

Is space exploration a waste of money?

Level: Advanced

Time: 90 minutes +

Summary: In this lesson, two experts offer their opinions on whether the enormous sums of money government agencies spend on space exploration are good investments to safeguard the future of mankind or a waste of time and money. Students:

1. complete a space quiz;
2. read one of two articles about space exploration;
3. conduct an information exchange with a student who read the other article;
4. discuss whether they feel space exploration is worthwhile;
5. research some inventions prompted by space exploration.

Materials: One copy of the worksheet per student

Group size: Two or more

Note: This lesson plan is for both pre-experience and in-work business students based on an original article first published in *Business Spotlight* issue 1/2019.

Warmer

Students do the quiz in pairs and then check their answers to find out who the class 'space experts' are.

Key:

1. *Apollo II*
2. *InSight*
3. *the far (or 'dark') side of the moon*
4. 1. *Mercury*; 2. *Venus*; 3. *Earth*; 4. *Mars*; 5. *Jupiter*;
6. *Saturn*; 7. *Uranus*; 8. *Neptune*. (Note: *Pluto* is not included because it is now considered to be a dwarf planet.)

Key words

Divide the students into two groups, A and B. Give students in group A the 'Yes!' article, and students in group B the 'No!' article. Students in each group should

read their article and find their half of the key words in task 2. The definitions are given in the order that the words appear in the article. Students can hear how to pronounce the words as well as see them in example sentences at www.macmillandictionary.com.

Key:

Article A

1. *cumulative*
2. *obscenely*
3. *abstruse*
4. *nihilistic*
5. *vastness*
6. *infinity*
7. *endurance*
8. *junk*
9. *disgraceful*
10. *misguided*

Article B

1. *origins*
2. *mindset*
3. *mission*
4. *prohibitive*
5. *colonizing*
6. *mitigate*
7. *disruptive*
8. *dwarfs*
9. *vice versa*
10. *inspire*

Expressions

Students use the words to make two expressions and find them in their article to read them in context.

Encourage students to use the expressions in sentences of their own, both about the article and another topic.

Key:

Group A

1. *the be-all and end-all*
2. *scrape the surface*

Group B

1. *in terms of*
2. *return on investment*

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Information sharing

Students first work with someone who read the same article as them, and together they should make a note of all the arguments the author makes as well as the monetary figures specified. Then they pair up with someone who read the other article, sharing the information from their articles by explaining to their partner the points that the authors make. Next they discuss the two authors' opinions, which of the two they think presents the most convincing argument and how they do this – paying particular attention to the authors' choice of vocabulary. At this point, they could also talk about the key words from both articles and look again at how they were used in context.

Discussion

Students talk in pairs or small groups about how they feel about space exploration and also about where, in particular, they think money should be invested in exploration and research, for example discovering more about our oceans or searching for distant habitable planets.

Research and presentation

Students research and present their findings on Velcro and non-stick pans and the connection these have with space exploration. Alternatively (or additionally), they could research and talk about NASA's recent missions.

Related topics on onestopenglish

The following set of news lessons is about the iconic image 'Earthrise', taken aboard Apollo 8.

www.onestopenglish.com/skills/news-lessons/weekly-topical-news-lessons/2019-weekly-news-lessons-archive/14th-february-2019-earthrise-how-the-iconic-image-changed-the-world/557143.article

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1 Warmer

Answer the questions.

1. What is the name of the first space mission that landed on the moon in 1969?
2. What is the name of NASA's probe that sent back images of Mars in November, 2018?
3. Where did China's Chang'e 4 probe make a historic touchdown in January, 2019?
4. Number the planets below 1–8 (with number 1 as the planet closest to the Sun and number 8 the furthest away from the Sun).

_____ Earth	_____ Mars	_____ Saturn	_____ Neptune
_____ Venus	_____ Mercury	_____ Uranus	_____ Jupiter

2 Key words

Write the key words next to the definitions. Then, find them in your article to read them in context.

Group A

abstruse	cumulative	disgraceful	endurance	infinity
junk	misguided	nihilistic	obscenely	vastness

1. increasing gradually as a result of more and more additions _____
2. extremely, especially in a way that makes you angry _____
3. hard to understand and very complicated _____
4. the belief that nothing in life has any importance or value _____
5. the fact that something is extremely large _____
6. something that has no end or limits _____
7. the ability to continue doing something physically difficult or continue dealing with an unpleasant situation for a long time _____
8. old, broken or useless things _____
9. extremely bad or shocking, especially used to describe something that you do not approve of _____
10. of an action that is based on judgments or opinions that are wrong _____

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Group B

colonizing disruptive dwarfs inspire mindset
mission mitigate origins prohibitive vice versa

1. the places or moments where something begins to exist _____
2. a way of thinking about things _____
3. a flight into space _____
4. too expensive to afford _____
5. sending people somewhere so they can live there and take control of the place _____
6. reduce the harmful effects of something _____
7. causing difficulties that interrupt something or prevent it from continuing _____
8. makes something seem small or unimportant _____
9. the opposite of what has been said _____
10. give someone the enthusiasm to do something _____

Is space exploration a waste of money?

Is space exploration a waste of money? Yes! Article A



Stars and planets have fascinated people since ancient times. But while some people think space exploration is a huge waste of money, others see it as a necessary measure for the survival of humankind. Here, Julian Earwaker passes on both opinions.

