Gold Seal Lesson:

Author(s): *Michael Lucky Voiselle*			*Lesson title MECHANICAL ITEMS CAN BE STRESSED OUT*			
Grade Span			***ICLE Application Model***			
K-4	***5-8***	***9-12 XX***	***A***	***B XX***	***C***	***D***

Instructional Focus:

Science as Inquiry
Students demonstrate knowledge and skills necessary to perform scientific inquiry

Communication
Students communicate and apply scientific concepts.

Performance Task

Mechanical stress is everywhere and must be addressed to develop strong, durable, and functional mechanical devices from automobile shocks to coffee makers to watches and clocks. You will explore tension, one of the four major types of mechanical stress. Your task is to explore the relationship between weights applied in grams to a spring and the distance in centimeters the spring stretches. Develop a chart containing the mass of the weights and the stretched distance in a logical and easy to read format. You are to graph this data and use the graph to predict the mass of an unknown weight using the distance that the unknown stretches your spring. Finally you are to gather information about the four types of mechanical stresses and organize in a report as the conclusion of this experiment.

ICLE Essential Skills

Apply in writing the rules and conventions of grammar, usage, punctuation, paragraphing and spelling. (ELA1)

Gather information from a variety of sources, including electronic sources, and summarize, analyze, and evaluate its use for a report. (ELA3)

Know the components and properties of the ***rectangular coordinate system***, (i.e., x - y axis, origin, quadrants, abscissa (x-coordinate) and ordinate (y-coordinate), and the general representation of a point (x,y)). (M23)

Know the metric system and the units of metric measure and convert metric units to English units. (S4)

Make observations using senses and instruments. Inferences and interpretations are arrived at based on observations. Classify observable properties and organize observations in a meaningful and logical way. (S5)

Exhibit good data management skills by collecting, organizing, and graphing data. (S19)

Scoring Guide:

4. The student organizes and collects data in a logical and easy to read format. The student develops a graph and demonstrates understanding of that graph by predicting correctly an unknown weight. The student collects information about other types of mechanical stress and organizes it neatly in a report. The students' report is written in paragraph style and is free from spelling and grammatical errors.

3. The student organizes and collects data with a little assistance. Graph is developed properly and unknown weight predicted successfully. Report is complete, written and organized well, but has a couple of spelling and grammatical errors.

2. The student organizes and collects data properly with assistance from others. The graph is developed with assistance, however the prediction is done properly and correct. The report is complete but not organized well. The report has many spelling and grammatical errors.

1. The student turns in partially completed work. The work is sloppy and shows no concern for proper language usage. Or the student does not attempt the experiment at all.

Keywords

English Language Arts	Mathematics	Science
Reading-independent reading	Algebra-coordinates graphs	Earth Science
Writing-technical writing	Geometry	Life Science
Communications	Statistics	Chemistry
Literature	Calculus	Physics-mechanics
Other	Trigonometry	Other
	Other	

Data Table - Example
Change in Length Due to Weight Change

Establish Rest Length $l_0 = 14.8cm$

Steps	**Weight (g)**	**Change in Length D l(cm)**
1	100g	$\Delta l_1 = l_1 - l_0 = 3.5cm$ (18.3cm - 14.8cm = 3.5cm)
2	200g	$\Delta l_2 = l_2 - l_0 = 9.2cm$ (24cm - 14.8cm = 9.2cm)
3	300g	$\Delta l_3 = l_3 - l_0 = 14.7cm$
4	400g	$\Delta l_4 = l_4 - l_0 = 20.2cm$
5	500g	$\Delta l_5 = l_5 - l_0 = 25.7cm$
6	600g	$\Delta l_6 = l_6 - l_0 = 31.1cm$
7	700g	$\Delta l_7 = l_7 - l_0 = 35.5$ cm

Graph - Example
Change in Length vs. Force

Name:
Date: