Life on other planets

Topic: Space exploration to find habitable planets

Aims:

- To help students understand a text about space exploration
- To develop students' vocabulary on the topic of astronomy and space exploration
- To develop students' communication and discussion skills

Level: low to mid Intermediate

Introduction
This lesson looks at recent developments in the search for habitable planets and opens up the topic of the possibility of life on other planets.

Procedure

- Ask students if they know the names of the planets in our solar system. They could shout them out or discuss the names in pairs.
- Hand out the worksheet and have students put the planets on order in **Worksheet Task 1** in pairs. Point out that the clue is a mnemonic. The first letter of each word represents a planet - in the correct order. You could quickly drill the planet names now. Ask students what they know about Pluto (it's been reclassified as a dwarf planet or 'plutoid').

Answers: The eight planets that orbit the sun are (in order from the sun): Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus, Neptune. Another large body is Pluto, now classified as a dwarf planet or plutoid.

Worksheet Task 1
These are the planets that orbit the sun:

Earth Jupiter Mars Mercury Neptune (Pluto) Saturn Uranus Venus

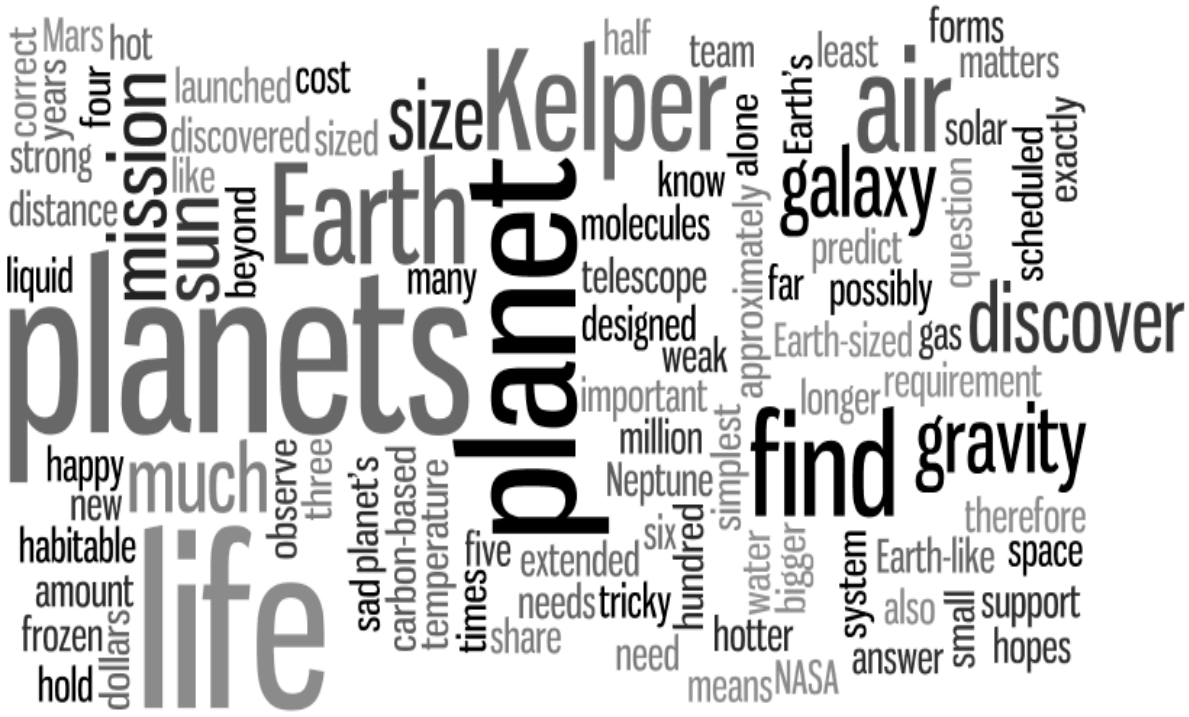
Can you put the planets in order? Here's a clue: My Very Excellent Mother Just Sent Us Nine Pizzas

- Have students look at the word cloud in **Worksheet Task 2** and underline the planets (there are 3 – Earth, Neptune and Mars).
- Tell the students that all these words are from a text that they are going to read later. Ask students to circle the largest words (these are the ones that occur most frequently in the text). If they ask about the meaning of 'Kelper' here you could ask them to guess what it is (it's the name of a telescope and space mission as well as a person).

- In pairs students complete the sentence 'I think the text is about…' with their ideas. Write up the different ideas/predictions on the board to refer to later.
- If you have Internet connection and a projector you can display the word cloud on the screen: http://www.wordle.net/show/wrdl/1893302/Untitled

Worksheet Task 2
Look at the word cloud. The words are from a text. Circle the biggest words then complete this sentence:

I think the text is about .....
.....



