

AMP UP YOUR EARTH SCIENCE CURRICULUM WITH INTEGRATED PRACTICES

CENTER FOR EDUCATION INTEGRATING SCIENCE,
MATHEMATICS AND COMPUTING (CEISMIC) &
GRIFFIN-SPALDING COUNTY SCHOOLS

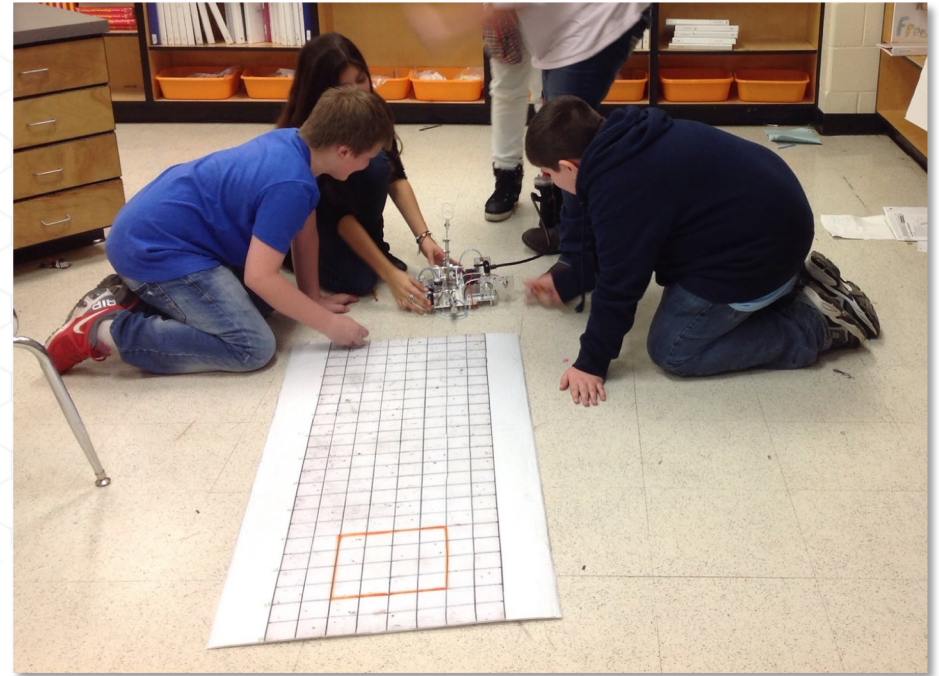


Award # 1238089

CREATING THE NEXT®

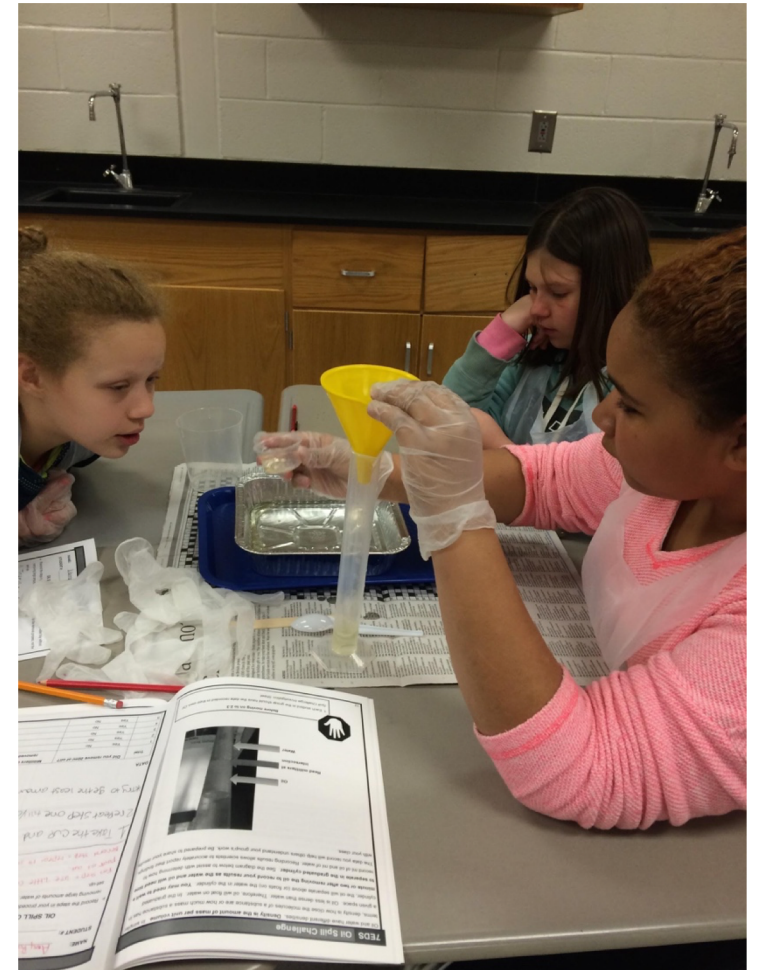
AMP-IT-UP

- A National Science Foundation Math and Science Partnership to *promote* workforce development and *cultivate* the next generation of creative STEM innovators.
- Partnership with the Griffin Spalding County School System
 - 2 High Schools, 4 Middle Schools
 - Professional Development for over 50 teachers
- Impact: > 11,000 students over 5 years



PROGRAM COMPONENTS

- Middle school STEM Innovation and Design (STEM-ID) exploratory courses that enable students to explore their creativity using robotics and rapid prototyping (semester long course)
