Introducing the Planets

Teacher's Notes and Answer Key

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This worksheet is designed for three lessons or more, and will take at least three hours to complete. It is suitable for lower secondary school students who are learning about the planets in the solar system for the first time: it also provides detailed information for students who have already been introduced to the planets.

Twenty photocopiable cards are provided separately for activity 3. These need to be printed and cut out before the first class.

A Powerpoint presentation is provided for activity 4, and is to be completed in front of the class with information they will provide. You will need a computer connected to a projector, which will allow you to input information directly onto the screen.

For activity 5, you will need to bring some fruit and vegetables to the class, or get the students to do so. You will need some peanuts, dried peas, grapes, hazelnuts, peaches, tomatoes, melons and cabbages (or other items of similar size and shape).

In activity 6, students label a colour image of the planets.

Aims

- To learn the names of the planets in sequence
- To focus on the English spelling and pronunciation of the planet names

Students work individually, writing the name of each planet next to its pronunciation and crossing off the letters they use. When they have completed their first attempt, allow them to check in pairs and then work together to incorporate all the letters given.

Check the answers with the whole class, and drill the pronunciations.

Key

/ˈmɜːkjəri/	MERCURY
/ˈviːnəs/	VENUS

/ɜːθ/	EARTH
/mɑːz/	MARS
/ˈdʒuːpɪtə/	JUPITER
/ˈsætən/	SATURN
/ˈjʊərənəs/	URANUS
/ˈneptʃuːn/	NEPTUNE

2 Large numbers

Reading, Writing

Aims

- To practise using complicated numbers
- To read numbers in English correctly

Students try this activity alone first, then check in pairs. When they have all finished, ask the class to call out the smallest number all together. Then ask one student to come and write it on the board: if it is given in figures, make them write it in words and vice versa. When it is written correctly on the board, read it out and have the whole class repeat it again. Then move on to the next number, and repeat the process for each one.

Key

−215	minus two hundred and fifteen
−21.5	minus twenty one point five
2.15	two point one five
2.5	two point five
215	two hundred and fifteen
250	two hundred and fifty
2,150	two thousand, one hundred and fifty
2,150,000	two million, one hundred and fifty thousand
21,500,000	twenty-one million, five hundred thousand
2.15×10^{9} (=2,150,000,000)	two point one five times ten to the power of nine
25,000,000,000	twenty-five billion
215,000,000,000	two hundred and fifteen billion
2.5×10^{11}	two point five times ten to the eleventh *or* two point five times ten to the power of eleven (=250,000,000,000)
two point five times ten to the twenty-fifth	2.5×10^{25} (=25,000,000,000,000,000,000,000,000)

3 Planet facts

Speaking

Aims

- To focus on specific individual facts about the solar system
- To ask and answer questions to practise question forms

Show the students one of the cards, and talk through the facts on it. Elicit the question forms they will need to ask for the information, and then draw their attention to the Useful Language box. Explain that they are going to practise using the question and answer forms in the box. Show them that there is one piece of information missing for each planet on the card.

Twenty cards are provided: if there are more than twenty students you will need two copies of some of the cards. Before you give them out, explain that they will have to get up and move around the room to find someone to talk to. They must not show one another their cards, but should ask and answer questions to complete the gaps. It may be that they cannot help one another, in which case they should move on to ask another person. They will not be able to find all the answers they need from one person, so they will need to keep moving and ask several people in order to be able to complete their card. Students who complete their cards can sit down once they have answered all the questions they are asked by the people who gave them the information.

When you have explained the rules, give out one card to each student, and then begin the activity. It will work better if you keep a card yourself and join in as well, in order to demonstrate what they have to do. Help the students to form the questions and answers correctly, and encourage them to help one another to do so as well.

Once they have all finished and sat down, tell them that they can check their answers in the presentation you are about to give.

