

# Mars Rover Celebration NGSS Alignment

**WEEK 4:** UNDERSTANDING ROVERS  
**LESSON 9:** SPACECRAFT STRUCTURE AND DESIGN  
**GRADE LEVEL:** 3-5

## PERFORMANCE EXPECTATIONS

In the NGSS framework, one of the important things that teachers need to do is explicitly identify when Science and Engineering Practices (SEP) and Cross Cutting Concepts (CCC) are being covered. The SEP's and CCC's are pervasive throughout the Mars Rover Celebration curriculum. The tables here are intended to assist the teacher in deciding when to mention that an SEP or CCC is part of the material being presented.

Lesson Objectives		
Students who demonstrate understanding can: <ul style="list-style-type: none"><li>Investigate probes and rovers to learn how they are built.</li><li>Learn about the propulsion, navigation, controls and daily handling of spacecraft</li><li>Gather, and analyze data from multiple sources on the internet</li><li>Understand how rovers communicate with Earth</li><li>Integrate new research into spacecraft/ rover designs</li></ul>		
Energy		
4-PS3-3 Ask questions and predict outcomes about the changes in energy that occur when objects collide.		
SCIENCE AND ENGINEERING PRACTICES (SEP)	DISCIPLINE CORE IDEAS (DCI)	CROSSCUTTING CONCEPTS (CCC)
<b>Asking Questions and Defining Problems</b> Ask questions that can be investigated and predict reasonable outcomes based on patterns such as cause and effect relationships	<b>ESS1: Earth's Place in the Universe:</b> ESS1.B: Earth and the Solar System	<b>System and System Models</b> A system can be described in terms of its components and interactions.
<b>Developing and Using Models</b> Develop models to describe phenomena	<b>ETS1: Engineering Design:</b> ETS1.B: Developing Possible Solutions	<b>Scale, Proportion, and Quantity</b> Standard units are used to measure and describe physical quantities

**Constructing Explanations  
and Designing Solutions**

Use evidence to support an  
explanation

**Obtaining, Evaluating and  
Communicating Information**

Obtain and combine information  
from books and other reliable  
media to explain phenomena

## SUMMARY OF THE THREE DIMENSIONS

The 5E lesson model provides the 5 phases of learning that helps to facilitate the process of science understanding. Teachers are encouraged to use the table below to help align their teaching methods with the embedded Science and Engineering Practices (SEP), Disciplinary Core Ideas (DCI) and Cross Cutting Concepts (CCC) present in the lesson.

5E MODEL PHASE	SCIENCE AND ENGINEERING PRACTICES (SEP)	DISCIPLINE CORE IDEAS (DCI)	CROSSCUTTING CONCEPTS (CCC)
ENGAGE	Asking Questions and Defining Problems	Earth and the Solar System Developing Possible Solutions	Systems and System Models
EXPLORE	Developing and Using Models Constructing Explanations and Designing Solutions	Earth and the Solar System Developing Possible Solutions	Scale, Proportion and Quantity
EXPLAIN	Obtaining, Evaluating and Communicating Information	Earth and the Solar System Developing Possible Solutions	Systems and System Models
ELABORATE	Obtaining, Evaluating and Communicating Information	Earth and the Solar System Developing Possible Solutions	Systems and System Models
EVALUATE	Performance Expectations	Performance Expectations	Performance Expectations