The word cloud was created here: http://www.wordle.net/

- Give students a time limit of 2 minutes to read the text in **Worksheet Task 3** (they'll read it again in more depth later) and check whether any of the predictions on the board were correct.

Worksheet Task 3
Now read the text. Was your prediction in Task 2 correct?

How many planets are there in our galaxy? That's a **tricky** question to answer. Are there other planets that support life? That's exactly what the Kelper mission hopes to discover.

NASA launched the Kelper space telescope, designed to find habitable planets, in 2009. So far it has discovered five new Earth-sized planets beyond our solar system. These planets are hotter than the Earth – much too hot for life as we know it. The Kelper team predict that they will need **at least three** years (and possibly longer) to find an Earth-like planet.

The simplest requirement for a planet to have life (carbon-based life like on Earth) is for there to be liquid water (not frozen or gas) so the distance from the planet's sun and therefore temperature are important. There also needs to be the correct amount of air. If a planet is as small as Mars (half the size of Earth) its **weak** gravity means that it can't hold on to air molecules. If a planet is Neptune sized (four times bigger than Earth) it has very strong gravity and too much air. So **size** matters too.

The cost of the mission is approximately six hundred million dollars. It is scheduled to observe until 2013 but this could be extended. Will we be sad if we discover we are **alone** in our galaxy or happy if we find that we share it with other life forms?

Glossary
tricky – difficult
at least three - three or more
weak – the opposite of strong
size – dimension, if a thing is big or small
alone – with no other people

- Ask students to do the matching activity in **Worksheet Task 4** and then compare answers with a partner.

Answers: 1d, 2a, 3f, 4b, 5b, 6e

Worksheet Task 4
Read and match 1-6 with a-e to make sentences about the text.

1 The Kelper space telescope	a) are not in our solar system.
2 Kelper has found five planets that	b) will not have enough air.
3 A planet can support life if it	c) will have too much air.
4 A very small planet	d) is looking for life on other planets.
5 An extremely big planet	e) about $600 million.
6 The Kelper mission will cost	f) has water and air.

- Ask students to find and underline the numbers in the text in **Worksheet Task 5.** Have students cover the text and then try to remember what the numbers refer to. They could do this in pairs or you could do it as a class activity with the numbers written on the board. Allow the students to have a sneaky look at the text if necessary. Students check their answers by looking back at the text.

Answers:
2009 - This is the year that NASA launched the Kelper space telescope
5 – The Kelper telescope has discovered five new Earth-sized planets beyond our solar system
3 – the number of years that the Kelper team predict that they need to find an Earth-like planet
½ - Mars is half the size of Earth
4 - Neptune is four times bigger than Earth
600 000000 – The cost of the mission in dollars
2013 –The mission is scheduled to observe until 2013

Worksheet Task 5
A) Underline these numbers in the text:

2009 - *This is the year that*……..
5 - ……
3 - ……
½ - ……
4 - ……
600 000000 - ……
2013 - ……

B) Cover the text. Work with a partner and try to remember what the numbers refer to. Make notes then look at the text to check.

- Ask students the question in the last paragraph of the text 'Will we be sad if we discover we are alone in our galaxy or happy if we find that we share it with other life forms?' as a lead in to the discussion in **Worksheet Task 6.** Students can then discuss the question in pairs or

small groups. You could give them a few minutes to make notes of what they want to say before they speak. Circulate around the room and make notes of any common errors and pronunciation problems for class correction later. Also note any particularly good use of language you hear, put this on the board at the end of the activity and draw students' attention to it. Ask a few students to report their discussions back to the class.

Worksheet Task 6
Discuss these questions with a partner:

Do you think the Kelper mission will find life on other planets?
What other things do you know about space exploration?
Is it a good idea to spend $600 million on space exploration?
Why do you think NASA wants to find habitable planets?

- Ask students why they think that NASA (an imaginary NASA!) has chosen the items in **Worksheet Task 7** to represent Earth for the new planet. In pairs have students add more items to the list. Put pairs in groups of 4 and ask them to justify their choices. Monitor and note common errors and 'good ' language for feedback to the class as above.

Worksheet Task 7
Imagine that the Kelper mission finds life on a distant planet. NASA wants to send some objects representing Earth to the new planet. Add more items to NASA's list of objects:

an encyclopaedia
a computer
photographs of world leaders
a bottle of sea water
…….
……..
…….
……..

- If you want to draw students' attention to language in the text (for example before a grammar focus exercise) you could have them underline examples of:
  Comparisons - *hotter than, as small as, bigger than*
  Enough, too much - *not have enough air, too much air.*
  Conditionals - *Will we be sad if we discover….*

  Find out more about Kepler here. *http://kepler.nasa.gov/*