challenge is any questions we have about materials and their properties.</li> <li>➤ Play video and pause strategically to ask students “Is this information we already know or new information?”</li> <li>➤ Add to the chart.</li> <li>➤ When the video is finished have students write a question on a sticky note to add to the anchor chart.</li> </ul> <p><b>20 minutes Introduce Assessment Task</b></p> <ul style="list-style-type: none"> <li>➤ Read or shared reading strategy about Material Engineers and show pictures on board.</li> <li>➤ Read the assignment to students.</li> <li>➤ Optional: read aloud <i>All Better</i> to students.</li> <li>➤ Guide students through the planning process as they Think-Pair-Share.</li> </ul>	<p><b>Vocabulary:</b></p> <ol style="list-style-type: none"> <li>1. Transparency</li> <li>2. Material</li> <li>3. Absorbent</li> </ol>	<p><b>Science Curriculum: Matter Knowledge:</b> Materials are used to make objects</p> <p>Knowledge of the properties of materials and their purposes is important in many occupations and roles, such as engineer</p> <p><b>Skills/Procedures:</b> Identify the materials used to make various objects.</p>	<p><a href="#">Properties of Materials 3 minutes video</a></p>  <p><b><a href="#">All Better on Youtube</a></b></p> <p><b>Materials to test (same as the stretch test &amp; some extra) cut into approximately same size &amp; shape</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> yarn,</li> <li><input type="checkbox"/> plastic garbage bag, or ziploc bag s</li> <li><input type="checkbox"/> aluminum foil,</li> <li><input type="checkbox"/> wax paper,</li> <li><input type="checkbox"/> Leather,</li> <li><input type="checkbox"/> rubber band</li> <li><input type="checkbox"/> Gauze</li> <li><input type="checkbox"/> Sandpaper</li> <li><input type="checkbox"/> Sponge</li> <li><input type="checkbox"/> Pipette or eye dropper</li> <li><input type="checkbox"/> Cup of water</li> </ul>
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	<ul style="list-style-type: none"> <li>➤ “What do we need to find out first before designing a bandage?”</li> <li>➤ “What is the purpose of a bandage? What does it do?”</li> <li>➤ “What properties are important for the material we choose?” <i>Ideally wanting students to talk about strength, changes shape (bends) and soaks up liquid (absorbent). Students may say waterproof or protect from water which is another property that is acceptable. But not necessary.</i></li> <li>➤ If students are missing important properties prompt with:             <ul style="list-style-type: none"> <li>○ “If you cut yourself there is blood what would be helpful about the material if you are bleeding?”</li> <li>○ “If you wear the bandage for a few days but you need to carry things and bend your arm, what would be an important property for the material to help with that?”</li> </ul> </li> <li>➤ Ask students: “how could we test or measure how different material soaks up water, so we are able to choose the best material?”</li> <li>➤ Ask students: “how could we test or measure how different materials can change shape, so we are able to choose the best material?”</li> <li>➤ Ask students: “how could we test or measure the strength of different materials so we are able to choose the best material?”</li> <li>➤ Students can share ideas.</li> </ul>			<p><a href="#">Student Bandage Investigation Booklet</a></p> 
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Estimated Time	Learning Goal based on curriculum expectations & engagements to develop student understanding.	Inclusion of all Learners How will all learners access the learning engagements? <i>Teachers can adapt to their context</i> <a href="#">Universal Design for Learning Principles:</a>	Assessment For Learning Based on the curriculum, what do I need to <b>see or hear</b> from students that shows they are getting it?	Resources
Lesson 11	<p><b>Explore: Testing Materials. Option 1) students can rotate at centers to test but would need to have a demonstration or option 2) take 3 30 minute sessions to complete each test. Either option requires the teacher to model how to perform the tests first.</b></p> <p><b>5 minutes - Activate prior learning</b></p> <ul style="list-style-type: none"> <li>➢ Ask students what the task from the bandage company is.</li> <li>➢ “What are we trying to find out? And what would be a good question for our investigation?”</li> <li>➢ Students write question in their journal or investigation handout.</li> </ul> <p><b>Testing Materials:</b> Students should predict what they will observe the answer will be at each testing station either orally or in written form.</p> <p>Discuss with students the idea of fair test so that observation and data can be similar.</p> <p><b>Absorbency test</b></p> <p><input type="checkbox"/> Students have a cup of water to fill pipette or eye dropper with water.</p>	<p><b>Sentence stems for predictions:</b></p> <p>I think ..... material will soak the most water because....</p> <p>I think ..... materials will bend &amp; twist because...</p> <p>I think ..... materials will be strong because...</p>	<p><b>Science: Matter</b> <b>Knowledge:</b> Properties of materials that can be tested include</p> <ul style="list-style-type: none"> <li>• if water is absorbed</li> <li>• if the material can be shaped (malleability)</li> </ul> <p><b>Understanding:</b>Materials have unique properties.</p> <p><b>Skills/Procedures:</b>Test properties of various materials.</p> <p><b>Scientific Methods:</b> <b>Knowledge:</b> Investigations are conducted for purposes such as</p> <ul style="list-style-type: none"> <li>• Solving a problem</li> </ul> <p><b>Skills/procedures:</b> Develop questions for the purpose of an investigation.</p>	<p><b>Materials to test (same as the stretch test &amp; some extra) cut into approximately same size &amp; shape</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> yarn,</li> <li><input type="checkbox"/> plastic garbage bag, or ziploc bag s</li> <li><input type="checkbox"/> aluminum foil,</li> <li><input type="checkbox"/> wax paper,</li> <li><input type="checkbox"/> Leather,</li> <li><input type="checkbox"/> rubber band</li> <li><input type="checkbox"/> Gauze</li> <li><input type="checkbox"/> Sandpaper</li> <li><input type="checkbox"/> Sponge</li> </ul> <p><b>Absorbency</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Pipette or eye dropper</li> <li><input type="checkbox"/> Cup of water</li> </ul> <p><b>Strength</b> Washers Textbooks</p>



