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 **Findley Oaks STEM Challenge**

 **2nd Grade Design Brief**



**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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| **Lunar Landers** | **Sun and Moon** |

**Standards:**

Prioritized Standard: S2E2.d Obtain, evaluate, and communicate information to develop an understanding of the patterns of the Sun and the moon and the sun’s effect on Earth. Use data from personal observations to describe, illustrate, and predict how the appearance of the moon changes over time in a predictable pattern. (Clarification statement: Students are not required to know the phases of the moon or tilt of the Earth.)

Prioritized Standard: S2P2.b Obtain, evaluate, and communicate information to demonstrate changes in speed and direction using a force (a push or a pull). Design a device to change the speed or direction of an object.

**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 a safe landing site 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 your design along the way.

**Criteria:**

* Design and build a shock absorbing system out of paper, straws, and marshmallows
* Attach a shock absorber to a cardboard platform
* Improve your design based on testing results

**Constraints:**

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

**Materials:**

* 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
* Paper and pencil for design planning

**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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