** Findley Oaks STEM Connect**

 **2nd Grade Design Brief**

**Name:**  **Lunar Landers**

**Brief Overview: “Astronauts (large marshmallows) are placed in their “cabin” (3oz. cup) and are dropped from a pre-determined height. (2 ft.). Drop height will be increased. Students must use the other provided supplies to cushion their landing and cause the astronauts to remain in the cabin.**

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| **Subject: Space****Unit 1-Stars, Star Planets, and Planets****Unit 6-Forces and Motion** | **Grade Level: 2** | **Suggested Timeframe:****45 minutes** |

**Standards: S4CS3-**Students will use tools and instruments for observing, measuring, and manipulating objects in scientific activities utilizing safe laboratory procedures.

Connections Include:Potential and kinetic energy, acceleration due to gravity, air resistance, measurement. See teacher notes.

Students should follow the **Engineering Design Process.**

**Background/Problem:** A spacecraft that can land gently is important for getting astronauts to and from the moon safely.

**Design Challenge:** NASA is looking for safe landing sites on the moon. Once they find one, they need to design and build a spacecraft that can land there without injuring astronauts or damaging the spacecraft. Today you’ll make a Lunar Lander (a spacecraft) that can land safely when you drop it on the floor. As you test, you’ll find ways to make it work better, improving a design based on testing is called the *engineering design process*.

**Criteria:** 1. Design and build a shock absorbing system out of paper, straws, and marshmallows. 2. Attach a shock absorber to a cardboard platform; and 3. Improve your design based on testing results.

**Constraints:**

1. No other items maybe inside the cabin with the astronauts.
2. The cabin may not have any type of lid, covering, or roof that intersects the vertical plane of the cup rim.
3. The astronauts may not be stuck to the cabin.

**Materials: (per team)**

* 1 piece of stiff paper or cardboard (approximately) 4x5in./10x13 cm.
* 3 index cards (3x5)
* 1 small paper or plastic 3 oz. cup
* 10 miniature marshmallows
* 2 large marshmallows
* 8 plastic straws
* 3 rubber bands
* Tape

**Tools:**

**Measuring tape**

**Rulers**

**Scissors**

**Be prepared to discuss:**

1. **What forces affected your lander as it fell?**
2. **After testing, what changes did you make to your lander?**
3. **Engineers’ early ideas rarely work out perfectly. How does testing help them improve a design?**
4. **What did you learn from watching others test their landers?**
5. **The moon is covered in a thick layer of fine dust. How might this be an advantage?**

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Picture – for teacher reference only. \*\*\*\*\*\*\*Students should brainstorm and construct their own version of a lunar lander.