



Solar System Bead Distance

Primary Audience:

Description: Participants create a model demonstrating the scale distances of the Solar System using astronomical units that have been converted into a 10-centimeter scale.

Keywords: Distance, AU, space

Concepts:

- Astronomical Unit - 1 AU = approximately 150 million kilometers (93 million miles)

Materials:

- Per Participant:
 - Planet Beads:
 - Sun (yellow)
 - Mercury (red)
 - Venus (cream)
 - Earth (blue)
 - Mars (red)
 - Asteroid (black)
 - Jupiter (orange)
 - Saturn (gold)
 - Uranus (blue)
 - Neptune (blue)
 - Pluto (brown)
 - 4.5 Meters of String
 - Meter Sticks or Measuring Device

Instructions:

Our Solar System is immense in size by normal standards. We think of the planets as revolving around the Sun, but rarely consider how far each planet is from the Sun. Furthermore, we fail to appreciate the even greater distances to the other stars.

Astronomers use the distance from the Sun to the Earth as one “astronomical unit”. This unit provides an easy way to calculate the distances of the other planets from the Sun.

We will construct a distance model of the Solar System to scale, using colored beads as planets. The chart below shows the planets and asteroid belt in order along with their distance from the Sun in astronomical units. First, complete the chart by multiplying each AU distance by our scale factor of 10 cm per astronomical unit. Next, use the new

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distance to construct a scale model of our Solar System. Start your model by cutting a 4.5 m piece of string. Use the distances in cm that you have calculated in the chart below to measure the distance from the Sun on the string to the appropriate planet and tie the colored bead in place.

Possible Interactive Questions:

- How far do you think the closest planet is? How about the closest star?
- If you were to travel to the nearest star, how long would it take?

What's Going On?

Planet	AU	Scale value (cm)	Color
Sun	0.0 AU	_____cm	yellow
Mercury	0.4 AU	_____cm	solid red
Venus	0.7 AU	_____cm	cream
Earth	1.0 AU	_____cm	clear blue
Mars	1.5 AU	_____cm	clear red
Asteroid belt	2.8 AU	_____cm	black
Jupiter	5.0 AU	_____cm	orange
Saturn	10.0 AU	_____cm	clear gold
Uranus	19.0 AU	_____cm	dark blue
Neptune	30.0 AU	_____cm	light blue
Pluto	39.0 AU	_____cm	brown

Astronomical Unit - 1 AU = approximately 150 million kilometers (93 million miles)

Consider that if you were traveling at the speed of light, it would take 8 minutes to travel from the Sun to the Earth (1 AU). It would take 4.3 years (traveling at the speed of light - 300,000 kilometers per second) to reach the next nearest star, Alpha Centauri!

Further Exploration:

1. Using participants as planets and the Level One Hallway as "Space," demonstrate how large the solar system is from the North Level One Spine (Ocean) to the South Level One Spine (Monster Elevator.)

Relevant Ohio Science Content Standards:

- Earth and Space Sciences 3-5 A: Explain the characteristics, cycles and patterns involving Earth and its place in the solar system.
 - 5.2: Explain that Earth is one of several planets to orbit the sun, and that the moon orbits Earth.
 - 5.4: Explain that stars are like the sun, some being smaller and some larger, but so far away that they look like points of light.
- Earth and Space Sciences 6-8 B: Explain that the universe is composed of vast amounts of matter, most of which is at incomprehensible distances and

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held together by gravitational force. Describe how the universe is studied by the use of equipment such as telescopes, probes, satellites and spacecraft.

- 8.6: Explain interstellar distances are measured in light years (e.g., the nearest star beyond the sun is 4.3 light years away).
- 8.8: Name and describe tools used to study the universe (e.g., telescopes, probes, satellites and spacecraft).