- Middle school math and science modules that promote inquiry and connect with Georgia Tech
- Extracurricular enrichment for students and teachers
- Research on how AMP-IT-UP affects academic engagement, content understanding, knowledge transfer and student persistence in STEM



1. Experimental Design

- Planning and Carrying Out Investigations (NGSS Practice 3)
- Make Sense of Problems (SMP #1); Use Appropriate Tools Strategically (SMP #5)

2. Data Visualization

- Analyzing and Interpreting Data (NGSS Practice 4)
- Make Sense of Problems (SMP #1); Model with Mathematics (SMP #4)

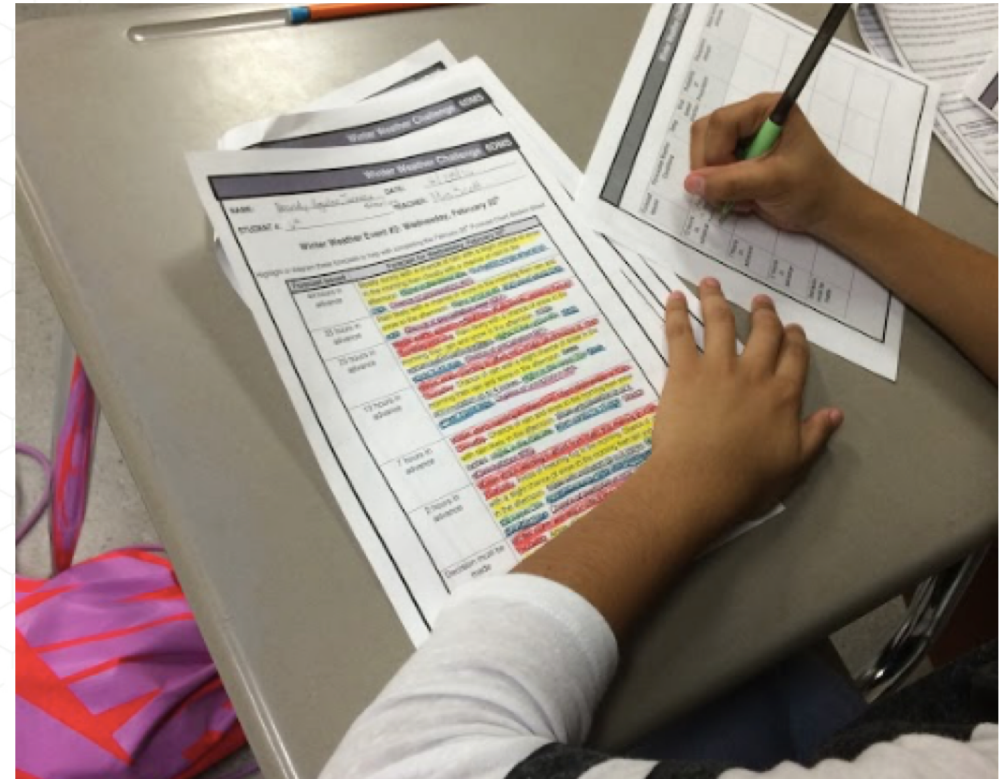
3. Data Driven Decision Making

- Constructing Explanations and Designing Solutions (NGSS Practice 6)
- Engaging in Argument from Evidence (NGSS Practice 7)
- Make Sense of Problems (SMP #1); Construct Viable Arguments (SMP #3)

