Appendix: STEM Standards and Practices

Next Generation Science Standards (NGSS)

https://www.nextgenscience.org/

Alignment of Activities With NGSS Disciplinary Core Ideas						
Motion and Stability (MS) Standard	Design a Foam Rocket With Stabilizing Fins	Track the Altitude of a Rocket	Build a Multistage Balloon Rocket	Optimize a Water Rocket Engine		
Forces and Interactions	Forces and Interactions					
MS-PS2-2	✓		✓	✓		
Engineering Design	Engineering Design					
MS-ETS1-1	✓		✓	✓		
MS-ETS1-2				✓		
MS-ETS1-3	✓		✓	✓		
MS-ETS1-4	✓		✓	✓		

Alignment of Activities With NGSS Crosscutting Concepts				
Concept	Design a Foam Rocket With Stabilizing Fins	Track the Altitude of a Rocket	Build a Multistage Balloon Rocket	Optimize a Water Rocket Engine
Patterns				
Cause and Effect	✓		✓	✓
Scale, Proportion, and Quantity				
System and System Models	✓		✓	✓
Energy and Matter			✓	✓
Structure and Function	✓			
Stability and Change				
Interdependence of Science, Engineering, and Technology	✓	✓	✓	✓
Influence of Engineering, Technology, and Science on Society and the Natural World				

Propulsion With the Space Launch System

NGSS Science and Engineering Practices

https://ngss.nsta.org/PracticesFull.aspx

Alignment of Activities With NGSS Science and Engineering Practices				
Practice	Design a Foam Rocket With Stabilizing Fins	Track the Altitude of a Rocket	Build a Multistage Balloon Rocket	Optimize a Water Rocket Engine
Asking Questions and Defining Problems	✓		√	✓
Developing and Using Models	✓		✓	✓
Planning and Carrying Out Investigations			✓	✓
Analyzing and Interpreting Data	✓	✓		✓
Using Mathematics and Computational Thinking	✓	✓	✓	✓
Constructing Explanations and Designing Solutions	✓		✓	✓
Engaging in Argument From Evidence				
Obtaining, Evaluating, and Communicating Information		✓		✓

International Society for Technology in Education (ISTE) Standards for Students

https://www.iste.org/standards/for-students

Alignment of Activities With ISTE Standards for Students				
Standard	Design a Foam Rocket With Stabilizing Fins	Track the Altitude of a Rocket	Build a Multistage Balloon Rocket	Optimize a Water Rocket Engine
Knowledge Constructor				
3d	✓	✓		✓
Innovative Designer				
4a			✓	
4c	✓		✓	
4d				
Computational Thinker				
5c		✓	✓	
Global Collaborator				
7c	✓	✓	✓	✓

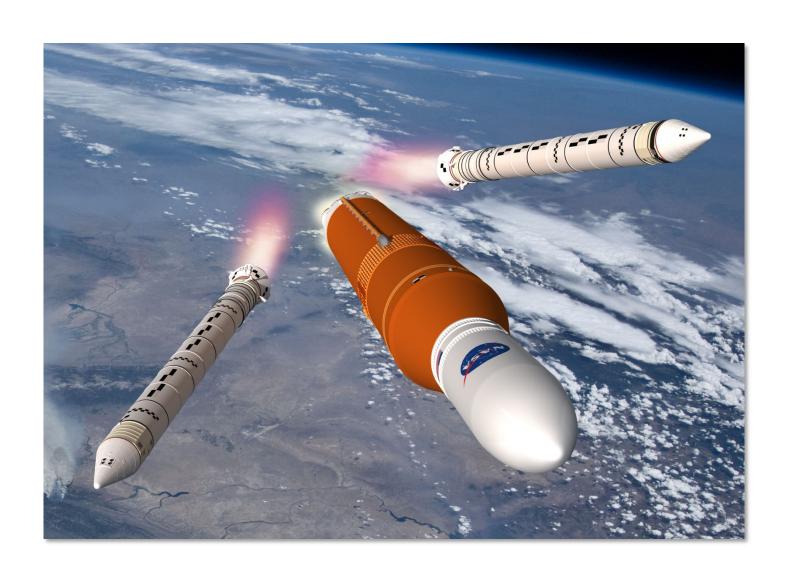
Common Core State Standards (CCSS) for Mathematics

http://www.corestandards.org/Math/

Alignment of Activities With CCSS Grade Level Content Standards by Domain						
Standard	Design a Foam Rocket With Stabilizing Fins	Track the Altitude of a Rocket	Build a Multistage Balloon Rocket	Optimize a Water Rocket Engine		
6th Grade	6th Grade					
CCSS.MATH.CONTENT.6.NS.B.3		✓				
CCSS.MATH.CONTENT.6.SP.B.5			✓	✓		
7th Grade						
CCSS.MATH.CONTENT.7.NS.A.2		✓	✓			
CCSS.MATH.CONTENT.7.NS.A.3		✓	✓			

Alignment of Activities With CCSS Standards for Mathematical Practice				
Practice	Design a Foam Rocket With Stabilizing Fins	Track the Altitude of a Rocket	Build a Multistage Balloon Rocket	Optimize a Water Rocket Engine
CCSS.MATH.PRACTICE.MP1	√		✓	✓
CCSS.MATH.PRACTICE.MP2				
CCSS.MATH.PRACTICE.MP3	√		✓	✓
CCSS.MATH.PRACTICE.MP4		✓		
CCSS.MATH.PRACTICE.MP5	√	✓	✓	✓
CCSS.MATH.PRACTICE.MP6		✓		
CCSS.MATH.PRACTICE.MP7				
CCSS.MATH.PRACTICE.MP8				





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