# EXPLORING OUR SOLAR SYSTEM (LEVEL 2)

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| **Description** | Learners will create their own model of our solar system to showcase the planets and some interesting facts about them |
| **Leading Question** | How are planets positioned in our solar system? |
| **Total Time Required** | 3 hours over 3 days |
| **Supplies Required** | Pen/pencil, ruler, color pens, paper, paper/plastic plate, small round object, torch/flashlight |
| **Learning Outcomes** | 1. Understanding of planets in the solar system and each planet's position in relation to the sun<br>2. Understanding of solar system planets movement in space due to gravity<br>3. Understanding of average temperature on planets and relation to distance from the sun |
| **Previous Learning** | Basic operations with numbers up to 1000 |

# DAY 1

Today you will learn about planets in our solar system.

| Suggested Duration | Activity and Description |
|---|---|
| **10 minutes** | • Write down a description of a planet.<br>• The earth is one of eight planets. What other planets do you know? |
| **20 minutes** | • Draw the solar system using the fact sheet in appendix 1.<br>• Begin by arranging the planets in the right order of distance to the sun, then keep in mind the sizes and shapes of planets mentioned in appendix 1. |
| **20-30 minutes** | • Numeracy activities:<br>• The distance of each planet from the sun is as follows:<br>Mercury: 35 million miles<br>Venus: 67 million miles |

Earth: 93 million miles
Mars: 142 million miles
Jupiter: 484 million miles
Saturn: 889 million miles
Uranus: 1.79 billion miles
Neptune: 2.8 billion miles

| Hundred Millions | Ten Millions | Millions | Hundred Thousands | Ten Thousands | Thousands | Hundreds | Tens | Ones |
|---|---|---|---|---|---|---|---|---|
| | 5 | 0 | 2 | 0 | 0 | 5 | 0 | 0 |
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- Imagine the Earth is only 93 miles away from the sun instead of 93 million miles. If we were to represent Uranus in an equivalent way, its distance from the sun will be 1790 million miles away since 1 billion = 1000 million. Uranus will therefore be 1.79 x 1000 = 1790 million miles away from the sun. What will Neptune's distance from the sun be in millions?
- Using the figures from the previous activity, calculate the range of planets' distance from the sun. Subtract the distance of the closest planet from the distance of the farthest planet to find the range in millions.

# DAY 2

Today you will learn about how planets move in space.

| Suggested Duration | Activity and Description |
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| **10 minutes** | • On Earth, gravity is what keeps humans, animals, plants, buildings etc. and all living and nonliving things on Earth. It pulls everything down, that's why we don't fly into space! Everything has a gravitational force, but smaller objects have very little force. In our solar system, planets and their moons also have their own gravity. |

**15 minutes**

- Select any two objects in your house that are different in weight - one object must be light like a feather or a small piece of paper, and another has to be heavier like a medium sized-toy, rubber ball etc.
- Make a prediction about which object you think will fall first and why
- Drop both objects at the same time and make a note of what happens. Did the experiment validate what you had predicted?
- Now try dropping a small solid object like a marble or stone and a bigger but hollow object like a basketball, football etc. What happened? Did you predict successfully what was going to happen?

| Objects | Hypothesis | Evidence |
|---|---|---|
| e.g. marble and football | football lands first | marble lands first |
| <insert objects> | <insert hypothesis> | <insert evidence> |
| <insert objects> | <insert hypothesis> | <insert evidence> |

**10 minutes**

- The learner and his or her sibling or other family member will choose two planets to simulate their movements. One of the selected planets must be Venus or Uranus. A third family member can play the sun
- The person who is simulating Venus/Uranus will rotate in one place in clockwise while the other person simulating any of the other planets will rotate in one place counterclockwise
- The person representing the sun will be placed in fixed position in the room and rotate counterclockwise while the two “planets” will start to move around the “sun” slowly and counterclockwise, while still rotating around themselves
- Do this slowly otherwise you might get dizzy!
- The person representing the sun can hold a torch or flashlight representing the sun’s light. Notice how the light falls on some parts of the “earth” and not others. The lit and dim parts change when the earth rotates. This is how night and day are caused. The lit parts of the “earth” are where countries experience day and the dim parts that are turned away are where it is nighttime.
- To demonstrate how seasons are caused, the person representing the “earth” should rotate and revolve around the sun *while* tilted (or leaning slightly to the right). The “sun” should have its light on. You will notice that when the northern part of the “earth” (called the

