UNBC UNIVERSITY OF NORTHERN BRITISH COLUMBIA

UNIT PLANNING TEMPLATE

Science Unit Topic / Guiding Question: Magnetism - An experiential **Science** Unit on the pushing and pulling of magnets.

Rationale:

As part of the BC Kindergarten Science curriculum, students are expected to learn how the motion of objects depend their properties. Magnets have special properties that affect the pushing and pulling of objects and can be found in everyday familiar materials and objects. The purpose of this unit is to allow students to allow students to learn these properties through experiential learning and play.

STAGE 1: Desired Results

UNDERSTAND

Big Ideas → **Essential Questions**

The motion of objects depends on their properties.

- How can you make objects move?

What objects move from magnets and how do they move?

- How does the shape or size of an object affect the object's movement

DO

Core Competencies:

Communication

- ☐ Communicating
- ☐ Collaborating

Students collaborate in their investigation of what objects are magnetic or non-magnetic. The class is divided into 3 or 4 groups and each group hypothesizes if various items will be affected by magnets. Students guess what the effects of the different magnetic poles will have: Will the same poles push apart or pull together? Through experiential play, students will explore how magnets work and how they push and pull based on a magnetic North and South poles. Students will hypothesize and experiment to see if the magnetic field can transfer through objects.

Thinking

- ☐ Creative Thinking
- ☐ Critical & Reflective Thinking

Students use creative thinking to solve how to move a magnetic item around a track without magnet touching it. Students use critical thinking to guess if magnets can pickup many paper clips without touching them.

Personal & Social

- ☐ Personal Awareness & Responsibility
- ☐ Positive Personal & Cultural Identity
- ☐ Social Awareness & Responsibility

Class discussions about how where magnets are found in everyday life, what the effects of the Magnetic Poles are(the same push away -- repel, opposites pull together - attract). Students are expected to be respectful to peers, such as waiting for one's turn to talk, not shouting out the answer, etc. Students are encouraged to help peers whenever learning is formative. Students are expected to share the magnets during the learning magnet play centre.

Learning Standards – Curricular Competencies:

Questioning and predicting

Observe objects and events in familiar contexts

Ask simple questions about familiar objects and events

Planning and conducting

Make exploratory observations using their senses

Safely manipulate materials

Processing and analyzing data and information

Represent observations

(color the pictures that are magnetic and place them in a T-chart for magnetic vs non-magnetic objects)

Communicating

Share observations and ideas orally

Discuss observations

(group comes to a consensus if an object is magnetic or not and records their results).

Ask the groups why they think it was or wasn't magnetic.

Ask students to hypothesize if two magnets will pull together or push apart based on their poles.

KNOW

Learning Standards - Content:

Students are expected to know the following:

properties of familiar materials (classify objects as magnetic or non-magnetic) paperclips, crayons,

leaf, metallic scissor blades, metal key, cloth, plastic button, wooden spoon, metallic spoon, book, 25cent coin effects of pushes/pulls (of magnets)

effects of pushes/pulls (of magnets)

First Peoples Principles of Learning

- ☐ *Learning ultimately supports the well-being of the self, the family, the community, the land, the spirits, and the ancestors.*
- ☐ *Learning is **holistic, reflexive,** reflective, **experiential**, and relational (focused on connectedness, on reciprocal relationships, and a sense of place).*
- ☐ *Learning involves recognizing the consequences of one's actions.*
- ☐ *Learning involves generational roles and responsibilities.*
- ☐ *Learning recognizes the role of indigenous knowledge.*
- ☐ *Learning is embedded in memory, history, and story.*
- ☐ ***Learning involves patience and time**.*
- ☐ *Learning requires exploration of one's identity.*
- ☐ *Learning involves recognizing that some knowledge is sacred and only shared with permission and/or in certain situations.*

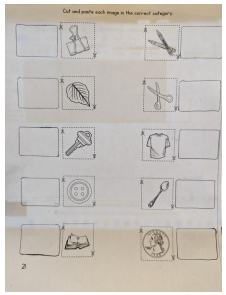
Comments on how you will address the FPPL:
Students will do guided discovery learning with magnets in this unit. Students will reflect on previous knowledge to guess how the various magnetic poles (North and South) will interact. It takes time and patience to experiment with and learn how magnets work.

STAGE 2: Assessment Plan

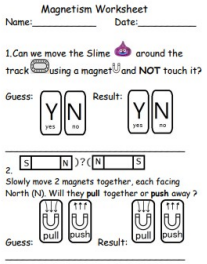
Formative Assessment (Assessment as Learning and Assessment for Learning):

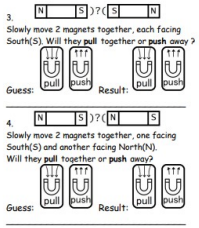
Observational assessment data can be collected throughout the topic for both assessment *as* learning and assessment *of* learning.