Yes!

**“There is an infinity of unexplored things here on earth”
– Robin Hanbury-Tenison**

1 NASA’s cumulative funding a few years ago totalled \$850 billion, and the annual budget now is around \$20 billion – an obscenely large sum of money linked to fairly abstruse research. I disagree with people like Stephen Hawking, who was passionate about the future of the human race and civilization depending on going into outer space. It is a kind of despair. It means that we have given up on this planet, handled things so badly that we have to find another planet to live on. That seems like a nihilistic approach to life because this planet is quite extraordinary, possibly unique in the universe.

2 There is a greater infinity of small things here on Earth than there is in the vastness of outer space. A cubic centimetre of soil contains a virtual infinity of life. These are real things that are not just interesting in themselves but also have a significant effect on our own lives. Microbes in your large intestine affect

your mood, and we know very little about how that happens. There is an infinity of unexplored things here on Earth. Yet the amount of money spent on that sort of research is insignificant compared to the \$850 billion spent on exploring the universe.

3 Scientific advances and products can’t justify the costs of space exploration. Velcro, the non-stick frying pan, rocket fuel? Helpful but hardly the be-all and end-all of life. Sending a body into outer space to test the limits of human endurance is interesting, but it’s hard to believe the future of mankind depends on it, whereas finding out how to stop this planet falling apart and to live more sustainably certainly is. Understanding the symbiotic relationships that hold the planet together is a whole universe of studies that we’re only scraping the surface of.

4 There’s a lot of concern about the amount of junk flying around in outer space, but it’s of much less importance than the immense amount of junk we’re polluting this planet with. Would we be any poorer if we didn’t know what was happening on Mars? It would be more exciting to spend that money on cleaning up the oceans and on developing the science of weather management. Instead, we are seeing investment in space travel and tourism. Who wants to go and sit in a capsule out in space? It’s like being on a fairground ride. It’s a pretty disgraceful example of humanity’s misguided priorities.

ROBIN HANBURY-TENISON is an explorer, author and farmer living in Cornwall.

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Is space exploration a waste of money?

Is space exploration a waste of money? No! Article B



Stars and planets have fascinated people since ancient times. But while some people think space exploration is a huge waste of money, others see it as a necessary measure for the survival of humankind. Here, Julian Earwaker passes on both opinions.

No!

“It’s always a good thing to inspire people” –
Massimiliano Vasile

1 There’s a philosophical argument not just for space exploration but for every single thing we do that has no obvious economic return. You cannot measure everything that humans do in terms of economics. What’s the money value, for example, of classifying insects or studying history? It’s how human beings improve themselves. We explore space to understand more about the origins of life on Earth, for example through the study of asteroids and comets. Increasing human understanding of how the universe works changes our mindset, our culture; it changes our understanding of our world in our lifetime.

2 The cost of space exploration appears to be expensive, but compared to other activities, it is not. To hear that a mission costs €400 million sounds prohibitive. But it is nothing compared to what we spend on watching live Champions

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League football on TV! We spend billions and billions each year on arms deals and weapons to support wars around the world. So let’s look at the return on investment not in terms of money but in terms of what we learn from it. You see immediately that space exploration represents good value.

3 There are bigger priorities than the science-fiction aspects of colonizing Mars or going to other galaxies. For example, if you know more about the Sun, you can perhaps mitigate the effect of solar storms, which can be very disruptive for a lot of electronics on Earth. Many of the essential services for life today, from telecommunications, to navigation systems, to weather forecasts, are affected by the activity of the Sun.

4 Of course, we should spend time and money saving our planet. But spending on renewable energies already dwarfs spending on space exploration. Space technology leads to progress in many other fields. Power generation and storage systems in space need to be very light, efficient and long-lasting. Many technological developments for space are very useful on Earth and vice versa. To stop space exploration would mean missing a piece of the overall advancement of science and technology. We have lots of examples from space programmes of increasing our knowledge – and of people deciding to research scientific side subjects. It’s always a good thing to inspire people.

MASSIMILIANO VASILE is professor of space systems engineering at the Strathclyde University Space Institute, Glasgow.

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3 Expressions

- a. Use the words below to make two expressions from your article. Write them next to their meanings.
- b. Find and underline the expressions in the article and then use them in sentences of your own.

Group A

be and scrape the the all all end surface

1. _____
the most important thing
2. _____
deal with only the simple or obvious parts of something

Group B

of in on investment terms return

1. _____
used for saying which aspects of something you are considering or including
2. _____
used to describe the profit you get from an activity, compared with the amount of money put into it

4 Information sharing

- a. Write the arguments from your article in the relevant box. Add a short explanation for each of the monetary sums the writer gives.

Yes! article	No! article

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- b. Talk to someone who read the other article. Exchange information, and fill the other box.
- c. Discuss the two authors' opinions, say who you think makes the strongest case and decide what part of his argument most convinced you.

5 Discussion

Describe how you feel about space exploration and missions, in particular, the money spent on them, the research time put into them and the benefits they can (or could) bring to humankind.

Which parts of ...

- space
- planet Earth

do you think we should invest more time and money exploring?

6 Research and presentation

Find out more about the inventions mentioned in paragraph 3 of article A. What is their connection with space exploration?

Read more about NASA's recent missions: www.nasa.gov