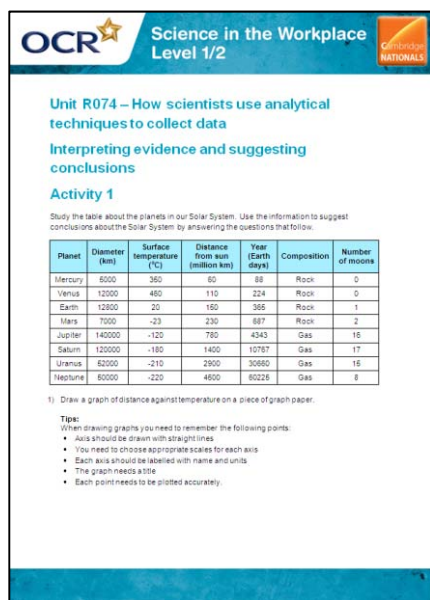


Unit R074 – How scientists use analytical techniques to collect data

Interpreting evidence and suggesting conclusions

Instructions and answers for teachers

The activities below cover LO1: Be able to apply the principles of good laboratory practice



Unit R074 – How scientists use analytical techniques to collect data
Interpreting evidence and suggesting conclusions
Activity 1

Study the table about the planets in our Solar System. Use the information to suggest conclusions about the Solar System by answering the questions that follow.

Planet	Diameter (km)	Surface temperature (°C)	Distance from sun (million km)	Year (Earth days)	Composition	Number of moons
Mercury	6000	360	50	88	Rock	0
Venus	12000	460	110	224	Rock	0
Earth	12800	20	160	365	Rock	1
Mars	7000	-23	230	687	Rock	2
Jupiter	140000	-120	780	4343	Gas	16
Saturn	120000	-180	1400	10767	Gas	17
Uranus	62000	-210	2900	30680	Gas	16
Neptune	60000	-220	4600	90226	Gas	8

1) Draw a graph of distance against temperature on a piece of graph paper.

Tips:
 When drawing graphs you need to remember the following points:

- Axes should be drawn with straight lines.
- You need to choose appropriate scales for each axis.
- Each axis should be labelled with name and units.
- The graph needs a title.
- Each point needs to be plotted accurately.

Associated files:

Interpreting evidence and suggesting conclusions (activity)

Activity 1 – approx. 40 minutes

Activity 2 – approx. 20 minutes



This activity offers an opportunity for English skills development.



This activity offers an opportunity for maths skills development.

These activities give learners the opportunity to interpret data and use science to suggest conclusions.

Activity 1

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Uranus	52000	-210	2900	30660	Gas	15
Neptune	50000	-220	4500	60225	Gas	8

- 1) Draw a graph of distance against temperature on a piece of graph paper.

Tips:

When drawing graphs you need to remember the following points:

- Axis should be drawn with straight lines
- You need to choose appropriate scales for each axis
- Each axis should be labelled with name and units
- The graph needs a title
- Each point needs to be plotted accurately.

Graph accurately drawn with axis correctly labelled and points plotted.

- 2) What conclusions can you suggest about the relationship between the temperature of a planet and its distance from the Sun?

Idea that the closer to the Sun the hotter the planet - with the exception of mercury.

- 3) What evidence do you have to support your conclusions?

The use of data from the table/graph to support their conclusions.

- 4) Can you explain your conclusions using science?

Idea that the closer to the Sun the more heat they can absorb, heat has to travel further to reach distant planets.

- 5) Imagine that an astronomer thinks s/he has found a new planet. The astronomer thinks that the new planet has a surface temperature of -190°C . Using your graph, suggest how far away this planet is from the Sun.

Correct number obtained from graph.

- 6) If you were asked to investigate if the distance from the Sun affected the orbital time, what would your two axes be on a graph?

Distance from Sun/year.

- 7) Plot this graph on a piece of graph paper.

Graph accurately drawn with axis correctly labelled and points plotted.

- 8) Using your graph, what conclusions can you suggest?

The idea that further away planets have to orbit in a larger path to get around the Sun.

9) What evidence do you have to support your conclusions?

The use of data from the table/graph to support their conclusions.

10) Can you explain your conclusions using science?

The ideas that all planets have a fixed orbital path and have to maintain a certain distance from the Sun therefore some will take longer.

11) The same astronomer think s/he has found another planet which is 900 million km from the Sun, what can you tell him/her about the length of the orbital period for this planet?

Correct number obtained from graph.

Activity 2

1) A group of students were given some samples to test – they were told they needed to find out what cations were present in the sample. They decided the best way to do this was to carry out a series of flame tests.

They carried out their investigation and recorded their results in the table below. Study the table and use the information to help them suggest conclusions about the samples.

Sample name	Flame colour
A	Pink/red
B	Purple/lilac
C	Brick red
D	Yellow/green
E	Bright yellow/orange

a. What cations do you think were present in sample A?

Lithium

b. What cations do you think were present in sample B?

Potassium

c. What cations do you think were present in sample C?

Calcium

d. What cations do you think were present in sample D?

Barium

e. What cations do you think were present in sample E?

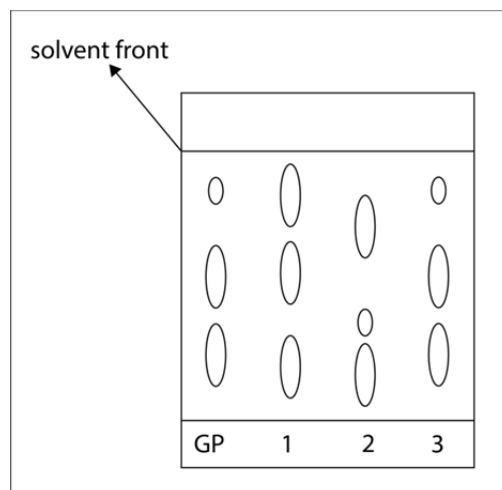
Sodium

- 2) A gate post had been knocked and pushed over by someone driving a car. Police found a sample of red paint left on the gate post. The police had three different suspects, they decided that if they could identify the pigments in the paint on the gate they could compare it with the pigments in each of the suspects' cars. They would then be able to identify the culprit. The police ran a chromatogram with paint from the gate and paint from the three suspects' cars.

The diagram shows the chromatogram they produced. The paint from the gate is on the left (GP).

- a. Look at the separation of the pigment, which suspect do you think knocked over the gate post?

Suspect 3.



- b. Explain your answer.

Because it had the same pigments which ran up the paper the same distance.

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