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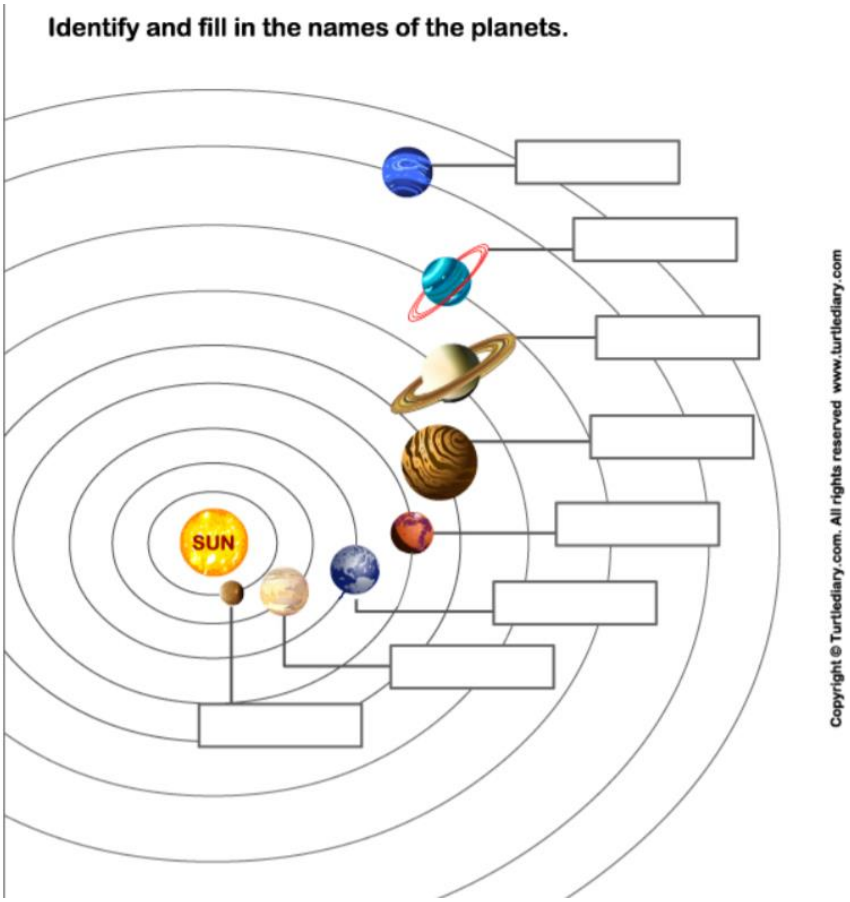
| | Northern Hemisphere) receives direct sunlight, the lower part (called the southern hemisphere) receives less light. This is why when the Northern Hemisphere experiences summer, it is actually winter in the Southern Hemisphere. The same is true when the order is flipped as the earth continues to revolve around the sun and the Northern Hemisphere is tilted away from the sun, resulting in winter for the Northern Hemisphere and summer in the Southern Hemisphere! |
| **5 minutes** | ● Take a small ball or round object the size of a grape and a round plate with raised edges like the following<br>  <br>● Place the object in the plate and begin rotating the plate slowly so that the object moves along the edge of the plate<br>● Imagine that the plate is the solar system and the center of the plate is where the sun is positioned. This is how planets move in a fixed path around the sun!<br>● If the round object was the Earth, how would it move? What about Venus?<br>● Reflection questions<br>- How long do you think it takes the Earth to rotate around itself? (one day)<br>- It takes different amounts of time to complete a rotation - it takes Neptune only 16 hours while Mercury completes it in 1,408 hours! The amount of time it takes to complete a rotation is the equivalent of one day on planets!<br>- How long do you think it takes the Earth to revolve around the sun? (one year or 365 days!) |
| **15 minutes** | ● Draw and label the following image on a piece of paper without looking at the appendix. |




source: https://www.turtlediary.com/worksheet/planets-of-solar-system.html

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| **10 minutes** | ● Numeracy activities:<br>- You just discovered a new planet that is very far from the sun! It takes this planet half the time it takes Earth to complete one rotation. How many hours does this planet complete one rotation around its axis? (Hint: 1 day = 24 hours)<br>- It takes the Earth 365 days to complete one revolution around the sun (also called a year), but it takes Venus 140 days less this amount of time to complete it. How long is a year in Venus? |

# DAY 3

Today you will learn about temperature on different planets in our solar system and create 2D or 3D solar system model!

