Gr. 7 – Understanding Structures & Mechanisms

Form and Function

Roll Can

Specific Expectations:

2.1 Follow established safety procedures using tools and handling materials.

2.2 Design, construct, and use physical models to investigate the effects of various forces on structures.

3.1 Classify structures as solid structures, frame structures, or shell structures.

3.2 Describe ways in which the centre of gravity of a structure affects the structure's stability.

3.4 Distinguish between external forces and internal forces acting on a structure.

3.5 Describe the role of symmetry in structures.

Big Idea (for lesson):

Students will build and explore how a mechanism can use its centre of mass to store energy internally, and transform this energy into kinetic 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 centre of mass and reintroduce stability for the lesson; either watch the video or do the demo in-person. Ask students why they are able to balance the nails, and whether they think there are some other orientations they'd like to try out. If time warrants, let the students try to work together on one other orientation.	Roll Can – Balancing Nails – Sick Science! - #118.mp4 12 Nails Board
Action: 15 mins	W ☒	S ☒	I ☒	Have students build their own Roll Cans according to the instructions on the handout. Teacher can circulate and ask questions of the different groups: -What do you think happens to the internal workings of the roll can as it's pushed? (*Answer: The elastic winds up tightly, but the bolt actually stays the way it is and the elastic spins around it*.) -What kind of energy do you put into the system? (*Answer: Kinetic energy to make the can move*) -What kind of energy does it change into? (*Answer: mostly elastic energy, but also some sound and friction before turning back into kinetic*.) -Would this keep going forever? Why or why not? (*Answer: No, because energy is being lost to friction and sound, so eventually it will not have enough energy to keep rolling*.)	Roll Can Handout (Materials listed)
Consolidate: 10 mins (Likely extended into next day)	W ☒	S ☒	I ☐	This lesson has had students visit a lot of energy transfer situations where energy of motion is changed into other types (sound, elastic, etc.). To end the class, you could do a demo where sound from a CD player is transferred into kinetic energy, as outlined on the following link:	CD Player Tall tin can Large balloon Laser pointer Duct tape CD of various genres

				http://www.scholastic.com/teachers/classroom_solutions/2010/03/investing-energy-transfer-using-music-and-lasers For another centre of mass video, consult the Balancing Utensils Video	Mirror Roll Can – Balancing Utensils Table Trick – Sick Science! #009