

SOLAR PIZZA: SIZE AND SCALE MODEL OF THE SUN-EARTH SYSTEM

Background Information:

What is a Solar System?

A solar system is a system made up of a star and planets where the planets orbit around a star that is at the center of the system. Our Sun (our closest star) is at the center of our solar system around which orbit our 9 planets (Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus, Neptune, and Pluto)

How Big is the Sun?

The Sun is an average star in that there are billions of other stars that are much larger than our star and just as many that are much smaller. There are also billions of other stars that are much hotter than our star and just as many that are much cooler. Because our sun is by far our closest star, it looks bigger and brighter to us than all the other stars.

How Big is the Sun compared to the Earth?

There are two ways to think about the comparative size of the Sun and Earth. (1) It takes about 100 Earths lined up end-to-end to stretch across the surface of the Sun. (2) If you pretend the Sun is a hollow ball, it would take one million Earths to fill it!

How Far Away is the Sun?

The Sun is 93 million miles (150 million kilometers) away from Earth. If we could ride in a minivan to the Sun, it would take us about 160 years to get there... with no bathroom breaks! Have you heard of the Speed of Light? If we could travel at the speed of light, that 160-year trip would only take us about 8 minutes. It takes about 8 minutes for Sunlight escaping the Sun to reach the Earth!

What is a Scale Model?

When you make a scale model of an object you make a relative sized copy of the object. Sometimes this copy is larger than the actual size and sometimes it is smaller. We make scale models that are larger than the actual size so that we can see more details. For example when you draw a human cell. If you don't have access to a powerful microscope, you can use a blown up scale model of the cell in order to see the different parts of the cell. Sometimes we make scale models that are smaller than actual size so that we can see things that are much larger than we are, like our Solar System. An example of such a scale model is to say, "If the

Sun were the size of a basketball, then the Earth would be the size of the head of a pin.”

Materials:

- Solar Pizzas
- white paper with an 8” diameter circle
- plain white paper
- Rulers and/or yard sticks
- Pens
- Long open space (at least 75 feet or 23 meters)

Activity:

1. Divide participants into small groups with at least 2 participants but no larger than 5.
2. Give each group a sheet of paper with the circle, a sheet of plain white paper, and a pen.
3. Explain to each group that the circle represents the Sun and that you want them to draw how big they think the earth should be relative to the Sun on their piece of plain white paper. The group must agree as a whole on the size of the Earth and they cannot proceed to the next step until everyone is in agreement.
4. Have the groups tape down the piece of paper with the Sun. Then have them tape the piece of paper with their earth down as far away from the Sun as they think it should be based on the size and scale of the model they are putting together. Again, the group must be in agreement before proceeding to the next step.
5. Once the group is in agreement give them a solar pizza. Explain that the circle on the piece of paper they taped down to represent the Sun is the same size as the solar pizza. Have them flip the solar pizza to find the relative size of the Earth. Have the groups compare it to the size of the Earth they drew.
6. Explain to the groups that on the Sun-Earth scale model they creating, the Sun and Earth should be separated by 75 feet (23 meters).
7. Now have groups measure out 75 feet (23 meters) using the rulers or yardsticks. Have the groups compare the actual distance between the Sun and Earth to the distance they had predicted.

TRY THESE SCALES MODELS AT HOME!

Paper Toilet Solar System: Size and Scale of the Solar System

Materials: Sun and Planet stickers, a handful of coins or a bag of M&Ms (or equivalent candy), roll of toilet paper, cut out planets, and a long open space (42 feet or 13 meters).

Step 1: You will need 10 coins or M&Ms to represent the Sun and the 9 planets. Choose a point at one end of a long hallway, large room or outdoor space and mark it as your starting point. Place one coin or M&M at this spot to represent the Sun. Now walking in a straight line place the remaining 9 coins, or M&Ms representing the 9 planets where you think they should be relative to the Sun distance wise. You will now create a toilet paper system next the M&M system you just created. This way you can compare the two systems side by side and see how accurate you were in your predictions.

Step 2: Begin unrolling the toilet paper (TP) in a straight line parallel to your Coin/M&M solar system model. The two Suns (any object can represent the Sun on your TP solar system) should be side by side. Use the chart provided to know where to place the planets along the rolled out toilet paper. For this model each separate sheet of toilet paper represents 3.6 billion miles (600 billion kilometers). Note that you are working with two different scales: Size (the relative size of the Sun and Planet cut outs) and distance (the distances between the planets). This is due to the enormous distances involved. The planet cut-outs would be too small to use in this scale model.

Sun	0
Mercury	1.0 sheet from the Sun
Venus	1.8 sheets from the Sun
Earth	2.5 sheets from the Sun
Mars	3.8 sheets from the Sun
Jupiter	13.2 sheets from the Sun
Saturn	24.2 sheets from the Sun
Uranus	48.6 sheets from the Sun
Neptune	76.3 sheets from the Sun
Pluto	100.0 sheets from the Sun

Playdoh Earth-Moon system: size and scale of the Earth-Moon System

Materials: 3lbs. of Playdoh, paper, pen, and a ruler

Step 1: Divide the Playdoh into 50 equal sized balls (as equal as possible). Choose an average sized ball and set it aside. Squash the other 49 back together. You now have the EARTH and MOON.

Step 2: The distance between the EARTH and the MOON should be equal to 30 EARTH diameters.