



CENTER FOR
MATHEMATICS, SCIENCE,
AND TECHNOLOGY
Illinois State University

Integrated STEM K-12 Curriculum Development for Mainstream Adoption

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Exploring the Idea



Exploring the Idea:

- Open up the sack on your table and remove the materials. Leave the books.
- There are enough materials for 3 groups at each table.
- Get started on the ***Explore It*** activity
- Answer the questions in the ***Describe It*** section.

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Common Core Standards - Grade Four

MEASUREMENT AND DATA

Solve problems involving measurement and conversion of measurements from a larger unit to a smaller unit. Represent and interpret data. Geometric measurement: understand concepts of angle and measure angles.

4.MD.1 Know relative sizes of measurement units within one system of units including km, m, cm; kg, g; lb, oz.; l, ml; hr, min, sec. Within a single system of measurement, express measurements in a larger unit in terms of a smaller unit. Record measurement equivalents in a two column.


4.MD.4 Make a line plot to display a data set of measurements in fractions of a unit ($\frac{1}{2}$, $\frac{1}{4}$, $\frac{1}{8}$). Solve problems involving addition and subtraction of fractions by using information presented in line plots.


4.MD.5 Recognize angles as geometric shapes that are formed wherever two rays share a common endpoint, and understand concepts of angle measurement: a. An angle is measured with reference to a circle with its center at the common endpoint of the rays, by considering the fraction of the circular arc between the points where the two rays intersect the circle. An angle that turns through $\frac{1}{360}$ of a circle is called a "one-degree angle," and can be used to measure angles. b. An angle that turns through n one-degree angles is said to have an angle measure of n degrees.

4.MD.6 Measure angles in whole-number degrees using a protractor. Sketch angles of specified measure.

Mathematical Practices

1. Make sense of problems and persevere in solving them. 2. Reason abstractly and quantitatively. 3. Construct viable arguments and critique the reasoning of others. 4. Model with mathematics. 5. Use appropriate tools strategically. 6. Attend to precision. 7. Look for and make use of structure. 8. Look for and express regularity in repeated reasoning.

 Rocket Apogee



Student STEM Project Edition
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MEASUREMENT AND DATA



Step 5.

- Object A – Amber Chandelier
- Object B – Top of the Screen
- Object C – Exit Sign
- Object D – A Smoke Detector

Step 7.

- Do this from your table.



Step 14.

Group	Base Distance	Angle	Tangent Ratio	Altitude



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Getting the Idea



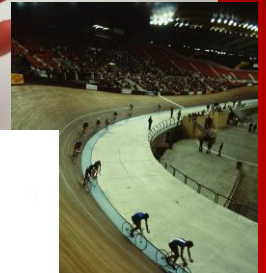
Getting the Idea:

1. What did you learn?
2. How did you learn it?
 - What did you do?
 - What did we do?



Bicycles and Cell phones

How do you learn ?



About 98% of all teachers think that projects are great way to teach. Only 50% ever do one.



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Applying the Idea



Applying the Idea:

Pull out the books and share them around the table.

They vary:

- Kindergarten to High School
- North Carolina to California
- Draft copies to final versions
- Color and monochrome
- Student and Teacher Editions
- English and Spanish versions



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Applying the Idea:

Try and wrap your head around what the lessons are doing...format, structure, context, content.

Ask us questions.



Consider the following:

1. How do we normally use projects?
2. How do these lessons use projects?

STEM for: “...mainstream adoption”



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What favors Integrated STEM for mainstream adoption?



The Learning Cycle:

Exploration

Discussion/explanation

Application

Expansion/further study

Assessment



Does it work?

<u>TIMSS</u>	National average	Mathematics 9.4	Science 11.5
	IMaST students	Mathematics 10.7	Science 13.4

Stanford Achievement Test no significant difference

Transformed pedagogy and student performance

“High school teachers could identify IMaST graduates because they were equipped to tackle problems on their own rather than ask “What do you want me to do?” or “What will be on the test?” etc.”



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Expanding the Idea:

Questions



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Please give us the books back.