PHOBOS LOGISTICS MISSION & PURPOSE

Students will create a scale model and written report about an International Logistics Mission to colonize Phobos, a moon of Mars. The primary purpose of this mission is to develop a plan to establish a sustainable base on Phobos with minimum support from Earth. A secondary mission of the base is to develop an infrastructure to support Command, Control, and Communication (C3) for robotics and humans on Mars. The base must be able to support a crew of 24 people within 10 years supported by nine (9) launches per year from Earth. Each launch can transport six (6) people or cargo in a module 4.5 meter diameter fairing with a length of 10m. The maximum cargo weight per launch is 30 metric-tons.

Students should consider/explain the following in a written report that will accompany a physical time-phased model:

• What location should be chosen on Phobos? Why?
• Only nine (9) launches per year can be sent to Phobos. What is the sequence of material and crew to grow the colony to eventually support 24 people within 10 years?
• How are you going to reuse the launch vehicle?
• What tools and resources are needed to construct the modules?
• What is required to make the colony sustainable?

PRIMARY MISSION

The primary purpose of the Phobos Logistics Mission is to:

• Provide a sustainable base for a colony of 24 people in 10 years
• Provide a written description of the landing site, sequence of launches, and sequence of construction of the Phobos Base

SECONDARY PHOBOS LOGISTICS MISSION

Develop an infrastructure to support Command, Control, and Communication (C3) for robotics and humans on Mars.

• Provide a written description of the needed infrastructure on Phobos (facilities, equipment, etc.)
• Provide a written description of the location of the C3 infrastructure including a description of why the location was selected
• Provide a written description of the crew skills, sequence of launches, and sequence of construction for the C3 relative to the primary mission

RECOMMENDED TIMELINE

Week 1 • Research and Brainstorm Project Scope and Solutions
Week 2 • Map out Primary Project Solution
Week 3 • Determine Physiological Factors
Week 4 • Determine Base Design Requirements
Week 5 • Define Society
Week 6 • Detail Primary Mission
Week 7 • Design of Station Interior and Creation of Scale Drawings
Week 8 • Secondary Mission
Week 9 • Building of Model/Verbal Presentation
Week 10 • Review and Adjust Project

APPLICATIONS DUE 11/24/2017
AEROSPACE CHALLENGE

HONEYWELL FIESTA BOWL

WHERE

WHEN

Final Competition and Winning Team Announcement TBD

Preliminary Competition ASU Polytechnic Campus, Mesa

Final Competition TBD

HOW

Complete and submit one application per team and one media release form per student and submit to Angel Guzman at aerospace@fiestabowl.org or 480.736.3903 by Friday, November 24, 2017. Entry in the competition is FREE. Please note that space is limited and filled on a first come, first served basis.

This contest was developed to promote team-building, communication, problem-solving and critical decision-making skills. It also supports the content areas of science, math, technology, engineering, social studies, language and fine arts.

WHY

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PROJECT REQUIREMENTS

PHYSICAL PRESENTATION

Each team should submit a physical model. The 3-D model should be no larger than:

- One (1) meter project base
- Module should fit in an 80 cm cube

The physical presentation should include the following elements:

- Model must not exceed the size requirements indicated above
- Interior design & scale drawings (metric measurements)
- Indication of time-sharing of base by year
- Mission patch (must not exceed 30 centimeters)
- Phobos Base name
- Display board

NOTE: Project construction and presentation must not exceed $50 in total cost. Receipts from purchases will be required and use of recycled materials is encouraged.

BASE DESIGN REQUIREMENTS

The physical model and written report should describe an International Phobos Base including the following structures:

- Habitation modules
- Recreation modules
- Landing and launch site
- Power sources
- Emergency plans
- Food production and storage module(s)
- Secondary mission support module(s)

DETERMINATION OF THE PHYSIOLOGICAL FACTORS

Design should take into consideration factors necessary for human comfort and existence. Keep in mind that Earth-based support must be within the project constraints. Provide written descriptions of the following areas and factor these areas into your design and describe how they will be maintained through the construction of your base:

- Air
- Food
- Water
- Location
- Waste
- Gravity
- Shielding
- Temperature
- Circadian Rhythm

PHOBOS BASE SOCIETY

Consideration needs to be given on how the International Phobos Base will operate as a society and evolve as the Phobos base is constructed. Provide written descriptions of the following:

- Personnel Qualifications
- Background of Culture
- Organization
- Job Assignments
- Art & Aesthetic Values
- Medical Care
- Recreation Module & Plan
- Communication & Language
- Personal Qualifications
- Organization
- Background of Culture
- Art & Aesthetic Values
- Medical Care
- Communication & Language
- Recreation Module & Plan

WRITTEN PRESENTATION

Write a 10-minute oral presentation. All written materials used to support your model must be made in hard copy. Your written presentation should address all aspects of both primary and secondary missions.

ORAL PRESENTATION (FINAL COMPETITION ONLY)

Two teams from each day of the preliminary competition will move on to the finals. The final six teams will be responsible for an oral presentation not to exceed 10 minutes.

GUIDELINES

ENTRY GUIDELINES

The contest is open to students in 5th-8th grade. Contest entries must consist of teams of 3-5 students. Coaches are free to enter as many teams as they choose. Members of past winning teams are ineligible. Submit contest application by Friday, November 24, 2017. All entries must include:

- One completed application per team
- One media release form per student signed by a parent or legal guardian
- One digital photo of each team
- One letter of commitment from each team (This letter may be brief, and should include a statement of team commitment and signatures from each participant)

CONTEST PRIZES

The six finalist teams will receive a team plaque commemorating their achievement. 30 teams will receive honorable mention awards given at the preliminaries (10 each day). Each participant will receive a t-shirt, certificate of achievement and commemorative program.

JUDGING

The preliminary competitions will take place over three days with each team presenting on one of these days. All teams will be scored by several panels of engineers from Honeywell.

Each team will be scored on a scale of 1-10 for the following areas:

- Physicality of model
- Creativity of model
- Technicality of model
- Organization
- Written report

In the event of a tie, the judges will be asked to rank the six finalists. The team with the greatest total score and highest rank will be the overall winner. All judges’ decisions are final.

The winning students will receive scholarships to the U.S. Space and Rocket Center Space Camp as well as an on-field appearance at the 2018-19 Fiesta Bowl in Glendale, Arizona. Airfare, lodging and meals are covered by the scholarship.