Introduction to Lunar Chair project

NASA HUNCH ACADEMY

Introduction to NASA HUNCH video.

Mission Statement: Empowering Elementary School Students in STEM through NASA HUNCH Academy

At NASA HUNCH Academy, our mission is to ignite a passion for STEM (Science, Technology, Engineering, and Mathematics) among elementary school students by providing an immersive and innovative educational experience inspired by NASA HUNCH. We strive to cultivate curiosity, critical thinking, and creativity, laying the foundation for future leaders in space exploration and technology.

Vision Statement: Fostering a Generation of Young Explorers and Innovators

Our vision at NASA HUNCH Academy is to create a dynamic learning environment where elementary school students can thrive in STEM fields. We envision a future where every child is equipped with the knowledge, skills, and inspiration needed to contribute to space exploration and technological advancements. Through hands-on experiences, collaboration, and mentorship, we aim to nurture a community of young explorers and innovators who will boldly shape the future of science and technology.

NASA and Moon landing videos

Introduction to NASA HUNCH Lunar Chair Project video

Objective

Read over the NASA HUNCH powerpoint, visit the websites and watch the videos for information.
https://www.hunchdesign.com/uploads/2/2/0/9/22093000/lunar_habitat_chairs.pdf
Develop, design and build a blueprint for a prototype of a chair that can be used on the Moon. NASA's long term goal is to have a base on the Moon. This base would be home to a research team that would spend long periods of time at this Lunar base. What research lab would be complete without some where to sit. The moon has very little gravity about 1/6th of Earth's gravity. So our chair must be designed to lock into a track that will keep all the legs on the ground. This chair must be lightweight and easily assembled, but sturdy enough to support up to 130 lbs. The height of the chair need to be 30" to 40" to fit at a table or work station comfortably. . This chair must have a back, armrest are optional. It must be light weight because it cost $1.2 million per pound of materials that go to the moon. This chair needs to be easy to assemble and store in a small space for transportation. First start out by drawing or making a blueprint of a basic chair like the one you sit in at school on paper. Make a hypothesis for the measurements. We will be measuring different chairs in the next station. Your hypothesis doesn't have to be correct. We will come back to this blueprint after we do our investigation stations. After we conduct our investigations we will use our updated blueprint to make a 3D design of our Lunar chair. We will use tinkercad for our final design. Once you have your basic design we will do research to learn what type of chair we want to design for this project. Be creative and remember it needs to be very light weight. Have fun and work together.

Videos about the moon

Ideas for a chair

2nd grade NGSS Science standards covered in this lesson.

K-PS2-1.Plan and conduct an investigation to compare the effects of different strengths or different directions of pushes and pulls on the motion of an object.

PS2.A: Forces and Motion. Pushes and pulls can have different strengths and directions.

Pushing or pulling on an object can change the speed or direction of its motion and can start or stop it.

ETS1.A: Defining Engineering Problems. A situation that people want to change or create can be approached as a problem to be solved through engineering. Such problems may have many acceptable solutions.

K-PS2-2.. Analyze data to determine if a design solution works as intended to change the speed or direction of an object with a push or a pull.

2-PS1-2. Analyze data obtained from testing different materials to determine which materials have the properties that are best suited for an intended purpose.*

5-ESS1-2.Represent data in graphical displays to reveal patterns of daily changes in length and direction of shadows, day and night, and the seasonal appearance of some stars in the night sky

3rd Grade NGSS Science standards covered in this lesson.

3-PS2-1. Plan and conduct an investigation to provide evidence of the effects of balanced and unbalanced forces on the motion of an object.

PS2.A: Forces and Motion. Each force acts on one particular object and has both strength and a direction. An object at rest typically has multiple forces acting on it, but they add to give zero net force on the object. Forces that do not sum to zero can cause changes in the object's speed or direction of motion. (Boundary: Qualitative and conceptual, but not quantitative addition of forces are used at this level.)

PS2.B: Types of Interactions. Objects in contact exert forces on each other.

3-PS2-2.. Make observations and/or measurements of an object's motion to provide evidence that a pattern can be used to predict future motion.

PS2.A: Forces and Motion. The patterns of an object's motion in various situations can be observed and measured; when that past motion exhibits a regular pattern, future motion can be predicted from it.

