Lessons for 2nd GRADE
PHYSICAL SCIENCE: PROPERTIES OF SOLIDS AND LIQUIDS

NOTE: Some Rock Hill Schools have the FOSS Solids and Liquids Kit, others have the STC: Solids and Liquids kit. Refer to the chart below for alignment with indicators.

Indicators	FOSS: Solids & Liquids	STC: Solids & Liquids
2.P.3A.1	Investigation 1: Solids Investigation 2: Liquids	Lesson 1: Spoon and steel ball—what do you know about solids Lesson 2: Classify solids based on physical properties Lesson 3: Compare solids that roll vs. those that stack Lesson 4: How far will solids roll? Lesson 5: Use send of touch to explore hardness of solids Lesson 6: Which solids sink, which float? Lesson 8: Guess my solid—based on its properties. (optional) Lesson 9: Identify properties of a button and a sponge. (optional) Lesson 10: Observing water vs. liquid glue Lesson 11: How do liquids look under magnification? Lesson 12: Liquids flow at different rates.
2.P.3A.2	Investigation 3: Bits and Pieces	This indicator must be taught from outside resources.
2.P.3A.3	Investigation 4: Solids, Liquids and water	This indicator must be taught from outside resources.
2.P.3A.4	Investigation 4: Solids Liquids and Water	This indicator must be taught from outside resources.
2.P.3B.1	This indicator must be taught from outside resources.	This indicator must be taught from outside resources.
2.P.3B.2	This indicator must be taught from outside resources.	Lesson 7: Testing solids with a magnet
2.P.3B.3	This indicator must be taught from outside resources.	This indicator must be taught from outside resources.

Standard 2.P.3: The student will demonstrate an understanding of the observable properties of solids and liquids and the special properties of magnets.

2.P.3A. Conceptual Understanding: Solids and liquids are two forms of matter that have distinct observable properties. Some matter can be mixed together and then separated again. Solids and liquids can be changed from one form to another when heat is added or removed.

Performance Indicators: Students who demonstrate this understanding can:
2.P.3A.1 Analyze and interpret data from observations and measurements to describe the properties used to classify matter as a solid or a liquid.

Additional Suggestions for teaching this indicator:

- What's in the bag? Students are given a baggie of various solids and asked to classify them in some way, then describe their method of classification. Some possible categories are listed. Students may think of their own categories.
    - Metals vs. Nonmetals
    - Opaque vs. Transparent vs. Translucent
    - Hard vs. Flexible
    - Plastic vs. Not Plastic
    - Floats vs. Does not Float
    - Magnetic vs. Not Magnetic

- Solids-True or False: Students are given True/False statements about solids and baggie of solids to study. They answer the True/False statements based upon the objects in their baggie.

	TRUE	FALSE	Comments
Solids never float.			
Solids are hard and cannot change shape.			
Solids are heavy.			
Solids are attracted to magnets.			
Solids are always smooth.			
Solids are opaque.			

- My Ball vs. Your Ball: Each student in a group of 4 is given a different ball (pingpong, steel, racquet, marble, etc.). The students verbally compare and write a list of things the balls have in common, then they write what the differences are. They then allow each ball to roll down a ramp and they compare how each rolls. *Does each roll at the same speed? Do they each roll straight? What may be the cause of the differences?*

- Boiled or Not Boiled: In pairs, students are given a boiled egg and a raw egg. Without breaking or dropping the egg, the students have to figure out which egg boiled and mark it with a B. In their notebook, they write how they came to that conclusion. Next the teacher breaks the eggs over a bowl for all to see. *Be sure students wash their hands after this activity.

- Guess the Amount: The teacher gives students 3 equal amounts of water in different shaped containers. Each group of students also needs a measuring cup. Students observe the water and organize the cups as most water to least water. Then students pour the water into the measuring cup to find out the amount, the record the amount on a chart. They will be surprised to see that each container held the same amount of water. *Discuss that liquids take the shape of their container. Liquids also can flow, be poured, or spilled. How would spilling have affected their results?*

2.P.3A.2 Develop and use models to exemplify how matter can be mixed together and separated again based on the properties of the mixture.

Suggestions for teaching this indicator:

- What's in the Mix? Give each student a scoop of Chex Mix. Ask them to examine their mix and determine how many different parts there are to the mixture. Ask how they were able to identify the different parts of this mixture. *Discuss how foods are often mixed to make other foods. Ask them if they ever separate their food because they don't like something—like taking the bell pepper off of their pizza.*

- What Happened to my Saltwater? Give students each a small cup of water, into the water they should stir to dissolve a teaspoon of salt. The cups of salt water must sit for a few days for the water to evaporate; the salt will be left behind. This can also be done with sugar, but ants may become a problem. Using bluing, students may be able to grow crystals.

- Oil & Water: Students should be given equal, small amounts of water and oil (like ¼ cup each). Students should make observations of each to record in their notebook. The oil and water should be poured into a third cup at the same time. Students will see the two liquids separate—water will be on the bottom and oil on top. Students may use eye-droppers to separate the oil back into its cup.

- What Color are Your M&Ms? Students will each be given a scoop of M&Ms. Students will sort the candies according to color and make a bar graph of their counts. *Discuss that mixtures are not always made of the same composition. Discuss mixtures that are important to always be the same.*

How Many M&M's in the Mixture?					
10					
9					
8					
7					
6					
5					
4					
3					
2					
1					
	Red	Orange	Yellow	Green	Blue

2.P.3A.3 Conduct structured investigations to test how adding or removing heat can cause changes in solids and liquids.
2.P.3A.4 Construct scientific arguments using evidence from investigations to support claims that some changes in solids or liquids are reversible and some are not when heat is added or removed.

