Does Mass Matter?

In this lesson, you will

- Design
- Build
- Fly
- Analyze

You are THE FUTURE

Essential Question

Does the mass of a model rocket affect the altitude and acceleration of the rocket's flight?

I Can Statements

- Articulate Newton's Second Law of Motion and provide examples.
- Conduct an experiment and display collected data to show the relationship between mass, and speed.
- Define the criteria and constraints of a design problem with enough precision to ensure a successful solution.
- Evaluate competing design solutions to determine how well they meet the criteria and constraints of the problem.
- Analyze data from tests to determine similarities and differences among several design solutions to identify the best characteristics of each that can be combined into a new solution to better meet the criteria for success.
- Develop a model to generate data for repeated testing and modification of a proposed object, tool, or process to achieve an optimal design.

Have you ever watched a rocket launch?

Rocket Launch

STOP

Fill Out Activity 1: Pre-Assessment

What do engineers who design rockets have to take into consideration?

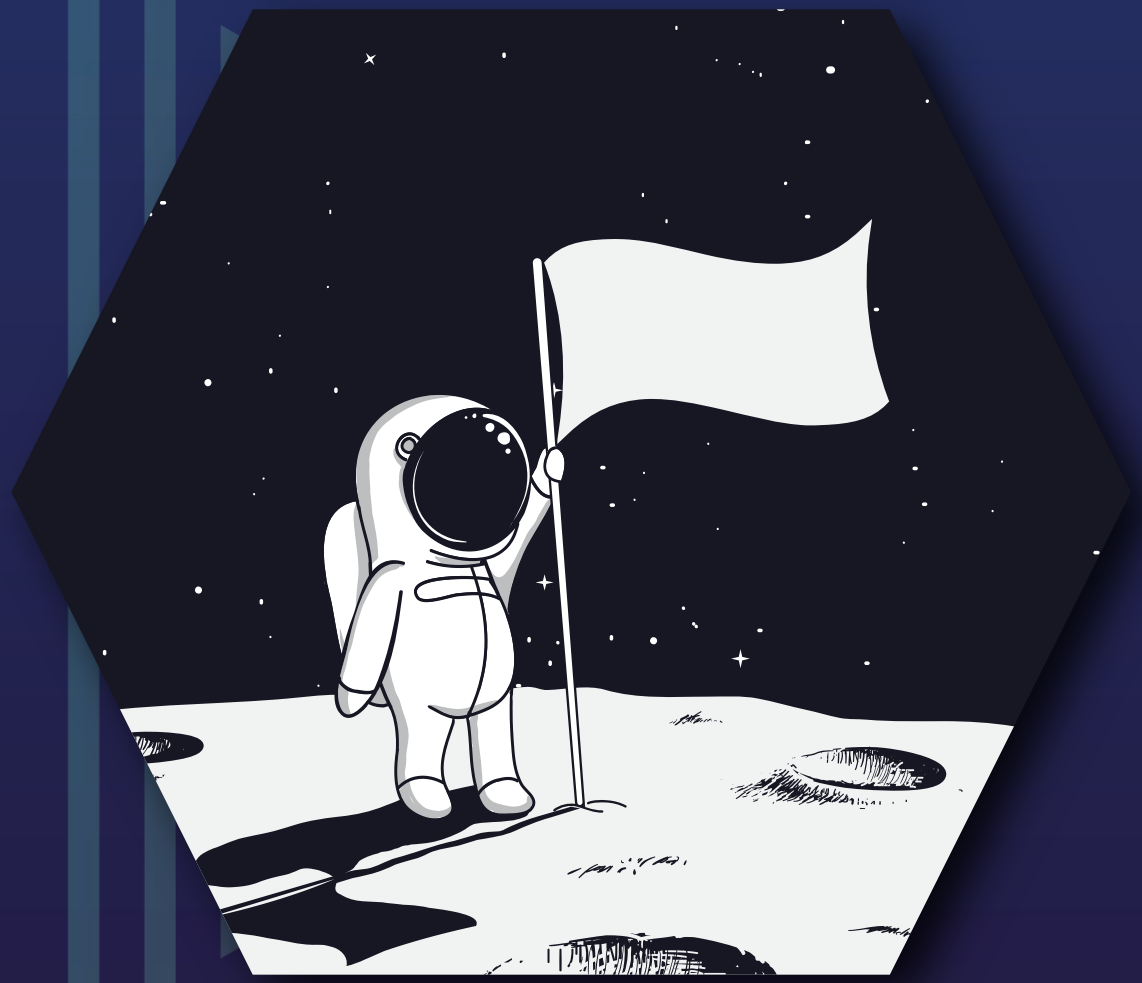
Do you think it matters how much mass the rocket has?

What is Mass?

Mass is NOT Weight

Weight measures how much gravity is pulling down on an object

- Weight can change!
- Your weight on the Moon is less because the gravity on the Moon is less



Mass is how much matter something has.

- MASS does not change even if you change location.
- Your MASS on the Moon is the same as your mass on Earth.

SO… If my MASS on Earth is 100kg, on the Moon my MASS would also be 100kg.

But… my weight would be only 1/6 of that!

Could a rocket have too LITTLE mass to fly?

What would be a disadvantage of a rocket that had too MUCH mass?

After the first shuttle launch in 1981, they stopped painting one of the fuel tanks orange because it saved them 272kg of mass!

Why do you think they bothered?

See more here

Remember Newton's Second Law…

Force = Mass X Acceleration

How does this law relate to the launch of a rocket?

In fact, all of Newton's Laws are demonstrated by a rocket launch.

1st: :Law of Inertia

The rocket remains in place until acted on by an outside force (engine)

2nd: Force

Mass and acceleration are related

3rd: Action/ Reaction

The engine pushes the rocket forward (action) and exhaust is pushed backwards (reaction)