| Suggested Duration | Activity and Description |
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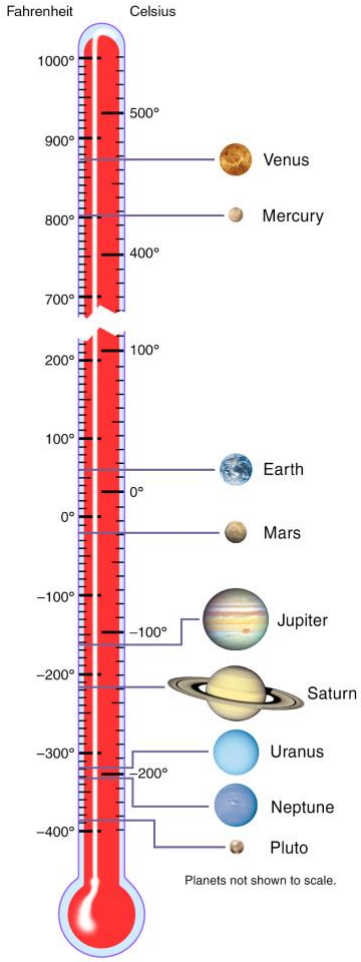
**10 minutes**

- Recall each planet's position with relation to the sun. How hot or cold do you think it is on each planet? The learner will think about the weather on each planet. What planet do you think would be the hottest? Think, then look at the image below:




source: https://solarsystem.nasa.gov/resources/681/solar-system-temperatures/

**30 minutes**

- Numeracy activities:
  - Let's see if it's true that in general planets that are farther from the sun are colder. Recreate the figure above in a number line from -300 to 500 (representing degrees celsius) and write down the name of each planet under their average temperature. Mark each point indicating the temperature of a planet in a different color and write the name of each planet in that same color as the point on the number line. Now, underneath each planet's name, write a number indicating the order of planets in relation to the sun. 1 should go under Mercury, 2 under Venus etc. What can

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| | you conclude? Is it true that planets farther away from the sun are colder?<br>- Let's find out how hot our solar system is collectively! Add all the temperatures of the planets to find the answer, making sure you pay attention to planets with negative average temperatures! |
| **30-40 minutes** | ● Now it's time to create your solar system model to showcase what you have learned. Make sure that your model represents all planets along with 2-3 fun facts about each one such as size, shape, average temperature etc.<br>● You can create a 2D model on a piece of paper. Draw, color, and cut out:<br>- the sun<br>- the eight planets in the solar system as accurately as possible. Make sure that you draw these big enough to cut out for your solar system display<br>● You can also use scrunched up paper or aluminum foil to make paper or aluminum foil balls for a 3D model. An adult should scrunch up pieces of paper, soak it in water and keep scrunching it until it reaches the desired consistency, and finally tape around it to create a sphere out of paper. Aluminum foil can be used instead to create a sphere for the planets. Simply scrunch up pieces of aluminum foil to create a spherical shape and rub it against a rough surface to smoothen it. You can create balls of different sizes for the planets and finally label each ball to represent each of the eight planets. You can also use any round objects available in your house for the 3D model.<br>● You may choose to include the orbital paths for each planet in your final model. Below are some examples of solar system models |
| **10 minutes** | ● Present the model to your family and state one fun fact about each planet!<br>● You can also quiz family members to see how much they know about planets. |

# ASSESSMENT CRITERIA

- Correct understanding of planets in the solar system and each planet's position in relation to the sun
- Correct understanding of solar system planets movement in space
- Completion of 2D or 3D solar system model with facts about each planet

# ADDITIONAL ENRICHMENT ACTIVITIES

- Learners can perform more complex operations using temperature figures by dividing figures for example to find out how many times more hot/cold a planet is compared to another
- Learners can write a short story imagining life on a planet of their choice and describing what a day would look like there

# MODIFICIATIONS FOR SIMPLIFICATION

Learners can draw the solar system and show planets' distance from the sun and write a few interesting facts about each planet using the information in appendix 1. Learners can do the experiments on day 2 to demonstrate gravity, rotation and revolution, night and day and seasons.

## APPENDIX 1

# Space Game Cheatsheet

### Earth

- the planet we live on
- 3rd planet from the sun
- only has 1 moon

### Mercury

- closest to the sun
- gray colored
- no atmosphere

### Sun

- a star
- the planets orbit around it
- provides the Earth with warmth

### Jupiter

- 5th planet from the sun
- largest planet
- has 53 moons

### Uranus

- light blue planet
- 7th planet from the sun
- coldest temperature of the planets

### Neptune

- blue planet
- 8th planet from the sun
- has 6 faint rings

### Saturn

- has large rings
- 2nd largest planet
- 6th planet from the sun

### Mars

- red planet
- 4th planet from the sun
- has 2 moons

### Venus

- 2nd planet from the sun
- hottest planet
- no moon

### Astronaut

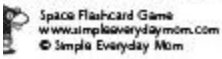
- person who travels in space

### Space Shuttle

- reusable spacecraft that carries people into space

### Rocket Ship

- non-reusable vehicle that goes into space




Source: https://www.simpleeverydaymom.com/solar-system-for-kids-game/