- Model for students to carefully drop and count the drops for each piece of material.
- Students have a recording sheet to document their observations.



**Can be shaped test** students will have prior knowledge with most materials when testing for stretch ability for rubber balls. This should provide context for students to make strong predictions for which materials can be shaped.

- Students will bend & twist each material to find out which ones can be shaped or not shaped.
- They can record their observations of the properties on the handout

**Strength Test:**

- Students use 2 text books the same distance apart and lay the material across to form a bridge.
- They may need to tape each end or

**Investigation Handout**

Name: \_\_\_\_\_

**TESTING MATERIALS**

Material tested	Did it absorb water?		How many drops?	Did water seep through or break the material?		Properties based on Observation:	
	Yes	No		Yes	No	Soaks water (absorbent)	Not absorbent
Yarn	Yes	No		Yes	No	<input type="checkbox"/> Can be shaped	<input type="checkbox"/> Not strong
Leather	Yes	No		Yes	No	<input type="checkbox"/> Can be shaped	<input type="checkbox"/> Not strong
Scissors	Yes	No		Yes	No	<input type="checkbox"/> Can be shaped	<input type="checkbox"/> Not strong
Wax Paper	Yes	No		Yes	No	<input type="checkbox"/> Can be shaped	<input type="checkbox"/> Not strong
Rubber band	Yes	No		Yes	No	<input type="checkbox"/> Can be shaped	<input type="checkbox"/> Not strong
Plastic Bag	Yes	No		Yes	No	<input type="checkbox"/> Can be shaped	<input type="checkbox"/> Not strong
Popcorn stick	Yes	No		Yes	No	<input type="checkbox"/> Can be shaped	<input type="checkbox"/> Not strong
Sandpaper	Yes	No		Yes	No	<input type="checkbox"/> Can be shaped	<input type="checkbox"/> Not strong
Sponge	Yes	No		Yes	No	<input type="checkbox"/> Can be shaped	<input type="checkbox"/> Not strong

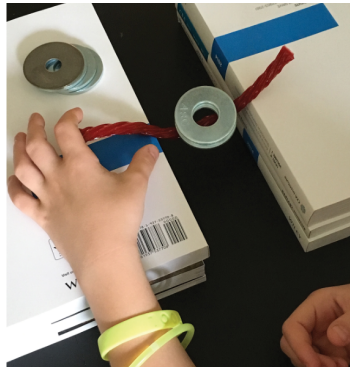
Name: \_\_\_\_\_

**TESTING MATERIALS**

Can the material be shaped?

Material tested	Does it bend?		Does it break?		Properties based on Observation:	
	Yes	No	Yes	No	Can be shaped	Can't be shaped
Yarn	Yes	No	Yes	No	<input type="checkbox"/>	<input type="checkbox"/>
Leather	Yes	No	Yes	No	<input type="checkbox"/>	<input type="checkbox"/>
Scissors	Yes	No	Yes	No	<input type="checkbox"/>	<input type="checkbox"/>
Wax Paper	Yes	No	Yes	No	<input type="checkbox"/>	<input type="checkbox"/>
Rubber band	Yes	No	Yes	No	<input type="checkbox"/>	<input type="checkbox"/>
Plastic Bag	Yes	No	Yes	No	<input type="checkbox"/>	<input type="checkbox"/>
Popcorn stick	Yes	No	Yes	No	<input type="checkbox"/>	<input type="checkbox"/>
Sandpaper	Yes	No	Yes	No	<input type="checkbox"/>	<input type="checkbox"/>
Sponge	Yes	No	Yes	No	<input type="checkbox"/>	<input type="checkbox"/>
cardboard	Yes	No	Yes	No	<input type="checkbox"/>	<input type="checkbox"/>




