

# 5E and the “M” in STEM

by Rebecca Freeman



| Freeman - Lesson Plan   |  | Foam Rocket Launch |  | 5E PLAN |  |
|---|--|--------------------|--|---------|--|
| <p><b>Engage</b><br/>The purpose for the ENGAGE stage is to pique student interest and get them personally involved in the lesson, while pre-assessing prior understanding.</p> <p>Ask the following questions:</p> <ul style="list-style-type: none"> <li>• What is an angle?</li> <li>• What tool can we use to measure the degree of an angle?</li> <li>• What are some real-world examples of why we would need to use it?</li> </ul> <p>Play the following video:<br/><a href="https://www.youtube.com/watch?time_continue=1&amp;v=UuywS-7HuV4">https://www.youtube.com/watch?time_continue=1&amp;v=UuywS-7HuV4</a></p>  |  |                    |  |         |  |
| <p><b>Explore</b><br/>The purpose for the EXPLORE stage is to get students involved in the topic, providing them with a chance to build their own understanding.</p> <p>Build and launch rockets</p> <p>Measure distance and angles used throughout this activity.</p>  |  |                    |  |         |  |
| <p><b>Explain</b><br/>The purpose for the EXPLAIN stage is to provide students with an opportunity to communicate what they have learned so far and figure out what it means.</p> <p>Ask students the following questions about the EXPLORE portion of lesson?</p> <ul style="list-style-type: none"> <li>• What did you notice about the different angles that you used to launch your rocket?</li> <li>• What angle launched your rocket the farthest?</li> <li>• What do you think would have happened if you launched at a 90-degree angle?</li> <li>• What do you think would have happened if you launched at a 0-degree angle?</li> <li>• What is the name of the type of angles that worked best for the launch?</li> </ul> |  |                    |  |         |  |
| <p><b>Elaborate/Extend</b><br/>The purpose for the EXTEND stage is to allow students to use their new knowledge and continue to explore to implications.</p> <p>Advanced students complete Initial Velocity activity</p> <p>Re-teach measuring various angles with students that need additional support</p>  |  |                    |  |         |  |
| <p><b>Evaluate</b><br/>The purpose for the EVALUATION stage is for both students and teachers to determine how much learning and understanding has taken place.</p> <p>Students submit completed data sheets with their conclusions</p> <p>Students can measure 3 angles for an exit ticket</p>   |  |                    |  |         |  |

“I feel that this is a lesson plan that pulls curriculum together.” Melissa



“Easy format to work with and remember”  
Stephanie



## EXPERIMENT

### Rocket Activity Foam Rocket

**Objective**  
Students will learn about rocket stability and trajectory with rubber band-powered foam rockets.

**Description**  
Students will construct rockets made from pipe insulating foam and use them to investigate the trajectory relationship between launch angle and range in a controlled investigation.

**Materials**  
30 cm-long piece of polyethylene foam pipe insulation (for 1/2" size pipe)  
Rubber band (size 64)  
Styrofoam food tray, cardboard, or stiff posterboard  
Duct tape  
Scissors  
Meter stick  
Press tack  
Washer or nut  
Quadrant plans printed on card stock  
Rocket construction instructions  
Experiment data sheet  
Masking tape  
Launch record sheet  
Eye protection  
For class - tape measure

**National Science Content Standards**  
Unifying Concepts and Processes  
• Evidence, models, and explanation  
• Change, constancy, and measurement  
Science as Inquiry  
• Abilities necessary to do scientific inquiry  
Physical Science  
• Position and motion of objects  
• Motions and forces  
Science and Technology  
• Abilities of technological design

**National Mathematics Content Standards**  
• Number and Operations  
• Algebra  
• Geometry  
• Measurement  
• Data Analysis and Probability

**National Mathematics Process Standards**  
• Reasoning and Proof  
• Communication  
• Connections  
• Representations

**Management**  
Select a large room with a high ceiling for the launch range, such as a cafeteria or gymnasium. Place markers on the floor at 1 meter intervals starting at 5 meters and going to 20 meters. If it is a calm day, the investigation can be conducted outside. Although the rockets can be launched outside on windy days, the wind becomes an uncontrolled variable that may invalidate the results. Prepare some sample rocket fins to show how they are constructed. Refer to the construction

“As a veteran teacher, this brings me excitement. I feel that there is hope for integration not isolation” Ranelle

## References:

<https://www.jpl.nasa.gov/edu/pdfs/foamrocket.pdf>

<https://www.jpl.nasa.gov/edu/teach/activity/foam-rocket/>

<https://nasa.us-satellite.net/courses/lessons/1342/preview/3031>