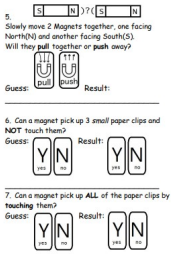
When testing objects for magnetism:



Hypothesizing / Recording the effects of North and South Magnetic Poles:



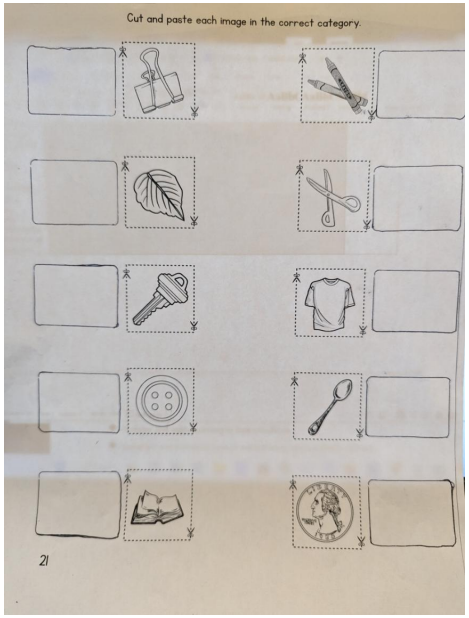
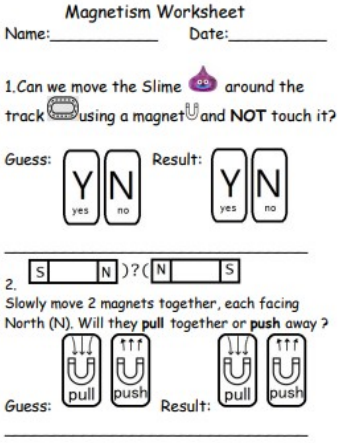
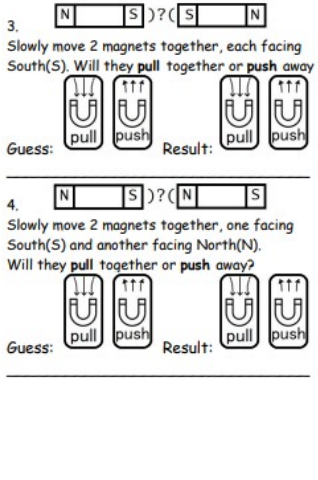
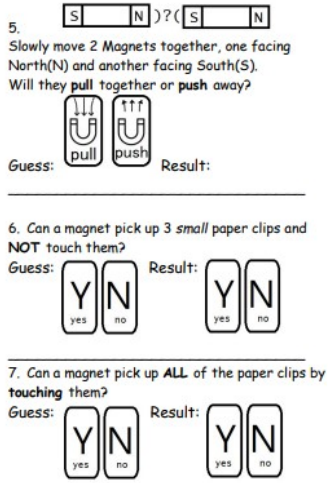




	Groups collaborate and complete the worksheets together. Students orally explain their guesses, teacher records the data and results.
	Summative Assessment (Assessment of Learning):
	Summative Assessment is recorded on Worksheets and observed via spoken answers.

Stage 3: Learning Plan

Date/Lesson	Learning Intentions	Instructional Activities (brief description here – lesson plans will be used to flesh out each lesson)
Mar 1st - April 5th	*Learning Centre - Magnet Play*	Student do experiential learning through play. The magnets are ball and stick magnets. I have labelled some of the long magnets North and South for the lesson, and students can continue to play using these magnets to reinforce their knowledge of how opposite poles pull together and similar poles push apart. Teacher led activities include forming 2D shapes and possibly doing some simple 3D shapes like a cube or pyramid. Students can also use their imagination and creative thinking to make robots, "people", etc. 
March 2nd Investigators - Testing for Magnetic Objects	*Lesson1 - Determining what familiar materials and household items are magnetic objects or non-magnetic object.*	Students do some discovery-based experiential learning to determine what familiar everyday items are magnetic objects or non-magnetic objects. The groups guess first and test their hypothesis.
March 14th	*Lesson 2 - Determine how magnets can push or pull other objects based on their magnetic poles*	Students continue to do some experiential learning to the characteristics of magnets and how magnetism works in relation to North and South magnetic poles. This lesson will be done as teacher-led learning centre to help

		differentiate the lesson and support the different leveled groups in their learning. The lesson begins with a puzzle for students to solve. They must move a magnetic "Slimey"  around a racetrack  using a powerful magnet with out touching it. Next, students try to predict and test how different and similar magnetic poles affect pushing and pulling of objects. Finally, students experiment with picking up paper clips with a large paper clip connected to a strong magnet. A centre which reviews determining magnetic objects (Lesson1) and Magnetic Ball/Rod Play will be concurrent learning centres during this lesson.
		(insert more rows as needed)
	Resources needed:	
	Classroom resources - Smart TV (canva), whiteboard, markers, colored pencils. **Worksheets for formative and summative assessments:** ***Assessment worksheet for Testing Magnetic Objects (Lesson1): (Student-groups fill out independently)***  ***Assessment worksheets for Testing Magnetic Poles (Lesson2) (Teacher fills out the worksheet based on spoken input from students and observed results):***   	

