SPACE EXPLORATION

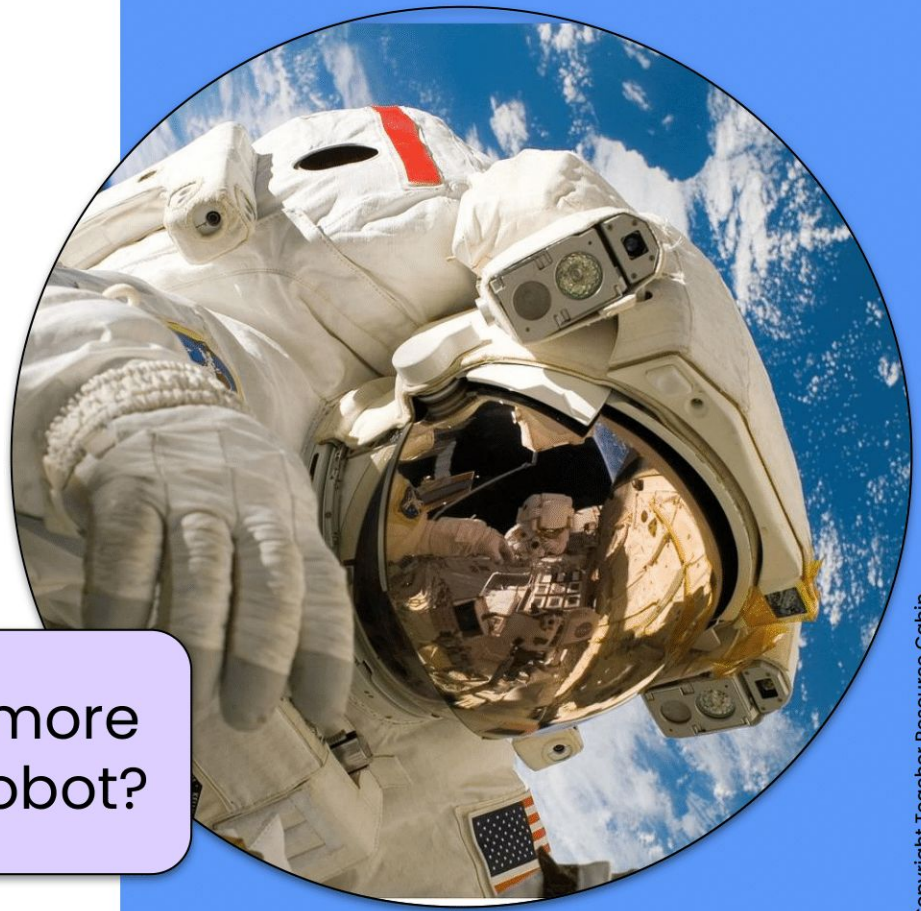
SPACE EXPLORATION

- Space exploration is a **very** costly endeavour.

Millions of dollars to send a robot to space.

Billions of dollars to send an astronaut to space!

Why do you think it costs more to send a human than a robot?



SPACE EXPLORATION BENEFITS

Economy and Jobs

- Space programs result in many job opportunities.
- People rely on these jobs to earn their living.
- Global space economy is worth ~$424 billion

Satellites

- Space exploration has led to the creation and use of satellites.

SPACE EXPLORATION BENEFITS

Action Against Climate Change

- ✓ Satellites take images that can be used to monitor the status of climate change.

Scientific Advancement

- ✓ Space exploration generates new scientific knowledge.
- ✓ The scientific findings through space exploration have benefitted:
  - Computer technology
  - Medical equipment
  - Electronics

SPACE EXPLORATION COSTS

Financial Costs

✗ Some people are concerned that the exploration of space results in excessive spending.