WINTER WEATHER CHALLENGE

SNOW DAY


- ❄️ Data Driven Decision Making
- ❄️ Students analyze weather forecasts and make decisions regarding school closures
- ❄️ 5 Class Periods



WINTER WEATHER CHALLENGE

SNOW DAY

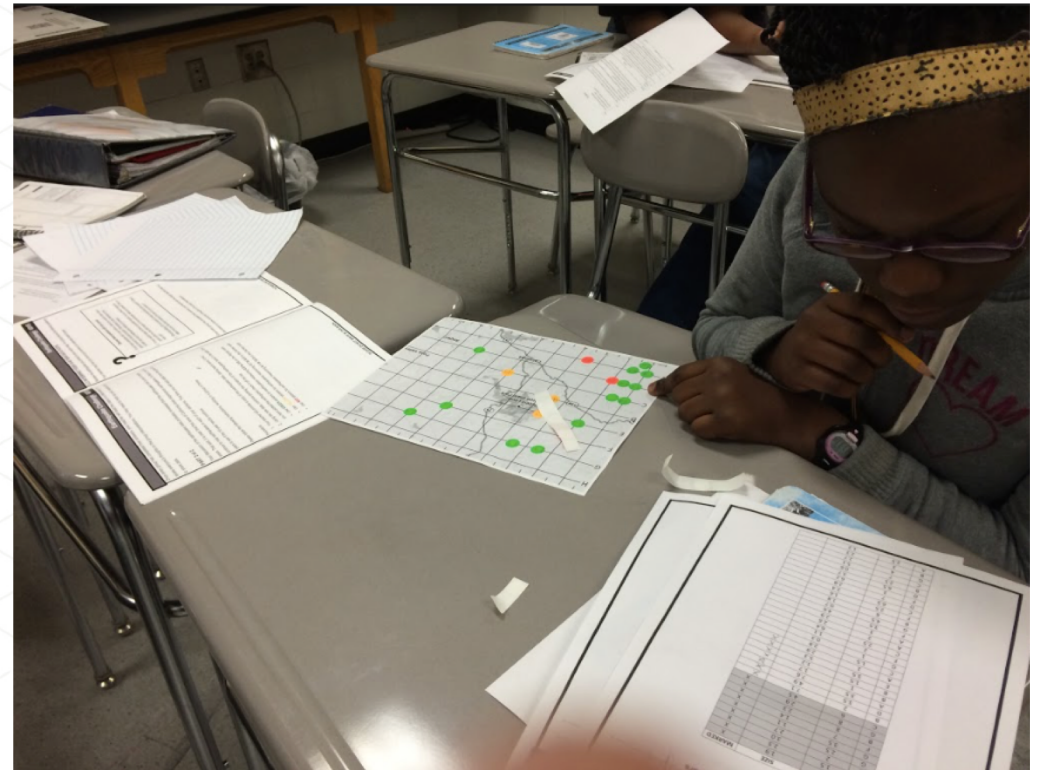
- ❄️ Read and analyze National Weather Service Forecasts
- ❄️ Look for trends and prioritize content to drive decision about closing school
- ❄️ Learn forecasting basics, trends and about probability

Forecast Issued	Forecasted Weather Conditions Green—Dry Yellow—	Temperature Green—40° or higher Yellow—Mid- to upper 20's	Probability of Precipitation Green- Less than 40%	Frozen Precipitation Amount Green—	Watch/warning/advisories Green—
Wednesday 4 a.m.					
	# Hey, guys watch for the snows today. If you have plans I suggest you cancel them.				
1. Did you decide that school should remain open or be closed? Why? We decided that school should be closed because the snow accumulation gets up to 2-3 inches, which is quite a bit.					
4 a.m.					
Monday, 12 p.m.					
Monday, 8 p.m.					
Tuesday 4 a.m.					

