

JAF01 Lesson 10 The Universe

I. Discuss in pairs:

1. Are you interested in the universe? If yes, what would you like to know about it?
2. Do you know about any recent discoveries in astronomy? What are researchers currently focusing on?
3. What do you think the edge of the universe looks like?
4. What is the shape and colour of the universe?
5. How did the universe start?
6. What three adjectives would you use to describe the universe?
7. Read the quotations below. Which do you like best and why?

Dyer said: "Everything is perfect in the universe."

Einstein said: "Two things are infinite: the universe and human stupidity; and I'm not sure about the universe."

Stephen Hawking said: "We are just an advanced breed of monkeys on a minor planet of a very average star. But we can understand the Universe. That makes us something very special."

II. The planets

Read the text and fill in the gaps with suitable words.

The planets are usually divided into two groups: the inner planets and the outer planets. Inner planets are sometimes called the _____ planets and include Mercury, Venus, Earth and Mars. They are the ones _____ to the Sun, they have rocky _____ and are all relatively small. The outer planets, Jupiter, Saturn, Uranus and Neptune, are giant planets and are often called the gas planets. They consist mainly of the gases of hydrogen, helium and methane. However, these planets are so _____ that the gases are compressed to a liquid or solid state. The two groups of planets are separated by hundreds of thousands of tiny chunks of metallic rock called asteroids. They _____ the Sun between Mars and Jupiter in what is called the asteroid belt. There are so many asteroids that there is always a _____ of collision for passing aircraft. Most planets have a _____ of gas, called an atmosphere, covering them. The inner planets have a relatively _____ atmosphere, while the gas planets have a much thicker atmosphere. Earth's atmosphere is a _____ of nitrogen and oxygen and smaller amounts of carbon dioxide and water vapour. Jupiter's thick atmosphere, on the other hand, consists mainly of hydrogen and helium. The gases in the atmosphere are held close to a planet by its _____. On a large planet like Jupiter, the lightest gases are held in the atmosphere. On Earth, however, these gases escape into _____. Mercury is so _____ and hot that it has no atmosphere at all.

(the text adapted from Kelly, K. *Science*. Macmillan, 2008)

III. Match terms with their definitions

1. Astronomy
 2. Solar system
 3. Geocentric model
 4. Astronomical unit
 5. Prograde motion
 6. Retrograde motion
 7. Conjunction
 8. Rotation
 9. Revolution
 10. Foucault pendulum
 11. Solar nebula
- a) Counterclockwise revolution around the Sun
 - b) Spinning on an internal axis
 - c) Proves that the Earth rotates
 - d) Considers the Earth to be the centre of the universe
 - e) Planetary clockwise rotation
 - f) The study of the totality of all matter, energy, space, and time
 - g) A flattened, rotating disk of gas and dust
 - h) Contains 8 planets
 - i) Average distance between the Earth and the Sun
 - j) Two planets lined up on the same side of the Sun
 - k) Movement of one object around another
- (Shipman, Wilson, Todd. *An Introduction to Physical Science*. Houghton Mifflin:2006)

IV. Video: Planets explained

<http://www.videojug.com/film/the-planets-explained?sourcelink=verticalrecommendation>

Listen and answer the questions:

1. What are the dark areas on the Sun called?
2. Is the Sun burning?
3. How hot is the surface of Mercury?
4. How long does it take for Mercury to complete an orbit?
5. What's Venus's nickname?
6. What is the distance of the Earth from the Sun?
7. What is the distance from the Earth to the Moon?
8. What is on the surface of the Moon?
9. What are the polar ice caps on Mars made from?
10. What is the shape of Mars's moons?
11. How long is a day on Jupiter?
12. What is the great red spot on Jupiter?
13. What is the size of Jupiter compared to Earth?
14. What is the surface of Saturn?
15. How thick are Saturn's rings?
16. What is odd about Uranus?
17. What is the recent discovery about Saturn?
18. What is Neptune's distance from the Sun?
19. When was Neptune visited by a NASA spacecraft?
20. What happened to Pluto in 2006?
21. What is Pluto called now?

V. Reading: The Moon – A Nice Place to Visit?

The moon has been described by songwriters and poets as a place for a romantic escape. We know of course that the moon is actually a very hostile environment for human beings.

The moon is completely devoid of water because the force of gravity on the moon is much less than on the earth. (The moon is much smaller; its surface is about as large as Africa.) The lack of a strong gravitational pull has caused any water the moon may have had to leak out into space over the 4.6 billion years that it has been in existence. Of course, since there is no water, there is also no vegetation.

There is no air on the moon because its gravity is insufficient to retain an atmosphere. Accordingly, travellers to the moon require not only oxygen and water but also protection against cosmic rays that are unfiltered by an atmosphere. No atmosphere also means no weather – no wind, no rain, no clouds.

Temperatures on the moon are quite extreme, ranging from 110°C to -173°C. This occurs because there is no atmosphere to filter the sun's rays when it is shining and then to blanket in warm air when the sun goes down. These extremes of temperatures are particularly striking during a solar eclipse, when the earth passes directly between the sun and the moon, temporarily blotting out the sun's light. At such times the temperature on the moon dips very rapidly and then rises immediately as the sun emerges from the earth's shadow. The change in temperature may be as much as 200°C in one hour! This sudden change can cause rocks to shatter due to the alternate expanding and contracting.

There is no twilight or dawn on the moon. Like the earth, the moon does not shine its own light: it reflects the light of the sun. Unlike the earth, however, there is no atmosphere to diffuse the light as day becomes night and night turns into day. Changes from light to dark and from dark to light occur suddenly.

The lunar sky is black. On the moon stars are visible in the daytime, but you would have to shield your eyes from the unfiltered sunlight to view them.

There is no sound on the moon. Sound travels on waves of air molecules and since there is no air, there is nothing to transmit sound.

The moon is a satellite of the earth, revolving around the earth once every twenty-nine and a half days. The moon itself rotates, but it does so very slowly. Therefore the same side of the moon is always visible to us. To get to the moon, you would have to travel 240,000 miles, a distance that is about the same as circling the earth at the equator ten times.

It is clear that if you were making a trip to the moon, you would need to pack more than a toothbrush and a change of underwear. Its adverse conditions would make it very difficult for a visitor from the earth.

Making inferences.

Indicate whether each of the following statements is stated in the passage (S), implied by other information (I) or neither stated nor implied (N).

1. The force of gravity on the moon is less than that on the earth.
2. The tides on the earth are caused by the moon.
3. A person would weigh less on the moon than on the earth.
4. It would be difficult to have a chat with someone on the moon.
5. The moon orbits the earth about once a month.
6. The temperature on the moon goes up to 200°C.
7. The moon has more extremes of temperatures than the earth has.
8. Human beings could not live on the moon.

(adapted from Zimmerman, F. *English for Science*. Prentice-Hall, 1989.)

VI. Study the phrases below. Then compare the planets of the solar system and/or the Moon and the Earth.

The following words and phrases that can be used to make a comparison more precise (Jordan 1999) :

X is	considerably a great deal (very) much rather somewhat a little slightly scarcely hardly only just	smaller bigger closer <i>etc</i>	than...
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X is	exactly precisely just virtually practically more or less almost nearly approximately about	the same as ...
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X is not	exactly entirely quite	the same as ...
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X is	totally completely entirely quite	different from Y.	X is not quite so/as	big expensive <i>etc</i>	as...
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X and Y are	different dissimilar	in every way/respect.
	totally completely entirely quite	different.