4 Presentation

Listening, Speaking

Aims

- To learn about the planets
- To understand a presentation
- To read and understand large numbers

Use the presentation provided and explain about the planets in English. Ask the students whose card features each planet to supply the information you need to complete each slide. You can type in the information yourself (if you do not actually start the presentation), or you can choose a student to type in the information for each planet. This will give extra practise in forming questions, and will allow you to correct any errors for the benefit of the whole class. If you prefer to start the presentation, right click on the first slide, select 'pointer options', and choose a pen. Students can then use the mouse to write in the information in front of the class.

Key

Mercury

Position – nearest to the sun
Distance from the sun – 57,910,000 km
Temperature – varies from −184°C to +427°C
Mass – 3.30×10^{23} kg
Diameter – 4,900 km
Atmosphere – almost none
Core – partly liquid iron
Named after – Roman winged messenger and escort of the dead
Other – fastest moving planet

Venus

Position – second closest to the sun
Distance from the sun – 108,200,000 km
Temperature – very hot: 457°C
Mass – 4.87×10^{24} kg
Diameter – 12,100 km
Atmosphere – very thick, poisonous
Core – iron
Named after – Roman goddess of love
Other – has volcanoes

Earth

Position – third closest to the sun
Distance from the sun – 150,000,000 km
Temperature – on average, 14°C
Mass – 5.98×10^{24} kg
Diameter – 12,700 km
Atmosphere – 78% nitrogen, 21% oxygen
Core – alloy of iron and nickel
Named after – the normal word for the ground and soil
Other – the only place where we know that life has evolved

Mars

Position – fourth closest to the sun
Distance from the sun – 228,000,000 km
Temperature – minimum −130°C, maximum 20°C
Mass – 6.42×10^{23} kg
Diameter – 6,800 km
Atmosphere – very thin, 95% carbon dioxide (CO_2)
Core – alloy of iron
Named after – Roman god of war
Other – has polar ice caps

Jupiter

Position – fifth closest to the sun
Distance from the sun – 778,000,000 km
Temperature – −150°C
Mass – 1.90 x 10^{27} kg
Diameter – 140,000 km
Atmosphere – very stormy, 75% hydrogen, 25% helium
Core – liquid metallic hydrogen, and perhaps a rocky core underneath
Named after – Roman king of the gods
Other – has 63 moons

Saturn

Position – sixth closest to the sun
Distance from the sun – 1,430,000,000 km
Temperature – −168°C
Mass – 5.68 x 10^{26} kg
Diameter – 120,000 km
Atmosphere – hydrogen and helium, with nitrogen, sulfur and oxygen
Core – liquid metallic hydrogen around a rocky core
Named after – Roman god of agriculture
Other – famous for its rings

Uranus

Position – seventh closest to the sun
Distance from the sun – 2,870,000,000 km
Temperature – −200°C
Mass – 8.68 x 10^{25} kg
Diameter – 51,500 km
Atmosphere – hydrogen, helium, and methane
Core – molten rock
Named after – Greek god of the sky
Other – has 11 faint rings

Neptune

Position – furthest planet from the sun
Distance from the sun – 4,500,000,000 km
Temperature – −215°C
Mass – 1.02 x 10^{26} kg
Diameter – 49,500 km
Atmosphere – hydrogen and helium
Core – rocky
Named after – Roman god of the sea
Other – thirteen moons have been discovered so far

5 Scale model

Speaking, Vocabulary

Aims

- To help visualise the dimensions of the solar system
- To work together and participate in building a scale model

For this activity you will need a metre-long ruler and a selection of fruit and vegetables or other themed objects. Students will need to choose two objects about the size of a pea or peanut (for Mercury and Mars), two the size of a grape or hazelnut (for Venus and Earth), two the size of a peach or tomato (for Uranus and Neptune) and two the size of a melon or cabbage (for Jupiter and Saturn).

The measurements required are all provided, so that students only need to negotiate who is going to stand where, and which objects to use for each planet. Before you start, teach them the names of all the objects you have brought.

Start in the corner of the room. If the diagonal measurement of the room is less than nine metres then Neptune may have to be a little too close, but students will still get the idea. Three students should stand in the corner to represent the sun. Students then choose an appropriately sized object for each of the planets and someone to hold it in place, carefully measuring the distance.