EARTHQUAKE CHALLENGE

SHAKE AND BREAK

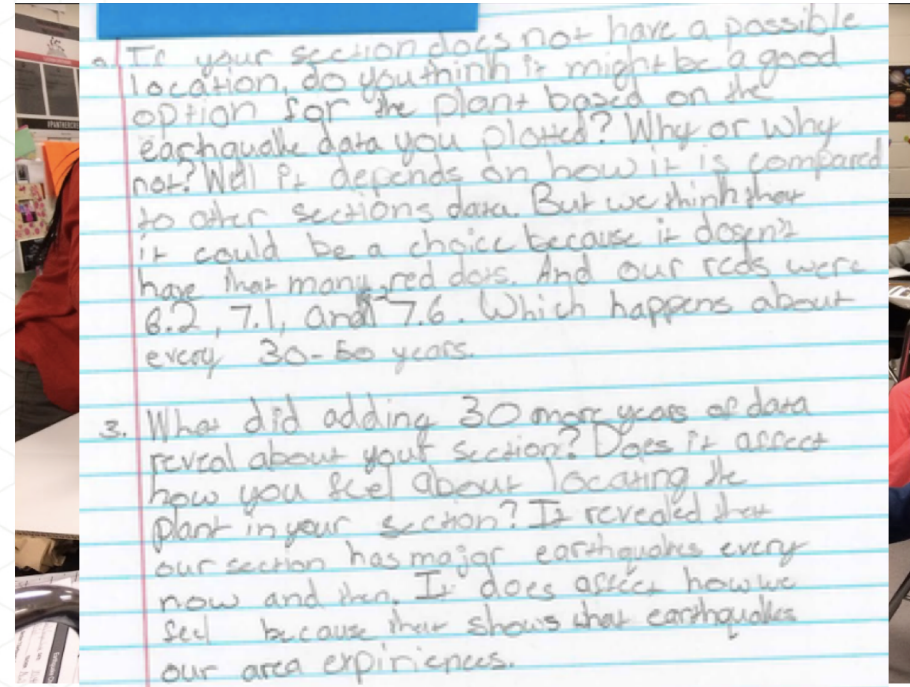
- Data Visualization Module
- Students analyze spatial and temporal earthquake data to determine where to build a manufacturing plant
- 3-4 Class Periods



EARTHQUAKE CHALLENGE

SHAKE AND BREAK

- Students map 10 and 40 year earthquake data showing location and intensity of each event.
- Students combine their map sections together to see “the big picture.”
- Analysis of temporal and spatial data leads to a recommendation of where to build the plant.



