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Space Exploration Research Project
"The Merits of Space Exploration and Travel"
To MARS… or NOT!

Ordinary people with big ideas pitch their entrepreneurial prowess to a panel of money making investors in the pursuit of making a profit is the main premise of the hit Canadian television series called "Dragon's Den". It will be your job to "pitch" your idea about the merits of space travel in the hopes that someone with take a chance and invest in your idea. It will be up to you to investigate, research and present your ideas about space travel by exploring one of the topics listed below.

Even though your goal is to receive investments for your space exploration project, you need to acknowledge and identify the benefits and challenges associated with space exploration. Ultimately, you should have a clearer understanding of the positives and negatives of space exploration.

Project Overview:

Carefully, choose ONE partner (or you may work individually). You will be required to choose ONE of the topics below. Once you have chosen, you will not be able to switch topics. Thoroughly read through the topics to understand what you are required to do. Even though you are "pitching" an idea, you must understand the history and background of your topic. You can be extremely creative in your presentation – PowerPoint, video clips, simulations, models, posters, demonstrations… there are many ways to do a presentation. However, do keep in mind what you have learned in your language arts classes in regards to speech making.

Divide up the research work and presentation format evenly between you and your partner. It is important that each you have a thorough understanding of the topic. You will be assessed as a group on your research, work skills and presentation. However, you will be assessing each other's individual efforts. If your partner has not "pulled their weight" then that individual will only receive a percentage of the mark from the overall assessed grade. This gives you the opportunity to voice your concern about those who "ride the coat-tails" of others. It is possible that each partner will receive an entirely different mark based upon their work effort and their commitment to do a good job. Partner work can be difficult – there are leaders and then there are followers… it is up to you to make sure that you are all contributing equally to the project. Bring your strengths to the project **NOT** your weaknesses.

General Outcome 4:

The main goal is to learn from each of the group presentations. You need to make a conclusion surrounding the debate about the merits of space travel.

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Topics:

1. Design a Space Capsule (Problem Solving) (GO 2)

- research the history of rockets (use page 399 as a reference)
- what is a rocket – consider payload, exhaust velocity, staged rockets
- describe technologies for space transport – development of multi-staged rockets, space shuttles
- analyze space environments and recognize challenges that must be met in developing space technologies that must support life systems – gravity, temperature, availability of water, atmospheric pressure and atmospheric composition
- how would you design and build a space capsule
- what are all the key components needed to build a functioning space capsule
- using Problem Solving Investigation 5J – Design a Space Capsule on page 422 as a guide, construct a space capsule (as a group or individually) – this project is done on YOUR own time outside of school – discuss your results
- consider space shuttles of today – expense and cost
- should space travel continue…
- should "ordinary" people travel into space if they can afford the expense… eg. celebrities
- why should space travel continue

2. Build a Space Vehicle to Explore Mars (Problem Solving) (GO 1, 2)

- research and analyze the terrain and atmosphere on the planet Mars
- how will your need to design your space vehicle to withstand the terrain on the planet
- what types of technologies are needed for space transport analyze space environments and recognize challenges that must be met in developing space technologies that must support life systems – gravity, temperature, availability of water, atmospheric pressure and atmospheric composition
- create a model or design
- refer to simulated designs that have already been created
- how will you transport your vehicle to Mars
- what are the risks involved in space exploration
- expense and cost
- maintenance and communication systems
- purpose of space vehicle – how will it be used
- will your space vehicle have to support life
- benefits of the space vehicle
- should your project be funded

3. Design and Create a Mars Colony (Problem Solving) (GO 2)

- refer to page 417 and 416 as a guide for creating your Mars colony
- create a design and model for your space colony
- how would you have to maintain a stable ecosystem to support life on Mars
- analyze space environments and recognize challenges that must be met in developing space technologies that must support life systems – gravity, temperature, availability of water, atmospheric pressure and atmospheric composition
- describe technologies needed for life-support system and interpret the scientific principles on which they are based – investigate systems that involve the recycling of water and air
- how will the needs in space be met – medicines, fuel, wireless communication
- is there merit in creating a mars colony

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4. Effects of Space Travel (Decision Making) (GO 4)