Once they are all in position, remind them that to be accurate to scale with these distances, each of the objects should be fifty times smaller, so that the sun should be a walnut instead of three people, Jupiter should be about half the size of the object being used for Mercury, and everything else should be in proportion, so that Mercury would be less than a hundredth of a centimetre across.

Revision

Writing

Aims

- To get students to recall information and revise what they don't remember
- To write simple sentences about each of the planets

The students will each have a copy of the image, but you can also display the poster or the first slide of the presentation while they do the writing.

Introducing the Planets

Francesca Costa

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1 Planet names

Writing, Pronunciation

Use these letters in the box to spell the names of the eight planets.

1. /'mɜːkjəri/ ________________
2. /'viːnəs/ ________________
3. /ɜːθ/ ________________
4. /mɑːz/ ________________
5. /'dʒuːpɪtə/ ________________
6. /'sætən/ ________________
7. /'jʊərənəs/ ________________
8. /'neptʃuːn/ ________________

A	A	A	A	C	E	E	E	E	E	E	I	J	H	M	M	N	N	N	N	N
P	P	R	R	R	R	R	R	R	S	S	S	S	T	T	T	T	U	U	U	U
U	U	U	V	Y																

2 Large numbers

Reading, Writing

Write these numbers (from a-g) in order, from the lowest to the highest. Say the numbers.

250

21,500,000

25,000,000,000

2,150

2.15

2.5×10^{11}

−215

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minus twenty one point five

two hundred and fifteen

two hundred and fifteen billion

two million, one hundred and fifty thousand

two point five

two point five times ten to the twenty-fifth

two point one five times ten to the power of nine

3 Planet facts

Speaking

Play a game. Your teacher will give you a card with information about four planets. There are four pieces of information missing. Your classmates have the information you need: you will need to ask different people to complete all the gaps. Move around the class and ask and answer questions using the language in the box to help you.

Useful Language box

Questions
What is the location of...? / Where is ... situated?
What is the distance of ... from the sun? / How far is ... from the sun?
What is the temperature / mass of...?
What is the atmosphere / core of ... made up of?
What does the atmosphere / core of ... consist of?
What is the planet ... named after? / Where does the name ... come from?
What else can you tell me about ...?

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Answers

... is located / is found / is situated ...

The distance between ... and the sun is ...

The distance of ... from the sun is ...

... has a temperature of ... / from ... to ... / varying between ... and ... / ranging from ... to ...

... has a mass of ... point ... times ten to the (power of) ... kilos

... has a (very thick / thin / poisonous) atmosphere (made up of ...)

... has a core which consists of ...

... is named after ...

It is also ... / It also has ... / It also ...

4 Presentation — Listening, Speaking

Give information from your card to your teacher to help complete the presentation.

5 Scale model — Speaking

Work together and use the whole classroom. Look at the data below and the items provided to make an approximate scale model of the solar system.

Represent all bodies 50 times larger than their actual size.
scale: 1:50,000,000,000 (for the distances)
1:1,000,000,000 (for the sizes of the sun and planets)

Body	Reality		Model	
	Diameter	Position	Diameter	Position
Sun	1.4 M km	0	140 cm	
Mercury	0.0049 M km	57.9 M km	0.49 cm	12 cm
Venus	0.012 M km	108.2 M km	1.2 cm	22 cm
Earth	0.013 M km	150 M km	1.3 cm	30 cm
Mars	0.0068 M km	228 M km	0.68 cm	46 cm
Jupiter	0.14 M km	778 M km	14 cm	1.56 m
Saturn	0.12 M km	1,430 M km	12 cm	2.86 m
Uranus	0.052 M km	2,870 M km	5.2 cm	5.74 m
Neptune	0.05 M km	4,500 M km	5 cm	9 m

6 Revision — Writing

What do you remember? Label the picture with the names of the planets and write a sentence about each of them.