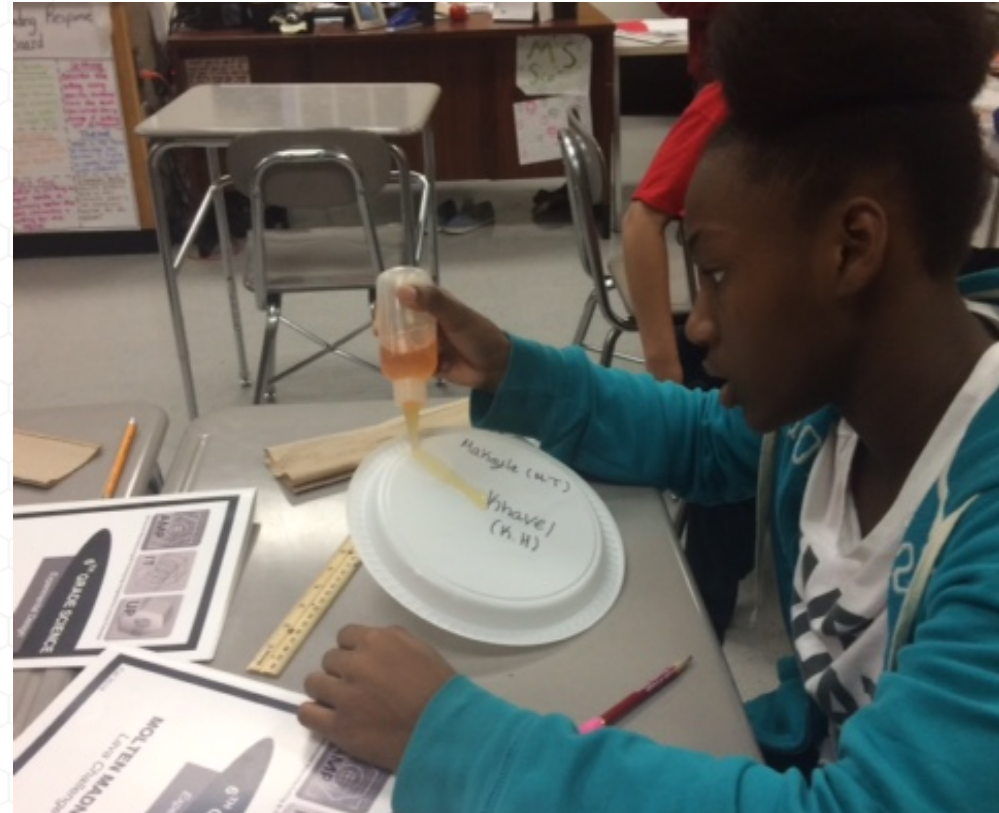
LAVA FLOW CHALLENGE

MOLTEN MADNESS

Experimental Design Module

Students investigate and model lava flow to aid a town with their evacuation plans

4-5 Class Periods



LAVA FLOW CHALLENGE

MOLTEN MADNESS

Students develop procedures to determine how long it takes lava to flow.

Data is presented and analyzed on Histograms.

Analysis of data drives the need for a uniform procedure that controls variables, reduces error.



Record the steps in your procedure to test how long it takes the lava to flow across the plate

1.	Put down Newspaper
2.	Set up plates: 7 inch incline use the bob
3.	Put a starting mark @ the top of the plate & stopping mark @ the bottom
4.	Put 10 drops on the plate, start timer when the first drop hits plate
5.	When the soap hits the bottom line, stop the timer
6.	clean the plate off between trials

Experience the Lava Challenge

LAVA CHALLENGE – *ENGAGE*

- Students are introduced to the challenge
- Reasons for using a model with the investigation



LAVA CHALLENGE- *EXPLORE*

Procedure:

1. Spend 5-6 minutes discussing and creating a procedure for measuring the time it takes for lava to flow with your group.
 - a. You can use the materials listed to design and follow a procedure to determine how much time it takes the lava (soap) to flow across the surface of the plate.
 - b. Additionally, you must complete at least six trials during your investigation, and record the data after each trial.
2. Write your procedure on your Investigation Sheet 1.
3. You will have 10 minutes to conduct your investigation and collect data.