Suggestions for teaching these indicators:

- Boy That's Cold! Give each student 2 ice cubes. One ice cube should be held in the student's hands and the other ice cube should sit and be observed in a clear plastic cup. Students should predict what will happen, then observe both ice cubes until they are melted. In their science notebook, students should write their prediction and support it. Then they should explain what they saw happen. *Did both ice cubes melt at the same time? Why or why not?*

- Ice Racing: Pose this question—If you put an ice cube in cold water, warm water and hot water, which cup of water will change its temperature most? Allow students to make a prediction, then provide them with the materials for this test. They will need identical plastic cups, measuring cups, thermometers, hot, warm and cold water. In a chart, students should collect data. Sample data is below:

	Hot Water	Warm Water	Cold Water
Starting Temp.	75°C	35°C	15°C
Ending Temp	65°C	30°C	12°C
Temperature Change	Down 10°C	Down 5°C	Down 3°C

- Ice Racing-Alt: Pose this question—If you put an ice cube into cold, warm and hot water, in which do you think the ice will melt first. Allow students to make a prediction, then provide students with the materials for the test. *Discuss that the same amount of water should be in each cup, the ice cubes should be the same size, each cup should be treated the same way.*

- Melt My Color: Have students bring in old, broken crayons and remove the paper. Purchase an electric candle warmer ($4.97 at WalMart) to melt the crayons Make a bowl from aluminum foil to put the crayons in, stir with an old pencil to mix the colors. Poured the melted wax into cookie cutters or into a mini-muffin pan to make new shapes. The wax will harden as it cools (when it is removed from the heat). *Discuss reversible vs. irreversible changes.*

- Where Did it Go? Give each student a small container of water (warm water may help) and several biodegradable packing peanuts. Students should write observations of each in their lab notebook. The packing peanuts should be placed in the water and stirred. The packing peanuts dissolve in the water. Discuss whether this is reversible or nor reversible. Students should write observations in their lab

notebook.

- Salty Cookies: In groups of 2-3 students can make a batch of salt dough, then use cookie cutters to cut their dough into shapes. ½ cup of salt, ½ cup of water, 1 cup of plain flour is what each group will need. If the dough is sticky, a little more flour may be added. *Discuss that 2 solids were mixed with 1 liquid to make the dough. Discuss whether the dough is a solid or a liquid. Discuss that although the salt and flour were "poured" into the bowl, they are solids not liquids.* The dough may be cut into shapes and baked at 200°F until slightly brown. The cookies can also be baked in the microwave in 10-sec intervals until done. Once done, the cookies can be painted and taken home by the students. *Discuss whether mixing the materials is reversible. Discuss whether baking the cookies is reversible.* *http://rainydaymum.co.uk/the-quickest-ever-salt-dough-recipe#sthash.JwIhISoz.dpbs*

- Recipe for Oobleck: http://www.livescience.com/21536-oobleck-recipe.html

2.P.3B. Conceptual Understanding: Magnets are a specific type of solid that can attract and repel certain other kinds of materials, including other magnets. There are some materials that are neither attracted to nor repelled by magnets. Because of their special properties, magnets are used in various ways.

2.P.3B.1 Conduct structured investigations to answer questions about how the poles of magnets attract and repel each other.

Suggestions for teaching this indicator:

- Pole Position: Students should be given at least 2 bar magnets with the poles labeled. Students should try different configurations of the magnets and sketch at least 4 in their science notebook. Use the terms attract and repel and ask the students to figure out a way to sketch what they feel when the magnets attract or repel.

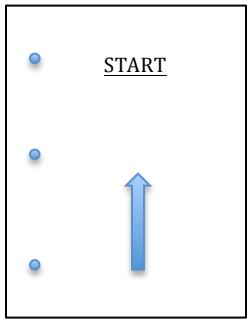
- Where's the Pole? Students should be given 2-3 ring magnets and asked to compare them to the bar magnets they have previously experienced. Ask students to investigate whether or not ring magnets have poles. Ask students to try to locate the poles and explain their findings in their science notebook.

2.P.3B.2 Analyze and interpret data from observations to compare the effects of magnets on various materials.

Additional Suggestions for teaching this indicator:

- Does Water Stop Magnetic Force? Pour iron filings into a container of water. Place a magnet into a sealed plastic baggie. Holding the magnet in the baggie, test to see if the magnet attracts the iron filings through the water. Will other objects that are magnetic outside of water still be magnetic in water?

- How Strong is the Magnetic Force: Students will draw a line on a sheet of typing paper and label it START. Students will place a few iron fillings on the start line. Beginning with the magnet at the bottom of the paper and slowly sliding it closer, they will investigate how close the magnet must be for the iron filings to begin to react. (It may be a good idea for the magnet to be in a plastic baggie for this activity.) They should stop the magnet when they see the iron fillings being pulled. Using a ruler, they should measure the distance between the START line and the top of the magnet and record this distance in their science notebook. Students should try this again with small paper clips on the START line. Next they should try it with a jumbo paperclip on the line. *Does the magnet reach the same distance before the object begins to move? Does it matter if the magnet is on the N or S pole?*



2.P.3B.3 Obtain and communicate information to exemplify the uses of magnets in everyday life.

- Make it Take it: Give each student a small magnet they can have to take home with them. Provide various materials: glue, construction paper, popsicle sticks, toothpicks, paperclips, etc. The student's task is to make something useful with their magnet. In their science notebook, they must describe a problem they can solve by using their magnetic creation, then make the magnetic creation and demonstrate its use to the class.