Videos:

Magnetism | The Dr. Binocs Show | Educational Videos For Kids
https://www.youtube.com/watch?v=yXCeuSiTOug

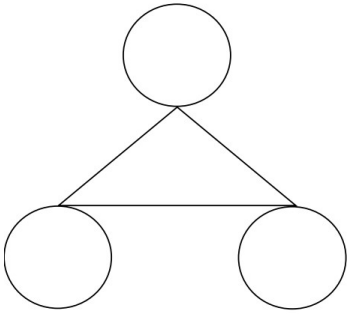
Learn Bright: Magnets for Kids | What is a magnet, and how does it work?
https://www.youtube.com/watch?v=7HHs98PBgk0

Science Experiment Lesson 1 (Learning Centre)

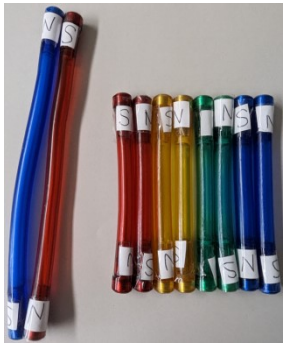
Items to test: paper clip (pincer type), standard wax crayons, leaf, scissors, key, clothes (doll), button (plastic), spoon (metal) (alternative wooden spoon after), book, quarter / 25cent coin. + Fishing pole magnets -(Ruler, with a string tied to it with a magnet at the end)

Science Experiment Lesson 2 (Learning Centre)

Small and larger paper clips, a paper clip mat, "North and South labeled poles" magnets and a strong magnet with a large paper clip attached at the end.



[Paper clip mat - place paper clips to pick up in each circle]



[Labeled magnetic poles - magnet rod]

Differentiated laminated race tracks and Slimey Magnets. Circle is easier (wider tracks, and easier motion) for students with motor skill issues.

	Play learning centre - Magnetix 
	Interdisciplinary connections: (e.g. How did you weave ELA, Social Studies, Science, Math, Fine Arts, and/or ADST together in this instructional sequence?)
	Cross-curricular: Math - shapes, counting corners of shapes. ELA - specialized vocabulary - For example: North and South Poles, magnetism, magnets.
	Reflection
	How did the unit go? How do I know? The unit went very well, as all students were heavily engaged in the lessons and always were excited to do the magnet play learning centre. Our special needs student with ASD asked, "Is this magic?" when was he experimenting with magnets with similar poles and found they were pushing each other away. Some students came to tell me the fishing magnet was "broken" when it did not pick the metal key. All groups expected any metal to work with magnets, so the results sometimes subverted their predictions. Most students from all group levels could predict the effects of the magnets based on their prior experience and knowledge. Once students saw how the North and North poles reacted they could surmise that South and South poles would react the same way. The magnet play centre allowed for creative play and helped students to deepen their recognition of shapes as they could physically make them. The metal balls used with the magnetic rods actually represent the math concept of vertices, so the physical modelling during this "play to learn" activity will be useful for understanding math concepts in later grades.

	Where to next? There are still a lot of scientific experiences to explore for magnets and magnetism. The next lesson I recommend is another experiential lesson where students can learn how to make a magnetic object (like rubbing a paper clip or nail on a strong magnet) through the process of "Magnetization." https://www.youtube.com/watch?v=ok9GkzRiymM This lesson idea was inspired by previous lesson, when a student had played with the large paperclips rubbing them against a magnet and found that even without the magnet, the magnetized paper clip could pick up other smaller paperclips. This student's discovery would be a valuable lesson for the class to learn. Another possible lesson is to introduce "electro-magnetism" where students can turn magnets off or on. This type of magnet is used for lifting cars in a junk yard. The following video is an interesting experiment that demonstrates how electromagnets can be used to simulate a motor: https://www.youtube.com/watch?v=LoSGSawJCO0 (BBC) Teacher Note: this experiment would have to be *heavily simplified* for a Kindergarten class -- the students are only adding the magnets to an electromagnetic battery device previously constructed by the teacher. I should be done in small groups and under teacher supervision. A cross-curricular Art/Science project could use a magnet to draw / paint. Students move a metal ball around based on magnetism. The metal ball would roll through paint on a canvas. This works similar to an "Etch-A-Sketch." Lastly, the scientific concept of "pushes and pulls" can be further explored outside the use of magnets. Students could play games like tug-a-war, observe the effects of levers and pulleys, or the transfer of force for pushing objects like when balls hit other balls like in billiards or croquet.