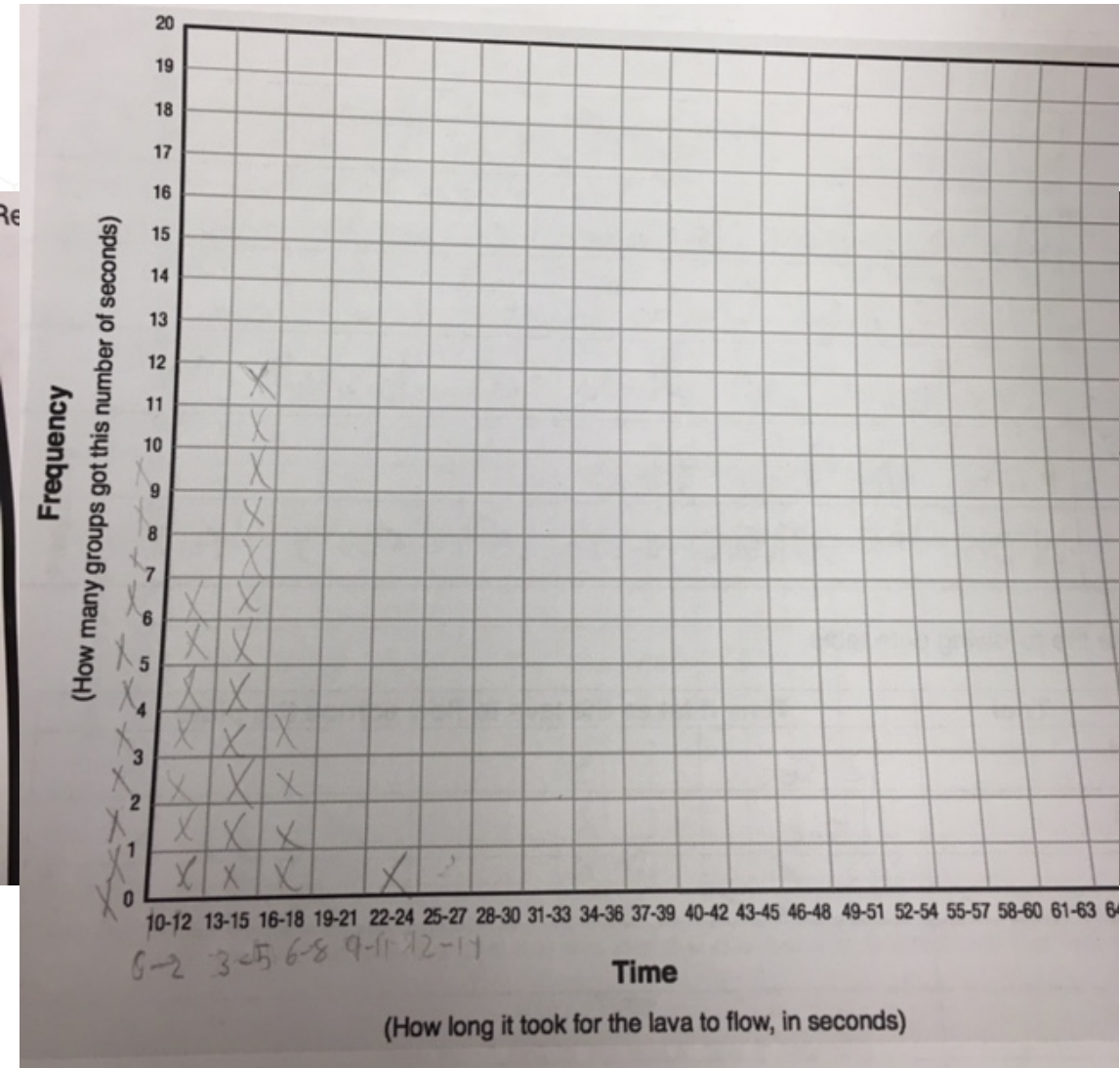
Materials

- Plastic Plate
- Model Lava (dish soap)
- Small Paper Cup (lava flow)
- Sharpie marker
- Stopwatch or timer
- Ruler
- Paper Towels
- *Investigation Sheet 1*

LAVA CHALLENGE – EXPLORE & EXPLAIN

Students:

- Plan their investigation & write a procedure for carrying it out
- Follow their procedure and record data
- Share their data with the class and record all data on a histogram
- Analyze the histogram data and observe the distribution of data
- Discuss procedural differences between groups & the importance of controlling variables to collect consistent data



LAVA CHALLENGE – ELABORATE & EVALUATE

Students write a letter to a neighboring town council explaining what they have learned about the need for writing/following good procedures

NAME: _____	DATE: _____
STUDENT #: _____	TEACHER: _____
Letter to the Town Council	
Date: _____	
Dear Town Council Members,	
My class recently completed several investigations in order to measure lava flow.	
During our investigations, we created a model of lava flow using plates and dish soap.	
Our last investigation produced more consistent data. Our evidence for this is:	

Some of the variables we needed to control in our investigations included:	

You should hire us for this job because we know how important it is to write and follow clear procedures. By following a standardized procedure, _____	

Sincerely,	

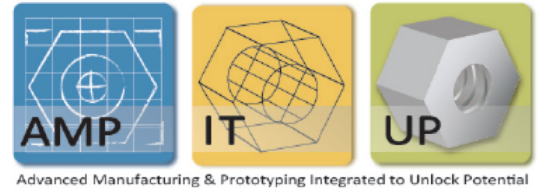
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AMP-IT-UP: SCIENCE AND MATH MODULES

AMP Crosscutting Integrated Theme		Earth Science (6 th Grade)	Life Science (7 th Grade)	Physical Science (8 th Grade)
Experimental Design	Science	Molten Madness	Oil Spill Drill	Marine Snow
	Math	Some Assembly Required	It's Game Time	It's Electric!
Data Visualization	Science	Shake and Break	Don't Wreck the Reef!	Riding the Concrete Wave: Helmet
	Math	Data Saves the Whales!	Aquarium Friend or Foe?	Rescue the Hot Shots!
Data Driven Decision Making	Science	Snow Day	Under the Sea	Riding the Concrete Wave: Skate Park
	Math	Sweet Machines	Perfecting Your Craft	Power Payoff

