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***□ Astronomy compels the soul to look upwards and leads us from this world to another.***

Plato

# Why Explore Space?

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# Warm Up Questions

## CPS Questions (1-2)





# Chapter Overview

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- Why Explore Space?
- Assembling a Space Mission
- The Hazards for Spacecraft
- Making Space People-Friendly





# Lesson Overview

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- The Historical Benefits of Exploration
- The US Strategic Plan to Explore Space
- The Current Costs of Exploring Space
- The Practical Benefits of Space Exploration



# Quick Write

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What similarities do you see between the Lewis and Clark Expedition and space exploration? What differences?



# The Historical Benefits of Exploration



- Successful civilizations are often the most likely to undertake the dangers and costs of exploring strange lands
- Such civilizations sought access to distant riches
- Exploration led to increased knowledge and the development of new technologies







# How Knowledge Gained Through Exploration Has Enhanced Society



- Colonies and new nation-states
- Globalization
- Opened new worlds of possibility







# Historical Examples of Technological Advancements Through Exploration

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- Sailing techniques, shipbuilding, and navigation
- More-accurate maps of the world
- The marine clock and the portable watch
- New World food and plant products



# The US Strategic Plan to Explore Space



- On 14 January 2004, the President announced a new vision for American efforts in space
- A new spaceship to carry astronauts to other worlds: *Orion*
- A series of **robotic** missions to the Moon

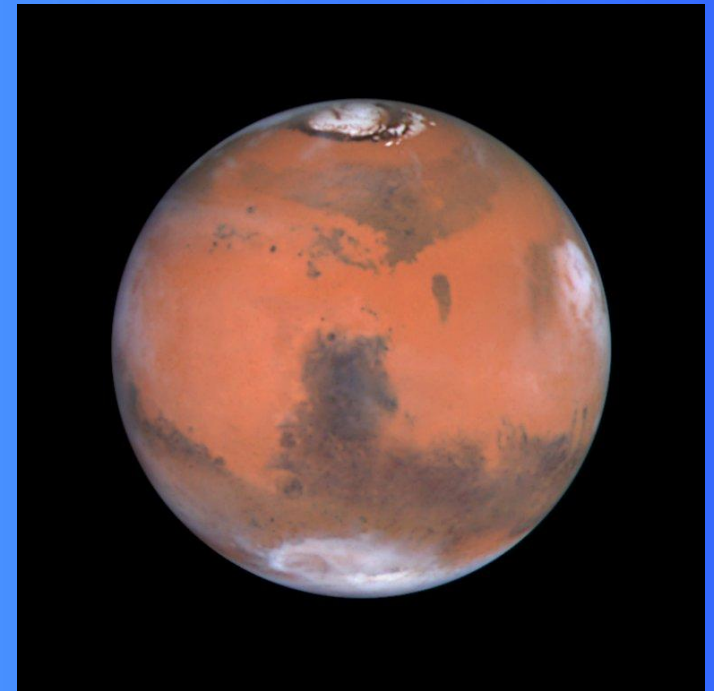




# The Long-Term Goal of Exploring Mars



- After the Moon, the plan calls for a manned mission to Mars
- Necessary technology is already available
- Determined mostly by NASA's **budget** – *a sum of money set aside to spend for a specific purpose*





# The Current Costs of Exploring Space

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- NASA's entire budget accounts for around six-tenths of one percent of the federal budget
- In 2009 recommendations for the US space program: increase NASA's budget by \$3 billion annually
- Current Budget-25.4 Billion



# How the International Space Station Will Advance Space Exploration



- Focus on understanding and overcoming the effects of space flight on human health
- This research will help make future space missions safer for astronauts



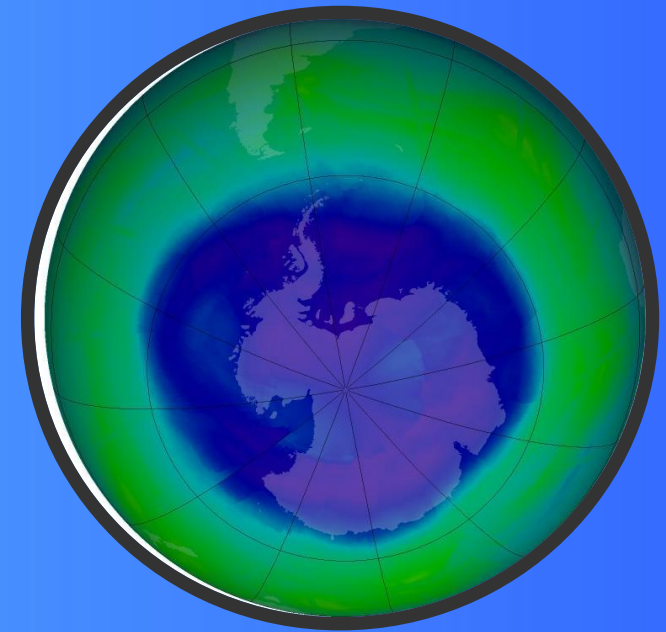




# Spending on Space Exploration Versus Other Spending



- Americans spend more on pet food than they do to explore outer space
- Space exploration is arguably more like an investment??
- Money spent on space tends to have lasting impacts







# The Practical Benefits of Space Exploration



- NASA “built” an establishment of space scientists
- Space exploration requires broad range of disciplines: Astrophysics, biology, physiology, chemistry, engineering, and planetary geology
- Without the space program, the United States would have far less scientific expertise





# How Science and Technology Fuel Economic Growth

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- Science and technology have always fueled economic growth
- Productivity growth leads to economic growth
- New technologies make whole new kinds of human activity possible



# How Space Exploration Has Led to Medical Breakthroughs



- Space science lifts Americans economically and is a boon as well to American health
- Important medical breakthroughs
- There's no telling what other benefits may arise from future space programs, since such discoveries often happen by chance





# Review

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- Exploration has led to increased knowledge and the development of new technologies that have strengthened the exploring nations
- NASA, along with private industry, is developing the new spacecraft named *Orion*
- After the Moon, the current plan calls for a manned mission to Mars
- Advocates of space exploration can point to important medical breakthroughs that have been byproducts of NASA



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# Learning Check

## CPS Questions (3-4)



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# Review Questions

## CPS Questions (5-6)







# Summary

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- The Historical Benefits of Exploration
- The US Strategic Plan to Explore Space
- The Current Costs of Exploring Space
- The Practical Benefits of Space Exploration



# Next...



- Done – Why Explore Space?
- Next – Assembling a Space Mission





# Hubble Telescope





# □ Hubble Images



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- <https://esahubble.org/images/archive/top100/>

