




## Learning Scientific Skills Outside the Classroom

### Scientific Skills

Predicting	Measuring	Concluding Specific skill - identifying patterns
Country of Origin	Suggested Age Range	Suggested Theme
 UK	9 - 11	Earth and Space
Location outside the classroom		Benefits of using this location
School grounds		A large space is needed for this activity and to gain an understanding of how far some planets are from the Sun.
Learning Objectives – Scientific Skills		Learning Objectives - Knowledge
To use their prior understanding of the planets to predict which planets will be close to the Sun To use steps to measure distance To explain what they have found out and identify any patterns between the size of the planets in our solar system and the distance between planets and the Sun		To understand the distance between the planets in the solar system To produce a model which represents the relative distance of the planets from the Sun
Key Vocabulary		
Scientific skills vocabulary – predict, predicting, measure, measuring, conclude, concluding, accurate, identify, patterns Knowledge vocabulary – distance, relative, Sun, Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus, Neptune		
Resources / Equipment		
<ul style="list-style-type: none"> <li>Equipment to produce a scale model of the solar system – string, pegs, planet labels, distance of planets from the Sun in km and in steps</li> </ul>		
Teaching Activities		
<p><b>Discuss</b> – What are the names of the planets in our Solar System? Which planet is the largest and which is the smallest? Can they order the planets in increasing size?</p> <p><b>Prediction</b> – Using their knowledge of the planets, children make a prediction about the distance of each planet from the Sun. They could predict which planets might be the closest together and explain why, which might be the furthest apart or predict the order of distance between the planets.</p> <p><b>Explain</b> – They are going to be looking at the distance between the planets in the solar system. Show them the distance of each planet from the Sun in kilometers and explain that these numbers are all approximate. Read the numbers out to the children to ensure they read them correctly and understand the value of the distances. Mercury – 57,910,000 km Venus – 108,200,000 km Earth – 149,600,000 km Mars – 227,900,000 km Jupiter – 778,412,000 km Saturn – 1,426,725,400 km Uranus – 2,80,990,000 km Neptune – 4,504,000,000 km</p> <p><b>Discuss</b> – Were their predictions about the distance of the planets from the Sun correct? Give children an opportunity to discuss the distances in small groups and discuss how they compared to their predictions. What do they notice from their previous work on the size of the planets? Where are the smaller planets? Where are the larger planets?</p> <p><b>Conclude</b> – Using the data provided, can they identify any patterns between the size of the planets and the distance of the planets from the Sun.</p>		



**Explain** – They are going to represent the distance of the planets from the Sun on the school playground using a piece of string to represent the solar system and pegs to represent the position of the planets and their distance from the Sun. They cannot measure out the distances in kilometres so they will have to scale these measurements down.

**Discuss** – How could the measurements be scaled down?

**Explain** – They need to use ‘relative’ distances so they can see one distance in relation to another. To do this they are going to use steps to measure the distance between the planets. The Sun is at the centre of the solar system so this will be at step 0. Show children the number of steps for each planet to the Sun and explain that these are all relative distances based on the Sun being 1cm in diameter. The distances in steps are as follows:

Mercury = 1 step from sun  
Venus = 2 steps from sun  
Earth = 2.5 steps from sun  
Mars = 4 steps from sun  
Jupiter = 13 steps from sun  
Saturn = 24 steps from sun  
Uranus = 49 steps from sun  
Neptune = 76 steps from sun

**Activity** – In small groups, children have a piece of string, the data provided above with the approximate distances and the number of steps required to represent this distance, some pegs and some planet labels. Children work in groups to place the planets at the correct distance from the Sun by pegging the planet label at the correct distance on the string.

**Measure** – Children need to accurately measure the distance of the planets from the Sun using their own steps as a way of measuring.

**Discuss** – What do they notice? Is their model accurate? Was the length of the steps the same for each planet? How could this affect the accuracy of their model?

**Conclude** – Using the model of the solar system and the relative distances from the Sun that they can now visualise using the pegs on the string, can they add to their conclusion from earlier in the lesson. Can they identify any further patterns between the size of the planets and the distance of the planets from the Sun?

#### Examples of children’s work and teacher comments from country of origin

*The children found this visual representation of the solar system really beneficial as they could clearly see the difference in the distances between the planets. It is essential to make sure there is enough room for all groups to complete the activity and that the string provided is long enough for each group.*

*The steps as a measurement tool prompted lots of discussion about the length of people’s legs and the size of their feet and how these could affect the accuracy of the model.*

*“We found out that Jupiter wasn’t the furthest planet away from the Sun even though it is the biggest.”*

*“I noticed that Mercury, Earth and Mars are very close together compared to the distance between Uranus and Neptune.”*

*“The planets which are closest to the Sun are usually the smallest planets.”*