5-ESS1-2. Represent data in graphical displays to reveal patterns of daily changes in length and direction of shadows, day and night, and the seasonal appearance of some stars in the night sky

4th Grade NGSS Science standards covered in this lesson

3-PS2-3.Ask questions to determine cause and effect relationships of electric or magnetic interactions between two objects not in contact with each other. Clarification Statement: Examples of an electric force could include the force on hair from an electrically charged balloon and the electrical forces between a charged rod and pieces of paper; examples of a magnetic force could include the force between two permanent magnets, the force between an electromagnet and steel paperclips, and the force exerted by one magnet versus the force exerted by two magnets. Examples of cause and effect relationships could include how the distance between objects affects strength of the force and how the orientation of magnets affects the direction of the magnetic force.

5-ESS1-2. Represent data in graphical displays to reveal patterns of daily changes in length and direction of shadows, day and night, and the seasonal appearance of some stars in the night sky

5th Grade NGSS Science standards covered in this lesson

5-PS2-1.Support an argument that the gravitational force exerted by Earth on objects is directed down.

PS2.B: Types of Interactions. The gravitational force of Earth acting on an object near Earth's surface pulls that object toward the planet's center.Engaging in Argument from Evidence

Engaging in argument from evidence in 3–5 builds on K–2 experiences and progresses to critiquing the scientific explanations or solutions proposed by peers by citing relevant evidence about the natural and designed world(s).. Support an argument with evidence, data, or a model.

5-ESS1-2. Represent data in graphical displays to reveal patterns of daily changes in length and direction of shadows, day and night, and the seasonal appearance of some stars in the night sky

5-ESS2-1.Develop a model using an example to describe ways the geosphere, biosphere, hydrosphere, and/or atmosphere interact.

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Middle School 6th - 8th Grade NGSS Science standards covered in this lesson

MS-PS2-1. Apply Newton's Third Law to design a solution to a problem involving the motion of two colliding objects.*

PS2.A: Forces and Motion. For any pair of interacting objects, the force exerted by the first object on the second object is equal in strength to the force that the second object exerts on the first, but in the opposite direction (Newton's third law).

Constructing Explanations and Designing Solutions. Constructing explanations and designing solutions in 6–8 builds on K–5 experiences and progresses to include constructing explanations and designing solutions supported by multiple sources of evidence consistent with scientific ideas, principles, and theories.

MS-PS2-2.Plan an investigation to provide evidence that the change in an object's motion depends on the sum of the forces on the object and the mass of the object.

PS2.A: Forces and Motion. The motion of an object is determined by the sum of the forces acting on it; if the total force on the object is not zero, its motion will change. The greater the mass of the object, the greater the force needed to achieve the same change in motion. For any given object, a larger force causes a larger change in motion.All positions of objects and the directions of forces and motions must be described in an arbitrarily chosen reference frame and arbitrarily chosen units of size. In order to share information with other people, these choices must also be shared

MS-PS2-3.Ask questions about data to determine the factors that affect the strength of electric and magnetic forces.

MS-PS2-4.Construct and present arguments using evidence to support the claim that gravitational interactions are attractive and depend on the masses of interacting objects.

MS-PS2-5.Conduct an investigation and evaluate the experimental design to provide evidence that fields exist between objects exerting forces on each other even though the objects are not in contact.

PS2.B: Types of Interactions. Forces that act at a distance (electric, magnetic, and gravitational) can be explained by fields that extend through space and can be mapped by their effect on a test object (a charged object, or a ball, respectively).

MS-ESS1-2.Develop and use a model to describe the role of gravity in the motions within galaxies and the solar system.

ESS1.B: Earth and the Solar System. The solar system consists of the sun and a collection of objects, including planets, their moons, and asteroids that are held in orbit around the sun by its gravitational pull on them.The solar system appears to have formed from a disk of dust and gas, drawn together by gravity.

MS-ESS1-1. Develop and use a model of the Earth-sun-moon system to describe the cyclic patterns of lunar phases, eclipses of the sun and moon, and seasons.

ESS1.A: The Universe and Its Stars. Patterns of the apparent motion of the sun, the moon, and stars in the sky can be observed, described, predicted, and explained with models.

ESS1.B: Earth and the Solar System. This model of the solar system can explain eclipses of the sun and the moon. Earth's spin axis is fixed in direction over the short-term but tilted relative to its orbit around the sun. The seasons are a result of that tilt and are caused by the differential intensity of sunlight on different areas of Earth across the year.