



## Water on the moon

Level B1

3 Dicembre 2020

"We are all in the gutter but some of us are looking at the stars." What Oscar Wilde meant with these words is that while we all face difficulties in life, some people choose to focus on their goals and aspirations instead. In dark times it is essential to remain positive, to engage in something hopeful, beautiful, or stimulating. A group who has been "looking at the stars" both metaphorically and literally for decades are the people at NASA. Since its founding in 1958, NASA has been advancing scientific knowledge and our understanding of the Earth and the cosmos. Its latest discovery, announced a few weeks ago, was obtained by SOFIA (Stratospheric Observatory for Infrared Astronomy), a very unusual telescope. SOFIA was not built on the ground, but rather in a Boeing 747.



### Going back to the moon

The Earth's atmosphere makes looking at the sky difficult: there are clouds, light pollution, and the air 'blurs' the light coming from the stars. SOFIA can overcome these problems because it flies above the denser, lower atmosphere where it can get a better look at the cosmos. And this is what it has discovered: there's water on the Moon, in the form of ice. This is great news for future astronauts. Last year NASA presented its Artemis Program, which plans to send a mission to the Moon in 2028 and establish a base there in the 2030s. Japan and China also want to send people to the Moon in the coming years. Even the private enterprises Blue Origin and Space X are planning lunar bases. SOFIA's discovery is great news for these missions because astronauts will be able to drink 'lunar' water instead of bringing water supplies from Earth. Sending stuff into space is expensive – sending a half-litre water bottle, for example, can cost between \$9,000 and \$44,000!

### Is this money well spent?

The world is full of problems and is currently facing a global pandemic, so why spend so much effort and money on space exploration? This is a legitimate question, but the same could be asked of other human activities. Every year, for example, the United States spends around \$600 billion on the military. In contrast, the money given to NASA is only \$22 billion. (It is estimated that with \$600 billion NASA could build 4 colonies on Mars.) Several studies show that the more a country invests in science and technology the higher its human development index, a statistic that measures the health and prosperity of its people. Money spent on science provides a good return (think, for example, of the money currently being spent on finding a Covid vaccine). Regarding the Moon, scientists believe that our satellite is like "a museum of the history of the Solar System". We can learn many things if we visit it, including, they believe, the answer to how life began here on Earth.

## Pale Blue Dot

Astronomy also helps us reflect on who we are. When Nicolaus Copernicus said the Earth was not at the centre of the Universe, he triggered a revolution that changed the world. Our planet is a tiny speck in the vastness of the cosmos. In 1990 the Voyager space probe (sent into space by NASA in 1977 to explore the Solar System) proved this when it took a picture of our planet. Voyager was so far away that, in the photo, the Earth was smaller than a pixel, a tiny bright spot against the darkness of space. The photo was named 'Pale Blue Dot'. Astronomer Carl Sagan wrote: "Look again at that dot. That's here. That's home. That's us. On it, everyone you love, everyone you know, everyone you ever heard of, every human being who ever was, lived out their lives." Sagan then reflects on how stupid our divisions are when seen from such a distance: "Think of the rivers of blood spilled by all those generals and emperors so that [...] they could become the momentary masters of a fraction of a dot." On the contrary, he concludes, we have a responsibility "to deal more kindly with one another, and to preserve and cherish the pale blue dot, the only home we've ever known."

### USEFUL LINKS

1) What does SOFIA look like? Learn more about SOFIA and its discovery in this video:

[https://www.youtube.com/watch?v=U70y8ypCbyA&feature=emb\\_logo](https://www.youtube.com/watch?v=U70y8ypCbyA&feature=emb_logo) [[https://www.youtube.com/watch?v=U70y8ypCbyA&feature=emb\\_logo](https://www.youtube.com/watch?v=U70y8ypCbyA&feature=emb_logo)]

2) You can read NASA's press release here:

<https://www.nasa.gov/press-release/nasa-s-sofia-discovers-water-on-sunlit-surface-of-moon/#:~:text=Data%20from%20this%20location%20reveal,spread%20across%20the%20lunar%20surface> [<https://www.nasa.gov/press-release/nasa-s-sofia-discovers-water-on-sunlit-surface-of-moon/#:~:text=Data%20from%20this%20location%20reveal,spread%20across%20the%20lunar%20surface>].

3) Look at the 'Pale Blue Dot' photo...

[https://en.wikipedia.org/wiki/Pale\\_Blue\\_Dot](https://en.wikipedia.org/wiki/Pale_Blue_Dot) [[https://en.wikipedia.org/wiki/Pale\\_Blue\\_Dot](https://en.wikipedia.org/wiki/Pale_Blue_Dot)]

... and listen to Carl Sagan's thoughts on it here:

<https://www.youtube.com/watch?v=wupToqz1e2g> [<https://www.youtube.com/watch?v=wupToqz1e2g>]

4) Why is everybody going back to the Moon? Find out here:

<https://www.theguardian.com/science/2019/jul/06/everyones-going-to-the-moon-again-apollo-11-50th-anniversary> [<https://www.theguardian.com/science/2019/jul/06/everyones-going-to-the-moon-again-apollo-11-50th-anniversary>]

5) What incredible things could science and technology do with \$600 billion?

