



Toilet Paper Solar System!

How big is our Solar System? The sheer size of space is often hard to express but in this fun playground activity the distance of each planet from the Sun can be demonstrated using toilet paper!

At a glance you will need:

- Several roles of toilet paper
- Blow-up planets (or pictures of the planets) in our Solar System

Evidence Idea: Why not take a photo of your toilet paper Solar System?

We would love to see your fabulous models, send a picture to us at education@dynamicearth.co.uk and we will put it on our website to inspire others!

Workshop	Title	Pre/Post	Suggested CfE Stage
Voyage through the Solar System	Toilet Paper Solar System	Post	Second

Learning Intention

We are learning how far from the Sun the planets in our Solar System are.

Task

We are going to create a scale model of our Solar System using toilet role to demonstrate the relative distances between the Sun and each planet.



Success Criteria

- Pupils will be able to work collaboratively to create an accurate scale model of our Solar System.
- Pupils will be able to demonstrate an understanding of how massive our Solar System is.
- Pupils will know the order of the planets relative to their distance from the Sun.

CfE Capacities

Successful learners:

- With enthusiasm and motivation for learning, combining communication and numeracy in a creative way.
- Able to engage with more abstract mathematical concepts and develop important new kinds of thinking.

Responsible citizens:

- Developing knowledge and understanding of our world and its place in the Solar System.

Effective contributors:

- Able to communicate in different ways and in different settings.

CfE Outcomes

Science – Planet Earth (Space)

By observing and researching features of our Solar System, I can use simple models to communicate my understanding of size, scale, time and relative motion within it. SCN 2-06a

Numeracy and Mathematics – Shape, position and movement (Angle, symmetry and transformation)

Having investigated where, why and how scale is used and expressed, I can apply my understanding to interpret simple models, maps and plans. MTH 2-17d

Description

This is great as an outdoor activity; it does require a lot of space but you could always work in the corridors of your school (if they are long enough!). Why not invite other classes to come view the final result?

The table below gives you the average (mean) distance from the Sun for each planet, along with the number of sheets of toilet roll (to the nearest whole number) required to model this distance where 1 sheet is the equivalent of 10 million km! Depending on the ability of the pupils, you could provide this information in its raw form (as below), round the numbers up or down or even challenge the pupils to come up with a suitable scale themselves.

Working in groups, pupils should be given a roll of toilet paper, each planet (either a blow-up planet or a picture of the planet) and a Sun. Pupils can then unravel the correct amount of toilet roll to show the relative distance from the Sun for each planet in turn. Once each distance is measured out, a pupil should hold the planet at the correct toilet roll sheet.

Taking a photograph at the end allows you to display the model on a computer screen while back in the classroom. Discussions around the size of the Solar System can then take place using the photo as a visual aid.



Object	Mean distance from Sun (km)	Number of Sheets from Sun	Number of sheets from previous object
Mercury	57,909,175	6	6
Venus	108,208,930	11	5
Earth	149,597,890	15	4
Mars	227,936,640	23	8
Jupiter	778,412,020	78	55
Saturn	1,426,752,400	140	62
Uranus	2,870,972,200	290	150
Neptune	4,498,252,900	450	160
<i>Pluto</i>	<i>5,906,380,000</i>	<i>590</i>	<i>140</i>

Just a couple of notes on the above table and activity:

- Mean distance measurements are courtesy of NASA.
- Pluto has been included in this table, largely for interest for although it was discovered in 1930, and long considered to be the ninth planet in the Solar System, as we delved deeper into space we found a number of similar worlds in an area called the Kuiper Belt, still within our Solar System. In 2006, after classifying the term 'planet', the International Astronomical Union (IAU) reclassified Pluto as a dwarf planet.
- While it is relatively easy to create a model to show the relative distances of the planets from each other and the Sun, it is much harder to then include accurate representations of the sizes of the planets too. To give an example, our biggest planet, Jupiter is a mere 140,000km across, which working to the scale of 1 sheet of toilet roll to 10million km means Jupiter would be just over a tenth of size of a piece of toilet roll!

Web Resources

Information about the solar system:

<http://solarsystem.nasa.gov/index.cfm>

<http://science.nationalgeographic.com/science/space/solar-system>

<http://www.bbc.co.uk/solarsystem/>

Information about scales and ratios:

<http://hubpages.com/hub/telia-mathshelp>

<http://www.bbc.co.uk/skillswise/numbers/wholenumbers/ratioandproportion/ratio/factsheet.shtml>

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Get in touch at education@dynamicearth.co.uk and let us know how it went. Remember to visit the website regularly for further activities as we are constantly working on novel content to enhance your Dynamic Earth experience both pre and post visit.

