

Practical Title: Planets Card Sort

This activity is adapted from mission 1 activity 2 of the Astroscience Challenge that can be found at <https://www.astrosciencechallenge.com/team-leader-resources/>

Focus and Principles: Card sorts as a means to encourage pupils' Higher Order Thinking

Equipment: A set of planet fact cards for each pair/small group of pupils

Suggested pupil group size: 2-3

Possible learning objectives:

- To learn about the different planets in our solar system
- To use data/information to identify patterns and support reasoning

Further instructions:

- Go through one of the planet cards & discuss with the class to consider what the four different facts mean, the units etc
- Ask them in their groups to order the cards in terms of distance from the Sun.
- Then ask them to look at the other facts on the cards and see if they can find any patterns - prompt them to focus on temperature first
- Is there an odd one out in a general pattern?
- There are different things that affect the temperature of a planet, not just the distance from the Sun, so there are likely to be exceptions introduce the word 'anomaly' which is a scientific way of saying this.
- Prompt: 'Can you think why there is a *general* pattern in temperature vs distance from Sun?'
- They may spot a pattern between distance away from the Sun and time to orbit the Sun, but we will come back to this.

Ask the class together to think of the solar system with the Sun at the centre

- If you stood on a planet nearer the Sun, what would it probably feel like (hotter/colder if need prompting)? Why?
- If you stood on a planet further from the Sun, what would it probably feel like (hotter/colder if need prompting)? Why?
- Analogy of standing very close to a hot radiator or further away.
- Can you think of a reason that Venus is hotter than Mercury, even though it further from the Sun?
 - Other things affect how hot a planet is, such as if it has an atmosphere. Venus has an atmosphere that traps heat. Mercury just has a really, really thin outer atmosphere.



Goldilocks:

Read or remind the class of the Goldilocks story.

There is something called the Goldilocks zone around a star (the Sun is our star) and the Earth is within that zone. Can they think what this means? Think, pair, share.

- Somewhere that is 'just right' for life
- What do we need for life? (water, food, air to breathe etc).
- We don't know which, if any, planets have water on them but if they did what would happen to that water? In their groups look at the cards to work out what would happen to water on the different planets. Prompt/remind them that water freezes at 0°C and boils at 100°C.
- Water would boil on hotter planets; freeze on further, cooler ones. Earth alone is 'just right' for liquid water. 'Just right' for life as we know it.

Further information:

'Life on Earth started in water, and water is a necessary ingredient for life (as we know it). The habitable or Goldilocks zone is the area around a star where it is not too hot and not too cold for liquid water to exist on the surface of planets.

Planets orbiting stars, other than our Sun are called exoplanets. Rocky exoplanets found in the habitable/Goldilocks zones of their stars, are more likely targets for detecting liquid water on their surfaces and therefore possibly life.'

Taken from <https://exoplanets.nasa.gov/faq/15/what-is-the-habitable-zone-or-goldilocks-zone/>

Additional note:

If the pupils spotted a pattern between distance away from the Sun and time to orbit the Sun, ask them why this might be? The more distant planets have further to go to make one complete orbit of the Sun – hence it is likely to take longer. They are not all travelling at the same speed though, so again there are other factors.

Health & Safety:

Teachers always need to risk assess practical activities for their children and defer to their health and safety advisor for the most up-to-date source of health and safety guidance. This training cannot be relied upon as source of health & safety guidance.

