Tour of the Solar System

Notes for Teachers

Activity Summary

Objective The aim of this activity is to expose students to the relative distances of each planet and sun in our solar system.

Overview 1) The teacher gives a detailed background presentation (provided by CPSX) about the sun, planets, and everything else that orbits the sun (dwarf planets to meteoroids).

2) This hands-on activity allows students to apply the relative distance concept in an applicable manner.

3) Students will also learn the order of the planets in our solar system.

4) Students will sketch the planets using the relative scale (i.e. Venus is smaller than Earth but bigger than Mercury).

Outcome Students will leave the activity knowing the order of the planets and how far they are relative to each other. Students can also use the mode and extend their learning and incorporate comets, asteroids, meteoroids, and Kuiper Belt objects.

Curriculum Outcomes:

Grade 1 (Understanding Earth and Space Systems)
3.1 identify the sun as Earth's principal source of heat and light

Grade 1 (Understanding Matter and Energy)
3.2 demonstrate an understanding that the sun, as the earth's principal source of energy, warms the air, land, and water; is a source of light for the earth; and makes it possible to grow food

Grade 6 (Understanding Earth and Space Systems)
2.2 use technological problem-solving skills (see page 16) to design, build, and test devices (e.g., a sundial, a model of the earth's rotation
around the sun) for investigating the motions of different bodies in the solar system
2.4 use appropriate science and technology vocabulary, including axis, tilt, rotation, revolution, planets, moons, comets, and asteroids, in oral
and written communication
3.1 identify components of the solar system, including the sun, the earth, and other planets, natural satellites, comets, asteroids, and meteoroids, and describe their physical characteristics in qualitative terms

Grade 9 (Academic Science) Earth and Space Science: The Study of the Universe
D2.1 use appropriate terminology related to the study of the universe, including, but not limited to: *celestial objects, orbital radius, retrograde motion,* and *satellite*
D2.5 compare and contrast properties of celestial objects visible in the night sky, drawing on information gathered through research and using
an appropriate format (e.g., compare the size of planets; represent the distance of stars from Earth using scientific notation; compare star
temperatures and colour)
D3.3 describe the major components of the solar system and the universe (e.g., planets, stars, galaxies), using appropriate scientific terminology and units
D3.4 describe the sun's composition and energy source, and explain how its energy warms Earth and supports life on the planet (e.g., with
reference to the types of radiation the sun emits and the interaction of the sun's energy with Earth's atmosphere)

Grade 9 (Applied Science) Earth and Space Science: Space Exploration
D2.1 use appropriate terminology related to space exploration, including, but not limited to: astronomical units, gravitational pull, and universe
D3.1 describe the major components of the universe (e.g., planets, moons, stars, galaxies), the motion of the different types of celestial objects, and the distances between certain objects, using appropriate scientific terminology and units
D3.2 compare the characteristics and properties of celestial objects that constitute the solar system, including their motion and their distance from other celestial objects in the solar system
D3.4 describe the characteristics of the sun and the effects of its energy on Earth and Earth's atmosphere

Grade 12 (Earth and Space Sciences)
B3.2 explain the scale of distances between celestial bodies (e.g., with reference to astronomical units, light years, and parsecs) and the methods astronomers use to determine these distances (e.g., stellar parallax, cepheid variables)
C3.1 explain the composition of the solar system (e.g., the sun, terrestrial inner planets, the asteroid belt, gas giant outer planets, the
Kuiper belt, the scattered disc, the heliopause, the Oort cloud), and describe the characteristics of each component
C3.2 identify and explain the classes of objects orbiting the sun (e.g., planets, dwarf planets, small solar system bodies
C3.4 identify the factors that determined the properties of bodies in the solar system (e.g., differences in distance from the sun result in
temperature variations that determine whether substances on a planet, moon, or other body are solid or gaseous)
C3.6 compare Earth with other objects in the solar system with respect to properties such as mass, size, composition, rotation, magnetic field, and gravitational field

