Gr. 7 - Understanding Matter & Energy

Pure Substances and Mixtures

Weird Whirlers

Specific Expectations:

1.2 Assess the impact on society and the environment of different industrial methods of separating mixtures and solutions.

2.5 Use appropriate science and technology vocabulary, including *mechanical mixture, solution, solute, insoluble, saturated, unsaturated,* and *dilute*, in oral and written communication.

3.5 Describe the processes used to separate mixtures or solutions into their components, and identify some industrial applications of these processes.

Big Idea (for lesson):

Students investigate the centripetal force that scientists use in separating mixtures through some analogous hands-on demonstrations.

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

Delivering The Lesson:

Portion & Timing	Grouping:			Introduction:	Materials
Minds On: 5 mins	W ☒	S ☐	I ☐	Teacher may demonstrate the coathanger/penny centripetal force	Metal Coat Hanger

				experiment, or show the mp4 video. Have students make some guesses as to why the penny was able to stay on the wire, then move onto the handout to see if they can figure it out for themselves.	Penny Weird Whirlers - Centripetal Force Penny - Sick Science! #161.mp4
Action: **20 mins**	W ☒	S ☒	I ☒	Have students build their own weird whirlers according to the instructions on the handout. Teacher can circulate and ask questions of the different groups: -What happens, or what do you predict will happen, when you slow down your spinning? (*Answer: the whirler will start to fall down*) -What happens if you speed up your spinning? (*Answer: the whirler will speeds up and pull the cord tight against your hand).* -If you wanted to throw the whirler really far, would you spin it fast or slowly? (*Answer: fast, so that the applied force would beat the centripetal force trying to pull it back*). Ask the class about the water whirler first: -Why didn't water fall out? (*Answer: when the cup was spun, the water tries to travel outwards because of inertia and pushes against the walls of the cup instead of spilling*.) -Why did the small eraser "beat" the big one? (*Answer: the spinning erase tugged outwards with enough force to lift something much heavier than itself*.) -How does this relate to orbiting around the earth? (*Answer: if the satellites were spinning much faster, they'd escape the pull of gravity and go outwards into space!*)	Weird Whirlers Handout (Materials listed)
Consolidate: **15 mins**	W ☒	S ☐	I ☐	Show the penny/coathanger demo again to the class. Ask students to write down an explanation to the demo shown at the	

				start of class. Then talk in a pair/small group, and come to a consensus of how it worked, and share with the class. (*Answer: Newton's law requires the penny to continue moving along a tangent to the circle. Thus a force is required to keep it always turning toward the center of the circle. The interpretation of this demonstration is potentially confusing when one considers that at the top of its arc, the penny is accelerating downward because of the motion, but that the force of gravity is also downward.)*	