The Orion spacecraft will take astronauts farther than ever before as we explore and pioneer the Deep Space frontier. It will serve as the exploration vehicle that will carry the crew to Mars, provide emergency abort capability, sustain the crew during space travel and ensure safe re-entry into Earth’s atmosphere.
The Engineering Design Process:

The Engineering Design Process is a series of steps engineers use to guide them in problem solving. Engineers must ask a question, imagine a solution, plan a design, create that model, experiment and test that model, then take time to improve the original – all steps that are crucial to mission success at NASA.
Design Challenge:

1. In teams of 3-4 you must design and build an Orion crew spacecraft with a parachute system that will allow the module to descend at a rate of 1 meter per second.
2. The spacecraft must safely land two astronauts. The crew must not fall out of the capsule.
3. Your team must sketch your plans before you begin constructing your spacecraft.
4. Your design must be approved by an adult before your team can begin building.

Team Roles:

- **Project Manager**: Ensures everyone is working as a team.
- **Materials Engineer**: Suggests and gathers building materials.
- **Systems Engineer**: Sketches or draws and labels design plan.
- **Data Specialist**: Records accurate data from trial testing.
General Building Materials:

Below is a list of suggested materials. Your team is encouraged to substitute other building materials to engineer your design.

- Tissue Paper
- String, Yarn, Fishing Line...
- Styrofoam Cup, Toilet Paper Rolls...
- Masking Tape, Sticker Dots...
- Aluminum Foil
- Objects to represent astronauts- Paper clips, raisins, marbles...

Supplies:

- Meter Stick
- Stop Watch
- Ruler
- Scissors
Plan A Design:

Draw and label the materials you plan to use to build your Orion spacecraft and parachute design.

Approved by: ________________________________
Test The Model:

1. Use a meter stick to measure the 1-meter (100 cm) drop height.
2. Drop test your Orion spacecraft and record the time in seconds it takes for it to descend 1-meter (100 cm) with a stop watch.
3. Record your results and observations in the table below.
4. If your spacecraft does not fall at a rate of 1-meter per second you must redesign your project and conduct another trial.

<table>
<thead>
<tr>
<th>Trial</th>
<th>Time (seconds)</th>
<th>Observations</th>
</tr>
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<tbody>
<tr>
<td>1</td>
<td></td>
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<td>2</td>
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<td>3</td>
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Challenge Closure:

Question 1:

List two things you learned about what engineers do through building your Orion spacecraft.

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Question 2:

What was the greatest difficulty your team encountered while trying to complete this challenge? How did you solve this problem?

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