STEAM *(Science, Technology, Engineering, Art & Math)* **Lessons** ***How*** **Can I Build That?**
Based on 'A Whale's Tale'

STEAM Lessons (geared to elementary students)

SCIENCE	TECHNOLOGY	**ENGINEERING**	ART	MATHEMATICS
• Data analysis • Data collection • Discussion • Display • Experiment • Hypothesis • Measurement • Prediction • Research • Technology use	• Display data (graphs/charts) • Input data • Printing • Research • Using tools with precision • Word processing	• Building accelerometer • Comparing and contrasting tools • Experimentation • Prediction • Using tools with precision	• Visual display of data in an aesthetic manner • Using tools with precision	• Counting • Graphing • Measurement • Prediction • Using tools with precision
LANGUAGE ARTS				
• Comprehension • Main idea • Speaking/listening • Supporting details	*Modify unit lesson pieces to meet content area/grade level requirements. You may find additional standards (including state level) that apply to the activities, feel free to add them to your documentation.*			

How **Can I Build That?** *Engineering* and *science* focus, make a simple accelerometer to measure the force of acceleration, whether caused by gravity or by movement of an object.

Materials	• Pencil • Paper • Ruler	• Protractor • Hole punch • String
High order questions:	• What is an accelerometer? • What devices do you know that have accelerometers? • What could you use an accelerometer to measure? • What did the tags placed on the whales measure? • Did the tags do anything else?	• Why did the scientists have to retrieve the tags? • What is the difference between a marine biologist and an oceanographer? • How would a scientist use an accelerometer? • Who else might want to use an accelerometer and for what purpose? • How do you think an accelerometer might help an athlete?

Engage	**Set focus for video viewing** (to meet content requirements), Watch ***A Whale's Tale: Wyatt's Antarctic Adventure with the Scientists*** – available at http://bluesteam.org/video/ **Begin KWL (what you *K*now, what you *W*ant to know, what you *L*earned) chart to acquire background knowledge.** • Complete Knowledge section of chart, Know – What is an accelerometer? • Discussion/Questions **Continue KWL - What I do I what to know – questions from students** (add more questions if they arise during experiment)
Explore	**Explore accelerometers** • Use the Internet to search resources • Sample site: https://www.youtube.com/watch?v=gIud8W8Hw0E by John Baglio – How to Make a Simple Accelerometer • IPhone, other hand held accelerometers • Each group (or the class) creates a hypothesis about what they think will happen when they use the accelerometer. What do they think they will learn and discover with this tool? Create accelerometers, find out what they record, write down data. Complete the exploration/experiment. • Record data.
Explain	• Discuss observations with small/large groups. • Questions from KWL chart • Input data to computer and create a graph(s) with group/class results. If not age appropriate or available create graphs by hand.
Elaborate	• Share graphs, post on wall. • Write statement about what they learned about accelerometers. • Share acquired information in visual format. • Questions

Evaluate	• Post graphs and discuss findings.
	• Students reflect on personal and group learning.
	  ○ What was observed?
	  ○ What conclusions can you make?
	  ○ Were your predictions correction?
	• **Complete KWL - What I learned** section with information they learned from the lesson and activity
	• Plan next step for future learning.

Extend	• Read **A Whale's Tale - Wyatt's Antarctic Adventure: Tagged by Scientists** (narrative available at http://bluesteam.org/books/)
	• Read **Color Wyatt the Humpback Whale and his Antarctic Friends** (coloring book available at http://bluesteam.org/books/)
	• Conduct additional research about scientific careers and/or the use of technology.
	• Word list/crossword puzzles (available at http://bluesteam.org/activities/)
	• Complete other art/craft projects
	• Read literature about Antarctica
	• Research marine life, habitat and/or geography.
	• Complete other integrated units in the series (available at http://bluesteam.org/resources/):
	  ○ *Who Lives in Antarctica?*
	  ○ *What is Buoyancy?*
	  ○ *When Should I Care for the Earth?*
	  ○ *Where in the World is Antarctica?*
	  ○ *Why is This Whale Talking?*

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Next Generation Science Standards Grades K-5 Science and Engineering Practices, Planning and Carrying Out Investigations, Analyzing and Interpreting Data	**Next Generation Science Standards Grades K-5** Connections to Engineering, Technology, and Applications of Science Interdependence of Science, Engineering, and Technology
Math - Common Core Standards	**Language Arts - Common Core Standards**
Kindergarten **Describe and compare measurable attributes.** **Count to tell the number of objects.** CCSS.Math.Content.K.CC.B.4 Understand the relationship between numbers and quantities; connect counting to cardinality.	**Kindergarten** **Comprehension and Collaboration:** CCSS.ELA-Literacy.SL.K.1 Participate in collaborative conversations with diverse partners about kindergarten topics and texts with peers and adults in small and larger groups. CCSS.ELA-Literacy.SL.K.2 Confirm understanding of a text read aloud or information presented orally or through other media by asking and answering questions about key details and requesting clarification if something is not understood.
1st Grade **Represent and interpret data.** CCSS.Math.Content.1.MD.C.4 Organize, represent, and interpret data with up to three categories; ask and answer questions about the total number of data points, how many in each category, and how many more or less are in category than in another.	**1st Grade** **Comprehension and Collaboration:** CCSS.ELA-Literacy.SL.1.1 Participate in collaborative conversations with diverse partners about grade 1 topics and texts with peers and adults in small and larger groups. CCSS.ELA-Literacy.SL.1.2 Ask and answer questions about key details in a text read aloud or information presented orally or through other media.
2nd Grade **Measure and estimate lengths in standard units.** **Represent and interpret data.** CCSS.Math.Content.2.MD.D.10 Draw a picture graph and a bar graph (with single-unit scale) to represent a data set with up to four categories. Solve simple put-together, take-apart, and compare problems using information presented in a bar graph.	**2nd Grade** **Comprehension and Collaboration:** CCSS.ELA-Literacy.SL.2.1 Participate in collaborative conversations with diverse partners about grade 2 topics and texts with peers and adults in small and larger groups. CCSS.ELA-Literacy.SL.2.2 Recount or describe key ideas or details from a text read aloud or information presented orally or through other media.
3rd Grade **Represent and interpret data.** CCSS.Math.Content.3.MD.B.3 Draw a scaled picture graph and a scaled bar graph to represent a data set with several categories. Solve one- and two-step "how many more" and "how many less" problems using information presented in scaled bar graphs. For example, draw a bar graph in which each square in the bar graph might represent 5 pets.	**3rd Grade** **Comprehension and Collaboration:** CCSS.ELA-Literacy.SL.3.1 Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 3 topics and texts, building on others' ideas and expressing their own clearly. CCSS.ELA-Literacy.SL.3.2 Determine the main ideas and supporting details of a text read aloud or information presented in diverse media and formats, including visually, quantitatively, and orally.
	4th Grade **Comprehension and Collaboration:** CCSS.ELA-Literacy.SL.4.1 Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 4 topics and texts, building on others' ideas and expressing their own clearly.
5th Grade **Convert like measurement units within a given measurement system.** CCSS.Math.Content.5.MD.A.1 Convert among different-sized standard measurement units within a given measurement system (e.g., convert 5 cm to 0.05 m), and use these conversions in solving multi-step, real world problems.	**5th Grade** **Comprehension and Collaboration:** CCSS.ELA-Literacy.SL.5.1 Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 5 topics and texts, building on others' ideas and expressing their own clearly.

	CCSS.ELA-Literacy.SL.5.2 Summarize a written text read aloud or information presented in diverse media and formats, including visually, quantitatively, and orally.