Year 9 Science: The planets in order, dwarf planets and how we explore space

Name: _____ Date: _____

Try these without your notes first, then check the answer key.

Practice

1. List the planets in order from the Sun and mark which are rocky, gas giants and ice giants.

2. Eris is round, orbits the Sun and lies among many other icy bodies beyond Neptune. Why is it not a planet?

3. Saturn is about 9.5 AU from the Sun. Roughly what fraction of Earth's sunlight does it receive?

4. A telescope cannot touch Mars, yet scientists know its air is mostly carbon dioxide. How?

5. Give one thing an orrery shows well and one thing it gets wrong.

Fix the mistake

6. Correct this statement: "Pluto stopped being a planet because it is too small."

7. Correct this statement: "At twice the distance from the Sun, a planet gets half the sunlight."

8. Correct this statement: "Mercury is closest to the Sun, so it must be the hottest planet."

9. Correct this statement: "Scientists switched to a Sun-centred model as soon as Copernicus published it in 1543."

Answer key (for parents and tutors)

1. List the planets in order from the Sun and mark which are rocky, gas giants and ice giants.
   Mercury, Venus, Earth, Mars (rocky); Jupiter, Saturn (gas giants); Uranus, Neptune (ice giants).
2. Eris is round, orbits the Sun and lies among many other icy bodies beyond Neptune. Why is it not a planet?
   It has not cleared its orbit of other objects, so it is a dwarf planet.
3. Saturn is about 9.5 AU from the Sun. Roughly what fraction of Earth's sunlight does it receive?
   $9.5^2 = 90$, so about 1/90, roughly 1%.
4. A telescope cannot touch Mars, yet scientists know its air is mostly carbon dioxide. How?
   By analysing the light that passes through or reflects off its atmosphere: carbon dioxide absorbs particular colours, and those gaps show up in the spectrum. Landers have since confirmed it.
5. Give one thing an orrery shows well and one thing it gets wrong.
   It shows planets moving at different speeds, with the outer ones slower. It gets the distances and sizes badly wrong and makes orbits perfect circles.
6. Correct this statement: "Pluto stopped being a planet because it is too small."
   Pluto is round and orbits the Sun, but it has not cleared its orbit of other icy bodies, which is the test it fails.
7. Correct this statement: "At twice the distance from the Sun, a planet gets half the sunlight."
   It gets a quarter, because the same light spreads over four times the area; always square the distance before dividing.
8. Correct this statement: "Mercury is closest to the Sun, so it must be the hottest planet."
   Venus is hotter, about 465 °C, because its thick carbon dioxide atmosphere traps heat, so distance is not the only factor.
9. Correct this statement: "Scientists switched to a Sun-centred model as soon as Copernicus published it in 1543."
   Agreement took decades, building up as telescope evidence such as the phases of Venus and Kepler's accurate predictions piled up.