- investigate the human needs for space travel and the effects on the body when living in space
- refer to Topic 8
- how are humans affected in space
- analyze space environments and recognize challenges that must be met in developing space technologies that must support life systems – gravity, temperature, availability of water, atmospheric pressure and atmospheric composition
- what is life like in space
- can humans live in space for long periods of time
- should astronauts live in space for long periods of time – purpose, goal, expense
- dangers and risks involved in space travel (space junk, equipment, radiation)

5. Create a Timeline of Space Travel (Research) (GO 4)

- research the history of space travel
- refer to Topic 8
- make reference to major space shuttle travel
- the risks involved
- successful and unsuccessful trips – lost lives
- purpose and goals of the trips (importance)
- should space travel continue – positives and negatives

6. Space Station (Research) (GO 4)

- what is the space station
- why/how was it created and developed – history of the space station
- life on the space station
- how is the space station designed
- what is its purpose
- life support systems
- analyze space environments and recognize challenges that must be met in developing space technologies that must support life systems – gravity, temperature, availability of water, atmospheric pressure and atmospheric composition
- what is life like in space
- can humans live in space for long periods of time – who has lived on the space shuttle for a long period of time – purpose of trip
- should astronauts live in space for long periods of time – purpose, goal, expense
- describe technologies needed for life-support system and interpret the scientific principles on which they are based – investigate systems that involve the recycling of water and air

7. Space Technologies (Research) (GO 2, 3)

- research the following space technologies
    1. Global Position Systems
        - Triangulation
    2. Communication Satellites – Low Earth orbit and Geosynchronous Orbit, Observing and Monitoring Satellites
    3. Hubble Space Telescope
- describe the who, what, where, when, why and how for each type of technology
- focus upon their importance – how have these technologies helped in the study of space exploration or how have they helped in the lives that we live today
- refer to Topics 6, 7 and 8 in textbook for a guideline
- does space research need to be continued to be funded

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8. Unmanned Satellites (Research) (GO 2)

- Research the following satellites
    1. Viking 1
    2. Viking 2
    3. Voyager 1
    4. Voyager 2
    5. Sputnick
    6. Rosetta
- Describe what these missions have accomplished and what they still hope to accomplish
- Date it was launched
- Details about the satellites destination
- Details about what the space craft will look like
- Draw a model of the solar system and indicate where each of these unmanned satellites is currently located.

9. Manned Flights (Research) (GO 4)

- Research all of the Apollo Missions and explain in detail the following:
    1. Was the mission successful? Why or why not?
    2. Were their lives lost?
    3. If the mission was successful, what new information did the mission bring back to NASA?
    4. What were the astronauts names on each mission
    5. What kind of space craft was the Apollo's? Draw or diagram an Apollo space craft.
    6. How did the astronauts space suits enable them to be able to walk on the moon without being harmed or endangered?
    7. Why did NASA stop the Apollo program?
    8. Are there any future missions to the moon?

10. Future Missions (Research, Problem Solving) (GO 3, 4)

- Research the following future missions:
    a. James Webb
    b. Orion
    c. Kepler (currently launched but has a long mission)
- Describe what these missions hoped to accomplish
- Dates the projects are set to launch
- Details about what the space craft will look like
- Design a prototype of what NASA is hoping to accomplish with the Orion missions. (Ie. What would it look like to colonize the moon?)
    a. This can be a model or a drawing but it should be very detailed.
    b. analyze space environments and recognize challenges that must be met in developing space technologies that must support life systems – gravity, temperature, availability of water, atmospheric pressure and atmospheric composition
    c. describe technologies needed for life-support system and interpret the scientific principles on which they are based – investigate systems that involve the recycling of water and air

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Other Concerns Associated with Space Travel

- cost of space exploration is high - USA is projecting to spend 600 billion in the next 10 years
- political, ethical and environmental issues arise - Who has the right to resources in space? Who owns space? Is it right to spend all that money on space exploration? Who is responsible for cleaning up space junk?
- politically and morally correct to spend billions of dollars on a space program when there are problems of poverty, hunger, pollution, disease
- living accommodations in space?
- resources in space?
- still competition between countries
- research of our universe