	<p>place some weight to hold either end down (again should be the same for each piece of material).</p>  <ul style="list-style-type: none"> <li><input type="checkbox"/></li> <li><input type="checkbox"/> Students place washer on the bridge &amp; count how many washers until the bridge collapses.</li> <li><input type="checkbox"/> Record observation and data on handout.</li> </ul>			<p>Name: _____</p> <p>TESTING MATERIALS</p> <p>How strong is the material?</p> <p>Name: _____</p> <table border="1"> <thead> <tr> <th>Material tested</th> <th>Amount of Washers</th> <th>Properties Observed (Strong or Weak)</th> </tr> </thead> <tbody> <tr><td>Yarn</td><td></td><td></td></tr> <tr><td>Leather</td><td></td><td></td></tr> <tr><td>String</td><td></td><td></td></tr> <tr><td>Wax Paper</td><td></td><td></td></tr> <tr><td>Rubber band</td><td></td><td></td></tr> <tr><td>Plastic Bag</td><td></td><td></td></tr> <tr><td>Paper plate</td><td></td><td></td></tr> <tr><td>Sandpaper</td><td></td><td></td></tr> <tr><td>Sponge</td><td></td><td></td></tr> <tr><td>cardboard</td><td></td><td></td></tr> </tbody> </table>	Material tested	Amount of Washers	Properties Observed (Strong or Weak)	Yarn			Leather			String			Wax Paper			Rubber band			Plastic Bag			Paper plate			Sandpaper			Sponge			cardboard		
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<p><b>Lesson 12</b></p>	<p><b>Explain &amp; Design:</b> Students review data gathered from testing in previous lessons to make a conclusion.</p> <p><b>5 minutes - Activate Prior Learning</b> ➤ Tell students that scientists review data</p>		<p><b>Science: Matter</b></p> <p><b>Skills/Procedures:</b> Explain the relationship between suitability of materials and purpose.</p> <p>Select a material and use it to create an item</p>	<p><a href="#">Claim/Support/Reason Graphic Organizer Or journals p. 6</a></p>



	<p>to make conclusions (answer to question).</p> <p><b>15-20 minutes - Compile the data as class table from each group</b></p> <ul style="list-style-type: none"> <li>➤ Have groups share results and record on a class data chart (similar to the data sheet students recorded on).</li> <li>➤ Collectively as a class review the data.</li> <li>➤ Circle the patterns or data that repeats (that students identify) across the different tests to find out which material would be the best to make a bandage from.</li> <li>➤ As a class work on the conclusion: "Claim - Support - Reasoning".</li> </ul>		<p>for a specific purpose.</p>	<div style="border: 1px solid black; padding: 5px;"> <p>Claim: Answer the question The material that would make the best bandage is _____</p> <table border="1" style="width: 100%; height: 80px;"> <tr> <td style="width: 33%; text-align: center;">Support from Data</td> <td style="width: 33%; text-align: center;">Support from Data</td> <td style="width: 33%; text-align: center;">Support from Data</td> </tr> </table> <p>Reasoning: The material _____ when tested had the properties of _____</p> <p>making it the best material to make a bandage with.</p> </div> <p><b><u><a href="#">Optional Non-Fiction Does it absorb or repel liquid video</a></u></b></p>	Support from Data	Support from Data	Support from Data
Support from Data	Support from Data	Support from Data					



Estimated Time	Learning Goal based on curriculum expectations & engagements to develop student understanding.	Inclusion of all Learners How will all learners access the learning engagements? <i>Teachers can adapt to their context</i> <a href="#">Universal Design for Learning Principles:</a>	Assessment For Learning Based on the curriculum, what do I need to <b>see or hear</b> from students that shows they are getting it?	Resources
<p><b>Lesson 14</b></p>	<p><b>Scientific Method Assessment</b> Students review the procedures they took part in for this investigation. To provide assistance with describing the procedures students are provided a handout with the focal procedures for this investigation and one that doesn't belong. They can cut out or number to order and describe what they did during the investigation.</p> <p>Example you may hear: "We talked about what we were trying to find out and we asked a question."</p> <p>30 minutes</p> <ul style="list-style-type: none"> <li>➤ Gather students together and review the steps of the investigation.</li> <li>➤ Tell students they will put the procedures in order and describe what we did at each step of the investigation.</li> <li>➤ Let them know there is a secret step that doesn't belong. When they find it put it to the side.</li> <li>➤ Students can either record descriptions or you can interview.</li> </ul> <p>Early finishers can continue to work on bandages as needed.</p>	<p><b>Vocabulary:</b> Procedures</p>	<p><b>Scientific Methods</b></p> <ul style="list-style-type: none"> <li>➤ Describe procedures of (this) investigation                             <ul style="list-style-type: none"> <li>○ Ask Questions</li> <li>○ Makes Predictions</li> <li>○ Observes and records data</li> <li>○ Analyze data</li> <li>○ Make Conclusions (In this task students are making conclusions through demonstration when they select and combine materials)</li> </ul> </li> </ul> <p><b>See Single Point rubric from performance task for criteria</b></p>	<p><a href="#">Claim/Support/Reason Graphic Organizer Or journals</a></p> <hr/> <p><b>Assessment: Describes procedures of an investigation</b> <b>Directions:</b> Cut out and place the steps of the bandage investigation in order. Describe what you did in each step of the investigation</p> 



## Sources

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