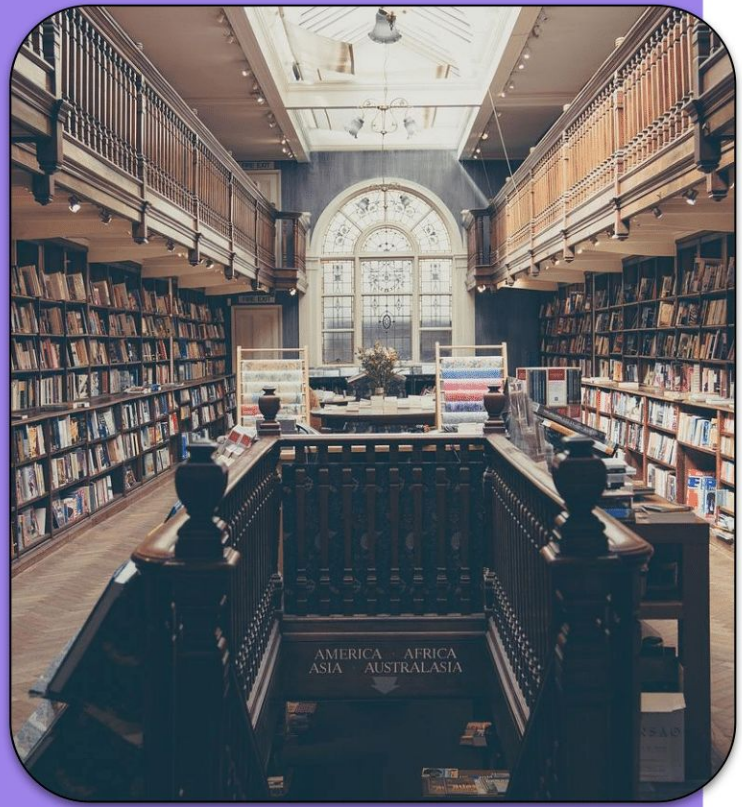
Why do you think space exploration is such a costly endeavor? What costs are involved?

SPACE EXPLORATION COSTS

Environmental Impacts

- Environmentalists are concerned about the impact of space exploration on the Earth.
- Since 1964, there have been over nine spacecraft or satellite failures that contained radioactive materials.
- When a rocket is launched into space, harmful gases are released into the atmosphere.
- Space launches release a lot of soot which contributes to ozone depletion and climate change.

SPACE EXPLORATION COSTS



Competition for Funding

- There is a limited amount of money that can be spent on public funding (e.g. healthcare or education).
- People argue that the money spent on space exploration could be better spent on other issues.

Think about it!

Compare the benefits and costs of space exploration in the chart below.

Benefits 	Costs 

? ? ?

Do you think space exploration is worth the cost?

Why or why not?

Think about it!

Research a recent innovation in space technology.
Explain the technology and attach an image below.

Insert image here!

Technology:

Explanation:

SPACE SURVIVAL

- Living in space is quite different from living on Earth.

- On Earth, our bodies need to resist the **force of gravity**.
    - This resistance helps to ensure that our bones and muscles stay strong and healthy.

SPACE SURVIVAL

- Outer space has v**ery little gravity**.
- An astronaut's body can become very **weak** and **frail**.

What do you think astronauts can do to stay healthy while in space?

SPACE SURVIVAL

- The International Space Station has an **exercise bike,** a **treadmill** and a **weightlifting machine** so astronauts can stay strong.

How does this gym equipment look different on the ISS than it does on Earth?

SPACE SURVIVAL

- On the ISS, astronauts do not have access to sinks or bathtubs.
  - Astronauts spit into a cloth after brushing their teeth.
  - Stay clean by using a special soap bar that does not require water to rinse

- Astronauts need **special toilets** that include a vacuum and a seatbelt.

SPACE SURVIVAL

- The International Space Station has about 300 different types of foods.

- The low gravity levels can make drinking difficult.
  - Astronauts must use **straws** to keep their drinks in a sealed container.

Think about it!

Is it true or false? Click and drag the T/F boxes.

The moon is visible from Earth because it emits light.	
The first four planets are gas giants.	
Earth is a gas giant planet.	
The Sun emits light and is not considered a planet.	
Mass is always consistent, regardless of position in space.	
Our Solar System is located in the Milky Way Galaxy.	
The first animal to orbit Earth was a dog.	

T

F