



Contest Overview

The Honeywell Fiesta Bowl Aerospace Challenge is a contest designed to enhance the knowledge of space technology in the classroom through the development of an International Lunar Base complete with a physical scale model, a written report and an oral presentation. The contest promotes team building, communication, problem solving, critical decision-making and creativity also supporting the academic areas of (tie to AZ State standards) science, technology, engineering, math, social studies, language and fine arts. **Each team's International Lunar Base must accommodate a crew of no more than 40 people for two years.**

The primary mission of the Lunar Base is to provide a future launch site and structure for a mission to Mars. Items to consider are mining, processing and storing of Helium 3, as well as creating and storing food and water supplies for the Mars mission.

In addition to the primary mission, teams should choose **one** topic and describe how it would be implemented on the Lunar Base. The topic options are applications of robotics on the Lunar Base **or** the development of lunar space tourism and recreation.

The following information is intended to guide students in the preparation of their entry. All information should be included in a written report that accompanies the physical model. The primary focus of the preliminary competition will be the physical model and written report. The final competition will focus on an oral presentation given by each of the six finalist teams.

Judging Guidelines

Judging will be based on the following categories:

- A) Physical Presentation (35 Points)
- B) Base Design Requirements (30 Points)
- C) Living Conditions (35 Points)
- D) Society (35 Points)
- E) Primary Mission (40 Points)
- F) Secondary Mission (25 Points)

Below is a listing of what should be included in each team's project.

A) Physical Presentation (35 Points)

Interior Designs – Scaled, *metric* drawings should be provided to show the various modules (habitation, recreation, work) in the Lunar Base.

Model Parameters –

- The 3-D model must be sturdy and capable of transport.
- The model should be light enough to be placed on a folding table.
- The model must be accompanied by *metric* drawings.
- The model dimensions may not exceed one (1) meter in any axis.
- The project cannot exceed \$50.00 in total cost. Receipts will be required and the use of recycled materials is encouraged.

NOTE: Adherence to the size and financial requirements is mandatory.

Mission Patch – The Mission Patch is a visual story about the team, its goals and its members. It should include the team name, mission number and team member names. The patch may not exceed 30 cm in diameter.

B) Base Design Requirements (30 Points)

Provide a written description of the following:

Habitation Modules – How will the crew be provided with a safe and pleasant living environment for two years?

Work Modules – Where will the crew work on their assigned tasks?

Transportation Systems/Structures – What method of transportation (human, robotic, material supplies) will be used in the Lunar Base?

Landing and Launch Site – What facility will be in place to allow for earth vehicles to land supplies and crew to support the Lunar Base?

Power Sources – How will the generation of electrical power for Lunar Base operation be accomplished?

Emergency Plans – What plans are in place for various emergency situations?

C) Living Conditions (35 Points)

Design should take into consideration the factors necessary for human comfort and existence. Keep in mind that earth-based support will need to be kept to a minimum.

Provide a written description of the following:

Food – Provisions should be made for food production, storage and preparation.

Water – How will the base get water? How will water be recycled? Will it be mined and/or processed water on the moon?

Waste Treatment – How will waste products be disposed of or recycled?

Air – An atmosphere will need to be provided which is similar in composition to that found on Earth. How will the base provide this?

Gravity – How will the Lunar Base address the issue of low gravity?

Shielding – Solar radiation is a very serious problem. Without the Earth's atmosphere to protect the base, harmful levels of radiation from the Sun, as well as in the form of cosmic rays, could result. Additionally, there is a lot of debris in space. How will the base be shielded?

Location – Where should the base be located on the moon and why?

D) Society (35 Points)

Provide a written description of the following:

Background of Culture – Give a description of the countries that are involved in the Lunar Base and to what extent. Include the qualifications of the personnel.

Human Tasks – What is the division of labor on the base? What does each member of the crew do?

Organization – What type of governing body is in place?

Communication – How will language barriers be addressed?

Arts and Aesthetic Values – How will art, music, dance, drama or literature be a part of the Lunar Base society?

Medical Care – How will the crew of the Lunar Base receive medical care? Have provisions been made for dealing with gravity related health issues? Have contingency plans been made in the event of a medical emergency?

Recreation – Two years in space is a long time. Potential psychological problems could result if opportunities for leisure time are not addressed. How will the Lunar Base plans rectify this concern?

E) Primary Mission (40 Points)

The mission of the lunar base is to prepare for a future launch site and structure for a mission to Mars. Items to consider are processing and storing rocket fuel for the future Mars mission with a crew of five.

Provide a written description of the following:

Mine Raw Material for Helium 3 – The moon has a natural resource called Helium 3 that can be used to produce fuel for fusion reactors. Fusion reactors can be used to power many things including propulsion engines in space ships.

Helium 3 Processing – The Helium 3 has to be processed to be usable in a fusion reactor. Suggest solutions.

Processed Helium 3 Storage – How will Helium 3 be stored?

F) Secondary Mission (25 Points)

In addition to providing rocket fuel, teams should choose **only one** topic from the list below and describe how it will be implemented on the Lunar Base.

Applications of Robotics – Describe uses of robotics or automation to reduce the human workload and/or increase human safety on the Lunar Base.

Space Tourism/Recreation – Describe how lunar tourism will be commercialized, including transportation, recreation and accommodation.

Each Team should have the following at the Preliminary Competition:

- Physical Model
- Mission Patch
- Report that contains all information about model and scale drawings. (Many teams will divide their report into different sections...i.e. society, scale drawings, etc.)
- Receipts showing any expenses associated with the project. (NOTE: there is a \$50 limit on spending)
- A presentation board is NOT required, however teams may bring one.