Inquiry Project Design Plan

Teacher/Designer Names: Maureen Corrigan-Connell	
Name of Project: Force and Motion Found in the Playground	**Grade Level: 1, 2, 3**
Est Launch Date: February 2023	**Est Duration (in weeks): 4-8**
Disciplines Involved: Math, Science, Art, STEAM	
Problem Statement: School playground has been demolished in recent storm. Students are tasked to work together in multi-age groups to understand the nature of motion and the effects of pushed and pulls on objects so to redesign a playground of their dreams and design for the 21st Century Modern Day School.	

STAGE 1: DESIRED RESULTS

Big Idea: Relating forces of nature to the everyday world of a child's life in the Playground. Where are the pushes and pulls found?

Enduring Understandings:	**Essential Question(s): How can you make objects move?**
∉ Position and motion of objects can be changed by pushing and pulling ∉ Objects do not have force but force is the relation between objects (a ball rolling does not have force but the push or pull of it is the force as is a wall or other object blocking a ball.)	

Established Goals (Standards, Performance Indicators, Learning Goals):
*choose relevant standards to unit/project plan timing and learning goals; do not need to use all disciplines below.
** unpack into SWK and SWBAT under identified standards as this will lead to aligned assessment design

Science Standards: Science Inquiry
C-1.1 Use simple science equipment (rulers, measuring cups, scales, hand lenses, thermometers
C-2.1Collect and interpret data to explain results from experiments
C-3.1Communicate results using drawings, graphs, tables and charts
C-4.1 Explain conclusions based on results
C-5.1 Develop additional questions to help further the investigation. Example: "I wonder what would effectively collect data relevant to experiments if this would happen..."

Standard D -Physical Science

D3.1 Recognize that a force is a push or pull.

Standard E – Earth and Space Science
E3.1 Describe how different weather such as wind, sun, rain, and snow affect living things.

NGSS Standards

Inquiry Project Design Plan

ETS1.A: Defining and Delimiting Engineering Problems
-a situation that people want to change or create can be approached as a problem to be solved through engineering(K2-ETS1-1)
-Asking questions, making observations and gathering information are helpful in thinking about problems. (K2-ETS1-1)
Before beginning to design a solution, it is important to clearly understand the problem. (K2-ETS1-1)

ETS1B:Developing Possible Solutions
-Designs can be conveyed through sketches, drawings or physical models. These representations are useful in communicating ideas for a problem's solutions to other people.(K2-ETS1-2)

ETS1.C: Optimizing the Design Solution
-Because there is always more than one possible solution in a problem, it is useful to compare and test designs. (K-2-ETS1-3)

Links to Standards/Reference Frameworks:
NGSS, NGSS by DCI Nat'l C3 SS Framework, NYS K-8 SS Standards, Common Core, ISTE, Learning for Justice Social Justice Standards, CASEL SEL Framework, NYS CS and Digital Fluency

Students will know (SWK):	**Students will be able to do (SWBAT):**
Students will know all the ways things can move: • **Pushing** • **Pulling** • **Throwing** • **Dropping** • **Students will know what an Engineer does** • **Students will know the steps engineers take when solving a real world problem** • **Students will be able to communicate differences in material**	• **Students will be able to understand the different effects of force on objects when they are in motion. They then use data to compare the effectiveness of different solutions.** • **Students will be able to use a variety of materials to create playground equipment which all uses the pushes and pulls of motion.** • **Students will be able to compare the effectiveness of different materials used for creating the playground apparatus.**

STAGE 2: EVIDENCE & ASSESSMENTS:

Inquiry Project Design Plan

Performance Task Narrative:

Goal: School playground has been demolished in recent storm. Students are tasked to work together in multi-age groups to understand the nature of motion and the effects of pushed and pulls on objects. The need to use this knowledge to design a new playground suited for the Twenty-First Century Learner. They will be able to utilize many recycled materials and will have a week to complete.

Role: Engineers, Innovators, Park Playground Designers

Audience: Primary Level 1, 2, 3 students will work together to solve the problem of the pushes and the pull and in the end design a playground and apparatus using recycled materials.

Situation: The school playground has been demolished in a recent storm and needs to be rebuilt. The students have been selected to come up with viable designs to rebuild the space meeting the needs of the Twenty First Century School.

Product(s): Clarify what the students will create and why they will create it.

- **Students will design a new playground and the equipment using their understanding of force and motion.**
- **Final Product Designs will be the Summative Assessment**

Standards (criteria for success):

- ❑ **Observe students during vocabulary activity. Check for understanding.**
- ❑ **Video Day 4 https://youtu.be/ZLDUrPaLQWE "Push and Pull For Kids"**
- ❑ **Vocabulary Review (Nearpod)**
- ❑ **Group work and design planning - observations**
- ❑ **Collaboration and group discussion throughout the project**

Other Evidence/Assessments:

Performance (Summative) Assessment: Students will design a new piece of playground equipment using their knowledge of force and motion

STAGE 3: THE LEARNING PLAN:

Inquiry Project Design Plan

Learning Activities

Day 1

Learning Goals:
Students will begin on the playground by experiencing motion and how different materials react differently when force is introduced.

Learning Events:
- **Students will play on the playground taking notes of how different apparatus responds to motion.**
- **Students will create sketches and drawings of apparatus they would like in a playground.**

Formative Assessments:
- **Observation of group activity**
- **Observation of collaborative sharing of ideas**

Notes/Resources:
Playground activities in Montessori 31's Playground can be watched over and filmed using the drone.

Day 2

Learning Goals:
Introduce vocabulary words :
- **Force**
- **Motion**
- **Gravity**
- **Push**
- **Pull**
- **Momentum**
- **Engineer**
- **Speed**
- **Position**
- **Friction**

Learning Events:
- **Students working in groups will play games using the three card design of picture and label match which is a standard presentation in Montessori.**
- **Students in groups can act out the words in motion.**
- Gravity - BrainPOP Jr.

Formative Assessments:
Observation of groups again collaborating and using the words correctly.

Day 3

Learning Goals: Students will work in multi-age groups and do a book chat/vocabulary

Inquiry Project Design Plan

activity. Students will be exposed to push and pull books.

- **See resources below**

Learning Events:

Students will demonstrate knowledge and support of vocabulary by playing these vocabulary reinforcement games.

Formative Assessments:

Time to Climb Nearpod

Notes/Resources:
Gather materials for students to use: straws, pipe cleaners, variety of cardboard, paper, glue guns, drawing medium, paint, multiple kinds of tape, popsicle sticks, wooden sticks varying sizes, foam, paint brushes, My Dream Playground Sheet, paper towel or toilet paper rolls. Chromebooks

You Tube Videos demonstrating building playground apparatus with different kinds of medium.

Simple Machines https://app.nearpod.com/?pin=blequ
Paper Swings https://app.nearpod.com/?pin=sr8db
Popsicle playgrounds https://www.youtube.com/watch?v=udUZq6KNquQ

Week 4

Learning Goals: Show video of students planning a Design for a new playground so to stimulate ideas before the drawing plan begins.
http://www.youtube.com/watch?v=O03ZkaRf1aA

https://app.nearpod.com/?pin=x4rfb The Engineering Process

Learning Events:

Students draw and write about their Dream Playground and share with their multi-age Engineers.
This will take a whole period.
Prototype building of playground will follow in week or weeks ahead. Students will continue to work in their multi-age groupings.

Formative Assessments:
MyDreamPlayground.pdf
Observing the collaborative work of the groups and seeing the playgrounds come together.