Gr. 3 – Understanding Matter & Energy

Forces Causing Movement

Windmill

Specific Expectations:

1.1 Assess the effects of the action of forces in nature (natural phenomena) on the natural and built environment, and identify ways in which human activities can reduce or enhance this impact.

2.1 Follow established safety procedures during science and technology investigations.

2.2 Investigate forces that can cause an object to start moving, stop moving, or change direction.

3.1 Identify a force as a push or pull that causes an object to move.

3.2 Identify different kinds of forces.

3.3 Describe how different forces applied to an object at rest can cause the object to start, stop, attract, repel, or change direction.

Big Idea (for lesson):

Students investigate wind power as a source of energy, and how it acts as a force to power a windmill. Students design and test different models to see which catches the wind best to produce movement.

Accommodations:

- ☒ Increase time
- ☒ Visual Aids
- ☒ Manipulatives
- ☒ Chunking
- ☒ Step-by-Step
- ☒ Scaffolding
- ☒ Copy of Notes
- ☒ Student Grouping

Differentiated Instruction:

- ☒ Content: Use demo to show the content as you offer verbal descriptions.
- ☒ Process: Have students work in pairs and support each other if physical impediments exist.
- ☒ Product: Students may show their final product in pairs, and communicate their findings either verbally, visually, or through written means.
- ☐ Other: _____

Bloom's Taxonomy:

- ☒ Knowledge
- ☒ Comprehension
- ☒ Application
- ☒ Analysis
- ☒ Synthesis
- ☒ Evaluation

Multiple Intelligence:

- ☒ Verbal/Linguistic
- ☒ Logical/Mathematical
- ☒ Visual/Spatial
- ☒ Bodily/Kinesthetic
- ☒ Naturalist
- ☐ Musical/Rhythmic
- ☒ Interpersonal
- ☒ Intrapersonal

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Delivering The Lesson:

Portion & Timing	Grouping:			Introduction:	Materials
Minds On: **10 mins**	W ☒	S ☐	I ☐	Teacher can do a demonstration to introduce how movement of water can do work by changing one type of energy to another. Follow the instructions here to build an easy water wheel: http://howto.wired.com/wiki/Build_a_Plastic_Cup_Waterwheel Ask students where the energy that lifts the pulley comes from? (*Answer: The force of the water turning the wheel*.) Ask students if they can think of any other sources of energy that are captured by turning wheels? (*Answer: Windmills!*).	4 Styrofoam plates Pencil Stiff straw 9 small plastic cups Masking tape String Water container/hose
Action: **15 mins**	W ☒	S ☒	I ☒	Have students build their own windmills according to the instructions on the handout. Teacher can circulate and ask questions of the different groups: -Besides wind and water, can you think of other places that energy comes from? (*Answers listed on handout*.) -What type of things do we use energy to do? -Is the energy from our windmill doing any real work? (*Answer: No, but we can make it do work with some adjustments*.)	Windmill Handout (Materials listed)
Consolidate: **15 mins**	W ☒	S ☐	I ☐	With a little bit of preparation, you can have an electrical set-up that can be connected to the windmill. The instructions are found at the following website: http://www.hometrainingtools.com/a/wind-energy-science-newsletter -Explain to students that the addition of the motor makes it into a generator. Show students that electricity flows through and lights the bulb. Ask students what type of energy the spinning mechanical energy changes into? (*Answer: electrical energy, then light.*) -How is this set-up similar to real windmills? (*Answer: they have large-scale generators that also convert mechanical energy into electrical,*	Pinwheel windmill (from handout) Small electric motor Alligator clip leads 1.5 V bulb Strong fan

				and potentially light!) -Have students describe the forces involved in getting a wind or water wheel to turn and do work.	