Procedure For Teachers

Preparation

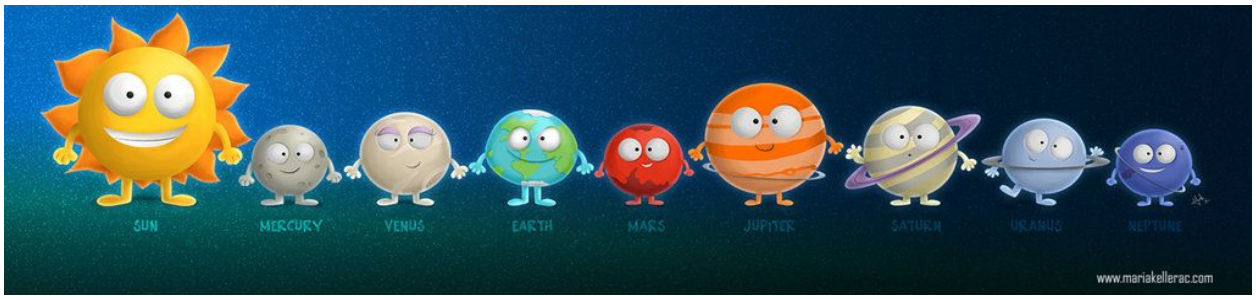
Teachers will distribute a one meter tape/cash register roll to each group of students. Each group will need pencil and colored pencils. It is also recommended the teacher post the chart of relative distances on the board. It's up to the teacher if she/he wants to distribute the hand-out with all the steps.

Presentation

The Teacher should use the Pocket-Solar-System PowerPoint. The slides are clear and to the point to help the teacher as well as the students through process of creating the pocket solar system. Depending on the level of the class, the teacher may need to go around each group and make sure they are following the instructions correctly.

Demonstration

After students finish marking and labeling all the planets, the next part of the activity is to sketch each planet using a relative scale. In other words, when you draw Earth, then the next planet Mercury should be drawn smaller, but bigger than Mars.



Background Research

These questions are intended to provide context for this experiment. An answer key (for the possible questions for your unit test below) for teachers provides information which may surpass what is expected from students, but may help the teacher in explaining concepts.

Follow up

You can extend this activity by incorporating other objects that orbit the sun, such as, dwarf planets, comets, asteroids, meteoroids, and Kuiper Belt.

Possible Questions for Your Unit Test:

1) What does the average distance in "AU" stand for?
    - Astronomical unit
2) Name 2 gases that are found in gas giants
    - Hydrogen and Helium

3) Is Pluto a planet? Explain.
   - No. It is a dwarf planet because it does not clear the neighborhood around its orbit.

4) What are the 3 criteria for planet classification?
   - Must be spherical, Orbit the Sun, and Must clear the neighborhood around its orbit

5) What is the coldest planet?
   - Uranus with a minimum temperature of -224.2 C

6) Other than lack of food and water, name 3 reasons why we cannot survive on Jupiter?
   - It's a gaseous planet and therefore lacks a well defined solid surface
   - Does not have oxygen
   - Too far from the sun and can't sustain human life

7) What is special about Ganymede? Where is it found?
   - It is the largest natural satellite or moon in our solar system. It orbits around Jupiter.

8) Does Pluto orbit around the sun on the same flat plane as the other planets?
   - No, pluto orbits at a 17 degree angle with the flat plane of the other planets.

9) Which planets don't have moons?
   - Venus and Mercury

10) Name the Inner Planets
   - Mercury, Venus, Earth, Mars

11) Name the Outer Planets
   - Jupiter, Saturn, Uranus, Neptune

12) What is the difference between a planet and dwarf planet?
   - A dwarf planet has not cleared its neighbourhood around its orbit.

Closing Notes

Thank you for participating in the education and outreach initiatives of the Centre for Planetary Science and Exploration! We are always thinking of new Planetary Science focused activities to share in classrooms and with the public. If you have any comments, questions, recommendations for how we can make this program stronger, or want a Planetary Scientist to visit your classroom (even virtually!) please field your thoughts to:

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