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Astronomy Resources

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Figure 5: This is the sky facing southeast on June 15 at midnight. The constellations shown are Cap=Capricornus, Sgr=Sagittarius and Sco=Scorpius. *Uranus* is just below naked-eye brightness. Through binoculars, *Uranus* can be seen about 2.5° northeast of the top star in the "teapot" of Sagittarius.

Figure 6: This is the sky facing northwest on June 24 at about 8 p.m. The four constellations shown are Lyn=Lynx, Cnc=Cancer, Gem=Gemini and Aur=Auriga. The Moon is a thin crescent only 3 days old and is illuminated 7 percent.

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The scale of the solar system is often demonstrated by having students stand at appropriate distances away from one another in order to represent the planets' average distances from the Sun. At any practical representative scale, however, the physical diameters of the planets cannot be shown at the same time.

To portray the physical sizes of the planets, the author uses a second scale model of the solar system in which the distances from the Sun are ignored. While circles drawn on paper or a chalkboard can illustrate the great difference in diameters among the planets, such a two-dimensional depiction does not sufficiently convey the drastically different *volumes* of the planets. The goal of this model was to show proportionally the three-dimensional space taken up by each planet using actual spheres that are readily found and familiar to students.

The key elements of this model are to be found in the produce section of the supermarket. In the solar system salad, a different common spherical fruit or vegetable is used for each planet. A suggested "recipe" follows:

Mercury -- a small pea
Venus -- a grape
Earth (*Venus*' twin) -- another grape
Mars -- a large pea
Jupiter -- a large grapefruit (suitably oblate)
Saturn -- a large navel orange
Uranus and *Neptune* -- two limes
Pluto -- another small pea

On this scale, the author asks students to think of the Sun as the largest Jack-o-lantern pumpkin they have ever seen.

Typically, the author takes the models of the planets out of an insulated lunch bag and places them one at a time on the lecture table. This is done in order of increasing distance from the Sun. By the time *Mars* appears, the students are encouraged to ask why such a small scale was established. The appearance of *Jupiter* then answers this question and dramatically demonstrates the difference in size between a terrestrial planet and a gas giant. (A few dashes of pepper between *Mars* and *Jupiter* get across the idea of the asteroid belt.)

The scale used in the solar system salad is far from exact. Indeed, the actual scale in this model is compressed; the differences between the largest and smallest planets should be more extreme. Students should be told that the model is an approximation and that they should consult a textbook or handout for the actual radii.

The author finds that he is better able to hold the attention of students with this model than with the more standard styrofoam balls. The solar system salad is one of the more memorable demonstrations of the astronomy class.

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Editor's Note: Darrel Hoff, *ISTJ* Assistant Editor, pointed out that, after the demonstration, some students may still be thinking in terms of diameter rather than volume. If this occurs, it will be helpful to have a hollow ball the same size as one of the larger planet models such as the grapefruit. A hole may be cut in the hollow sphere which is slightly larger than one of the much smaller sphere models. The student may have suggested that the larger sphere is only four or five times larger than the smaller one, but will find that many more than four or five of the smaller will fit into the larger. Conveniently, grapes come by the bunch.

--C.W.B.