<https://www.forbes.com/sites/startswithabang/2017/11/01/5-incredible-advances-science-could-buy-with-the-governments-600b-military-budget/?sh=5d2ef380902f> [<https://www.forbes.com/sites/startswithabang/2017/11/01/5-incredible-advances-science-could-buy-with-the-governments-600b-military-budget/?sh=5d2ef380902f>]

6) Interested in the Artemis Program? You can learn about it here:

<https://www.nasa.gov/specials/artemis/> [<https://www.nasa.gov/specials/artemis/>]

### COMPREHENSION

**1) Read the article and cross out the WRONG alternative (two answers are correct and one is incorrect).**

1. Oscar Wilde said that, when faced with adversity,

- a. we all follow our dreams.
- b. some of us fail to think positively.
- c. some people keep their eyes on their dreams.

2. NASA's SOFIA

- a. is not an ordinary telescope.
- b. was built in 1958 to study the cosmos.
- c. can fly because it was built on a plane.

3. SOFIA can see the stars

- a. better than a telescope on the ground.
- b. without the problems caused by the Earth's atmosphere.

- c. even through clouds.
- 4. SOFIA discovered
  - a. something useful for future astronauts.
  - b. ice on the Moon.
  - c. liquid water on the Moon.
- 5. In the near future, on the Moon, there will be
  - a. bases built by private enterprises.
  - b. a joint American-Chinese base.
  - c. astronauts from different countries.
- 6. NASA receives
  - a. far less money than the military.
  - b. enough money to build 4 colonies on Mars.
  - c. enough money for the Artemis Program.
- 7. It's important to invest in science and technology because
  - a. it's not expensive.
  - b. you get something good back.
  - c. it makes people healthier and more prosperous.
- 8. Scientists want to go to the Moon because they want
  - a. to raise the human development index.
  - b. to learn things about our Solar System.
  - c. to discover how life began on Earth.
- 9. Carl Sagan wants us to consider that
  - a. all of our history took place within a tiny dot floating in space.
  - b. planet Earth is our only home.
  - c. Earth's size is less than a pixel.
- 10. Carl Sagan believed that the 'Pale Blue Dot' picture told us that
  - a. our world is precious.
  - b. we and our world are insignificant.
  - c. it makes no sense to fight each other.

## VOCABULARY

**2) Complete the sentences with the following words. Put the verbs and nouns in the right form, if necessary.**

to face \* gutter \* to engage \* to blur \* to establish \* supply \* enterprise \* to trigger \* space probe \* to cherish

1. A \_\_\_\_\_ is a robotic spacecraft sent into deep space.
2. An \_\_\_\_\_ can be a project, or a business. It's also the name of Star Trek's spaceship!
3. The Moon looked like a vague white disk when the fog \_\_\_\_\_ its light.
4. Elon Musk created Space X. He \_\_\_\_\_ it in 2002.
5. He visited NASA last year. He \_\_\_\_\_ a souvenir he bought there as if it was a piece of gold!
6. She has a passion for astronomy; it's a hobby that really \_\_\_\_\_ her interest.
7. It was his remark that \_\_\_\_\_ the argument. Just imagine, he told the NASA astronaut that the Earth is flat!
8. All the rainwater ends up in the \_\_\_\_\_ along the side of the road.
9. Water, sandwiches, snack bars, fruit – I think we have more than enough food \_\_\_\_\_ for our trek in the forest.
10. If somebody tells you to '\_\_\_\_\_ the music', she means that you have to be strong and confront a certain unpleasant situation.

## GRAMMAR - Future forms (present simple, present continuous, will, shall, be going to)

**3) Complete the sentences with the correct future form.**

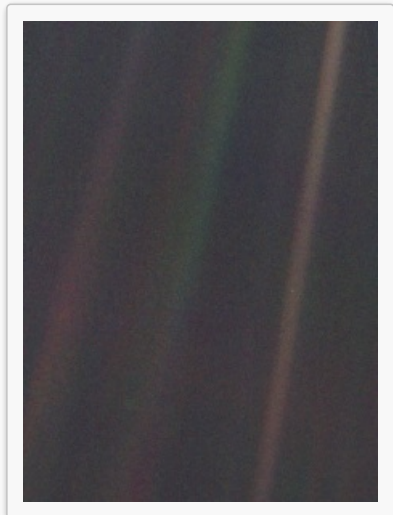
1. *Shall / Will* we watch the documentary on NASA?
2. The astronauts *are having / shall have* their medical check-up today.
3. "I *am going to leave / 'm leaving* for the moon tomorrow," said the astronaut.
4. The rocket to the moon *leaves / will leave* tomorrow, at 7 a.m.
5. The astronauts *have / will have* a safe journey, I am sure.
6. Okay, I *'ll come / come* with you to the observatory tonight.
7. Unfortunately, it's cloudy – I think we *shall not see / are not going to see* a single star!
8. If you like, I *'ll lend / 'm lending* you my telescope.
9. I'll tell you as soon as I *see / shall see* the Moon.
10. I *'m going to become / will become* an astronaut! That's my goal.

### SHORT ESSAY

**4) Using future forms, imagine you're an astronaut on a trip to the Moon. How will you get there? What will you do when you land? What do you think you will find? (60-80 words)**

**4) Do you think the \$22 billion spent on space exploration is money well spent? What about the \$600 billion spent on the military? Would you spend all this money differently? (60-80 words)**

**5) Look at the 'Pale Blue Dot' picture. Can you see Earth? What are your thoughts and impressions? (60-80 words)**



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(Carlo Dellonte)

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