

Where Are We Going?

Elementary grades

Lesson Summary

Students map the progress of a “spacebus” as it travels through the solar system. They practice rounding numbers, multiplying numbers and working with simple fractions.

Prior Knowledge & Skills

- Arithmetic

AAAS Science Benchmarks

The Physical Setting

The Universe

NSES Science Standards

- **Earth and space science:** Objects in the sky

NCTM National Mathematics Standards

- **Number and operations:** Multiplying and dividing numbers, Understanding commonly used fractions, Estimation
- **Problem solving:** Solve problems that arise in mathematics and other contexts

Teaching Time: One 45-minute period

Materials

Each student needs:

- Pencil
- Student activity sheet

To share with the whole class:

- New Horizons growth chart poster (optional)

Advanced Planning

Preparation Time: 10 minutes

1. Gather materials
2. Review lesson plan

NEW HORIZONS



TO PLUTO AND BEYOND

<http://pluto.jhuapl.edu>



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Level

Grades 2 - 5

Learning Goals

Practice rounding numbers to ones and tens places, multiplying numbers, working with simple fractions.

Understanding the placement and distances of planets in the Solar System.

National Science Education Standards

Standard D: Objects in the Sky

National Council of Teachers of Mathematics

Number and Operations: Multiplying and dividing numbers; understanding commonly used fractions; estimation (rounding)

Problem Solving: Solve problems that arise in mathematics and other contexts

Materials per class:

New Horizons growth chart poster (optional—to help visualize movements)

Materials per student:

Pencil

Student Activity Sheet

Teacher Overview

1. Students will be using mathematics skills (rounding, multiplication, fractions) to pilot an imaginary spacebus around the Solar System.
2. At the beginning of the Student Activity Sheet, several questions are posed regarding the solar system and the distances of the planets from the Sun. You may want to discuss these questions or have students write their thoughts in a journal.



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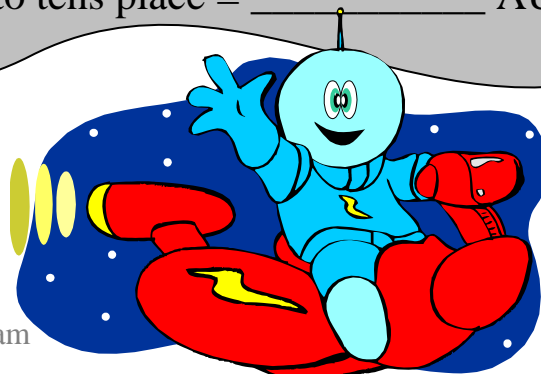
STUDENT ACTIVITY SHEET

The planets in the Solar System are not evenly spaced out in distance from the Sun. What do you notice about the sizes of the orbits? Compare the orbits near the Sun with those farther away from the Sun. If you were the commander of a spacebus that traveled among the planets, would you rather travel between the Inner Planets (Mercury, Venus, Earth, Mars) or the Outer Planets (Jupiter, Saturn, Uranus, Neptune, Pluto)? Why?

Imagine that you are the commander of a school spacebus. You will use your knowledge of the Solar System to pick up students at their home planets. Make sure you don't bother flying to Mercury and Venus because it is always summer vacation on those planets!

To help you find your way around, *estimate* the distances to the planets outside of Earth's orbit.

Earth	1.0 AU	→ round to ones place = _____	AU
Mars	1.5 AU	→ round to ones place = _____	AU
Jupiter	5.2 AU	→ round to ones place = _____	AU
Saturn	9.5 AU	→ round to ones place = _____	AU
Uranus	19.2 AU	→ round to tens place = _____	AU
Neptune	30.0 AU	→ round to tens place = _____	AU
Pluto	39.5 AU	→ round to tens place = _____	AU



Next, follow the instructions below to figure out which planet the next spacebus stop is on. Always start at Earth, your home. Be sure to write down your location after each step. If you have a copy of the New Horizons poster, you may use it to help find your way through the Solar System.

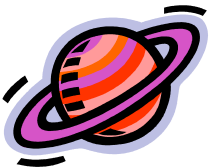


Example: Go 20 times farther away from the Sun. Travel half way back.

Answer: Earth is 1 AU from the Sun, so $20 \times 1 \text{ AU} = 20 \text{ AU}$, which is Uranus.

From Uranus we come half way back so $1/2 \times 20 \text{ AU} = 10 \text{ AU}$, so the spacebus stop is at Saturn.

1. Go 10 times farther away from the Sun. Travel half way back.
2. Go 30 times farther away from the Sun. Travel $1/3$ of the way back.
3. Go 40 times farther away from the Sun. Travel $1/2$ way back. Travel $1/2$ way back. Travel $1/2$ way back.
4. Go twice as far from the Sun. Go 10 times as far from the Sun.
5. Go 30 times farther away from the Sun. Go $2/3$ of the way back to the Sun. Go $1/2$ way back to the Sun.
6. Go 40 times farther away from the Sun. Travel $3/4$ of the way back. Go 3 times farther away. Go $1/3$ of the way back towards the Sun.



7. Starting at Earth, make up your own trip with four stops. Give it to a partner to solve.

Answers

1. Saturn, Jupiter
2. Neptune, Uranus
3. Pluto, Uranus, Saturn, Jupiter
4. Mars, Uranus
5. Neptune, Saturn, Jupiter
6. Pluto, Saturn, Neptune, Uranus