AMP-IT-UP CURRICULUM SUPPORT MATERIALS

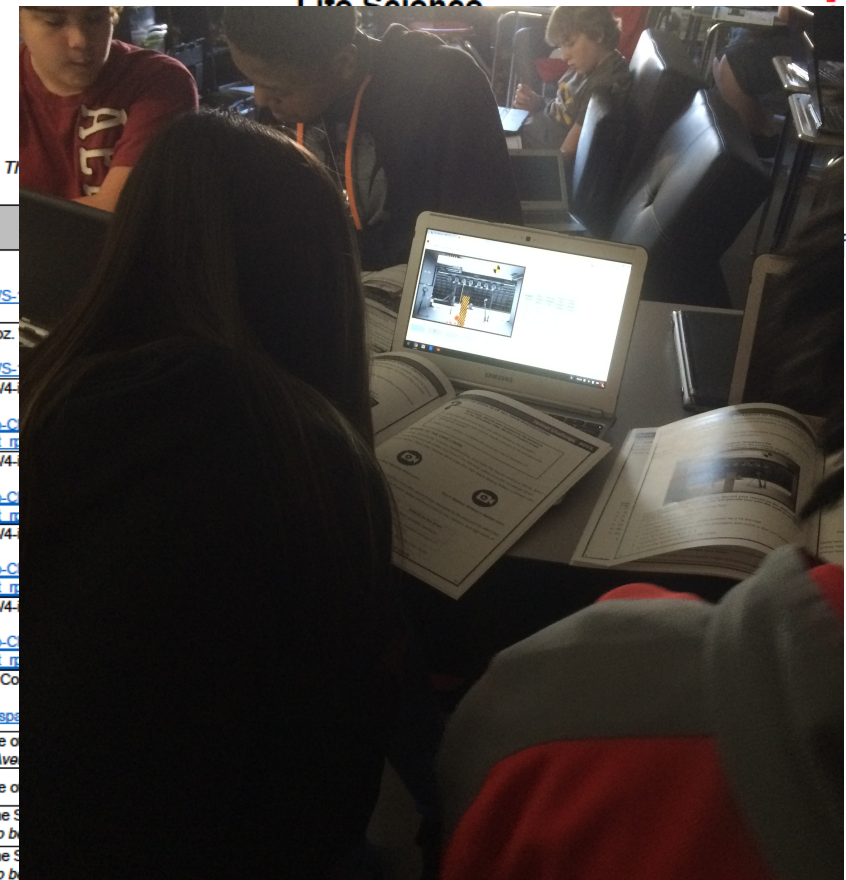
5E Stage	Student Activities	Teacher Activities
	How will students engage actively in the three	How will the teacher facilitate and monitor



Module Curriculum Includes:

- Student texts
- Student pages
- Annotated Teachers Edition
- Teacher Prep Guide
- Videos
- Material List
- Supplemental Materials

Item	Source of Purchase	Item #	
Cardboard Trays (1 per pair of students)	Uline	S-13340	Corrugated Trays https://www.uline.com/Product/Detail/S-13340/22FromOrderHistory=Y
Wide Mouth Jar Canisters (class set)	Uline	S-14509	White Round Wide-Mouth Jars – 12 oz. https://www.uline.com/Product/Detail/S-14509
Orange Counters (Refer to the Material Preparation Guide for the quantity per canister)	Amazon	N/A	Royal Bingo Supplies 1000 Pack of 3/4" https://www.amazon.com/1000-Bingo-Counters-Orange/dp/B00EHLKZ72/ref=pd_cart_r
Purple Counters (Refer to the Material Preparation Guide for the quantity per canister)	Amazon	N/A	Royal Bingo Supplies 1000 Pack of 3/4" https://www.amazon.com/1000-Bingo-Counters-Purple/dp/B00EHLKZ72/ref=pd_cart_r
Green Counters (Refer to the Material Preparation Guide for the quantity per canister)	Amazon	N/A	Royal Bingo Supplies 1000 Pack of 3/4" https://www.amazon.com/1000-Bingo-Counters-Green/dp/B00EHLKZ72/ref=pd_cart_r
Pink Counters (Refer to the Material Preparation Guide for the quantity per canister)	Amazon	N/A	Royal Bingo Supplies 1000 Pack of 3/4" https://www.amazon.com/1000-Bingo-Counters-Pink/dp/B00EHLKZ72/ref=pd_cart_r
Colored Pencils (1 per teacher)	Staples	433097	Binney & Smith Crayola® Classpack Co http://www.staples.com/Crayola-Classpack-Co
Labels for Canisters			Document is inside of the Supplemental Materials folder <i>Recommended to be printed on A4 paper</i>
Material Preparation Instruction Guide			Document is inside of the Supplemental Materials folder
Procedure Sheets (1 per pair of students)			Document is inside of the Supplemental Materials folder <i>Recommended to be printed on A4 paper</i>
Coral Reef Sorting Sheet (1 per pair of students)			Document is inside of the Supplemental Materials folder <i>Recommended to be printed on A4 paper</i>
Coral Reef Digital Decision Matrix			Document is inside of the Supplemental Materials folder <i>Share document electronically with students for the activity</i>



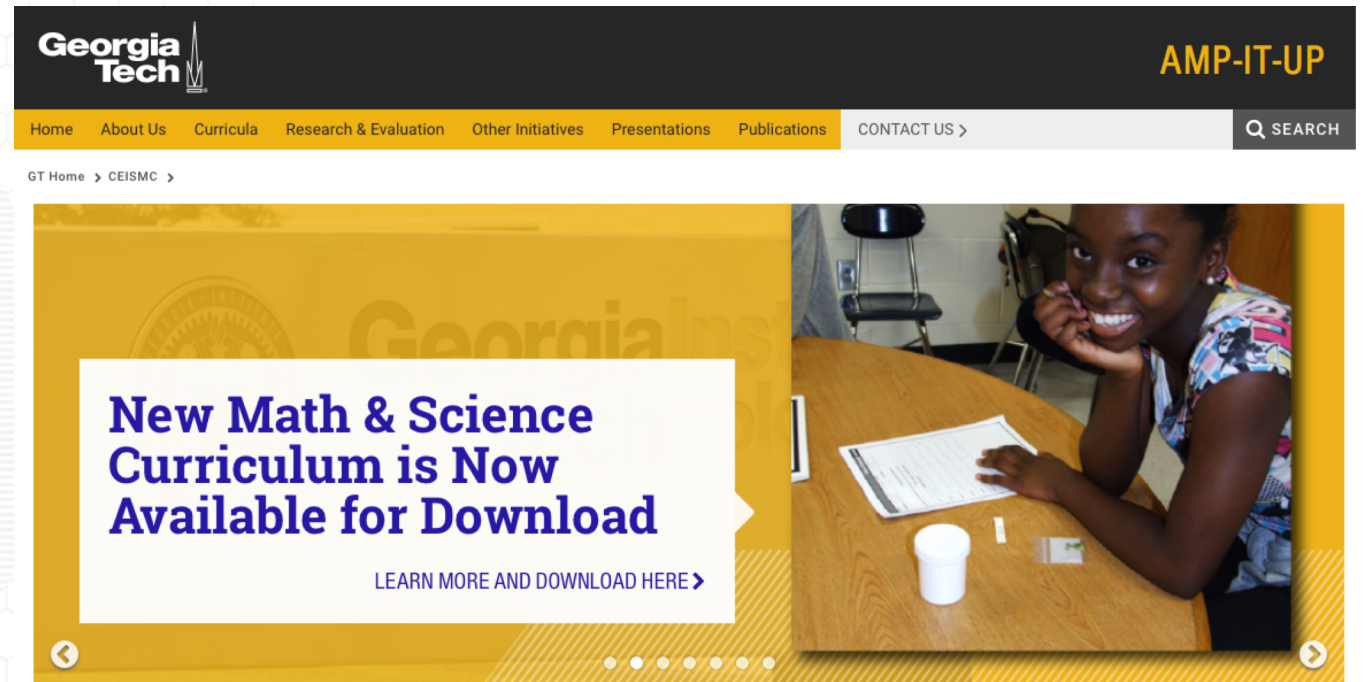
Estimated Challenge Total Cost per Teacher: \$198.89

...sense of phenomena and/or to design solutions?

QUESTIONS?

Download the Curriculum:
<http://ampitup.gatech.edu>

Curriculum contact information:
ampitup@ceismc.gatech.edu



ADDITIONAL AMP-IT-UP NSTA PRESENTATIONS

- **Life Science Modules:**
 - Saturday 12:30-1:30
Georgia World Congress Center, C207
- **Physical Science Modules:**
 - Saturday 11-12
Georgia World Congress Center, C302
- **STEM-ID Course:**
 - Saturday 11-12
Georgia World Congress Center, C213



@ Georgia Tech

Friday 12:30-1:30

Georgia World Congress Center, B402

THANK YOU!