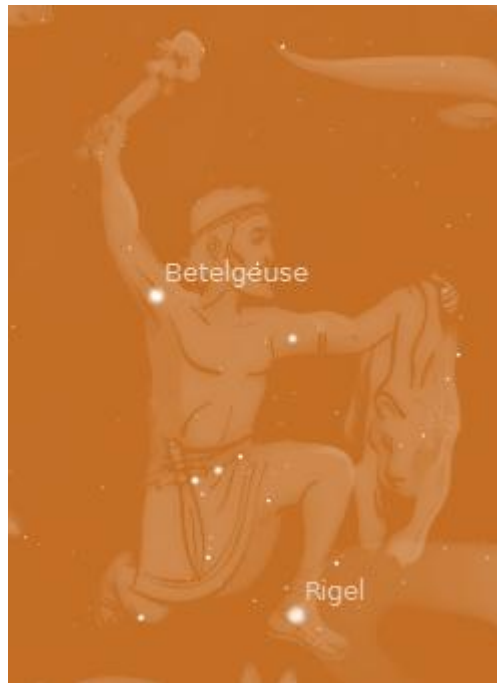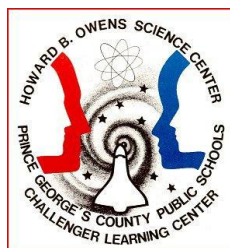# Astin's Sky Adventure

Image credit: Stellarium

Pre-Visit Activities

Howard B. Owens Science Center

Activity 1-A Scale Model of the Earth-Moon System

Suggested Length of the Activity: 1 class period

Introduction – An excellent scale model of the Earth and Moon can be made using a basketball and a tennis ball. They are the correct relative sizes. They should be 24 feet apart to be the correct relative distance. Excellent background for the teacher can be found at this website: http://blogs.discovermagazine.com/badastronomy/2011/02/24/how-far-away-is-the-moon/

Teacher and Student Materials:

- Balls of many different sizes. Provide enough balls for each student. Ask students to bring in balls from home. You can use marbles, ping-pong balls, basketballs, styrofoam balls, etc.

Procedure:

1. Place all the balls in a pile.
2. Invite each student to select a ball.
3. Instruct students to pair up in such a way that one of the students has a ball to represent Earth, and one has a ball to represent the Moon. They should be keeping in mind the sizes of Earth and the Moon, although they probably don't know the correct sizes at this point. Allow them to pair up in any way they wish.
4. Tell the students that Earth's diameter is approximately **8,000 miles** (7,918 miles (12,742 km) to be exact). The Moon's diameter is about **2,000 miles** (2,159.2 miles (3,475 km) to be exact).
5. Tell students to calculate how many times bigger Earth is than the moon, providing guidance as needed. (Or simply tell students that Earth is four times bigger than the Moon).

   8,000 miles÷2,000 miles=4

   So Earth is 4 times the diameter of the Moon. (See Image 1)
6. With this new information, tell the students to pair up again, so that one has a ball 4 times bigger than the other (many pairings will be approximate, as it is unlikely that they will have balls of exactly 4 times the size of others).
7. Next, challenge them to put their balls as far apart as they think they should be to represent the distance between Earth and the Moon. They will most likely put them too close together at this point.

8. Tell students that the Moon's average distance from Earth is about **240,000 miles** (238,900 miles (384,400 km) to be exact).

   Tell them 30 Earths would have to line up to give the correct distance, or the Moon is 30 Earth diameters away. (See Image 2)

IMAGE 1: Correct relative sizes of the Earth and Moon (not correct distance)
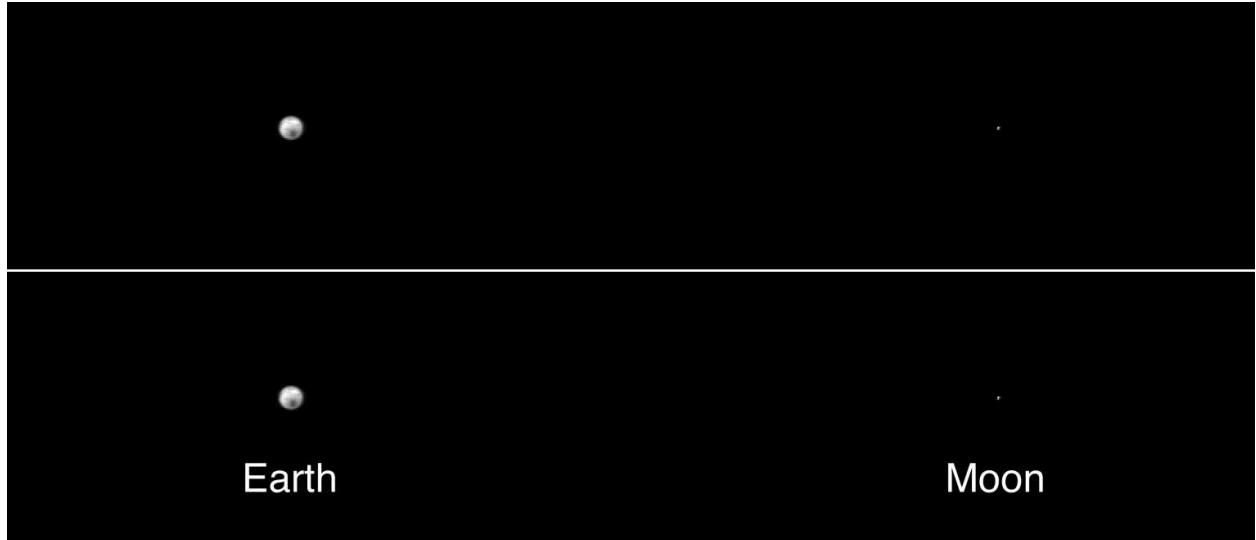*Image credit: StarDate*

IMAGE 2: Correct relative sizes AND distance of the Earth/Moon system
Image credit: NASA/Jet Propulsion Laboratory/Arizona State University

Activity 2-Creating Constellations

Suggested Length of the Activity: 1 class period

Student Materials: copies of Circle Puzzle page and Dots Puzzle page

Pre-Visit Activity 2 is taken from Planetarium Activities for Student Success (PASS) Volume 1 Jointly published by the Lawrence Hall of Science, University of California, Berkeley, CA and the New York Hall of Science, Flushing Meadows, Corona Park, NY

Part A. Circle Puzzle

Hand out the Circle Puzzle. Read the directions with the students if necessary. Then allow about ten minutes for them to work.

Invite 3-4 students to share one of their ideas by recreating it on prepared chart paper/white board/chalkboard.

Invite all students to share your papers with their neighbors to see how many different ideas they can count. Ask students leading questions such as *How many did you find? How many different possibilities do you think there are? How many of you could only come up with a few different ideas for the circles, and then just couldn't think of any more? What are some different things you could try at that point, to think of a different idea?*

Invite students to share strategies for generating new ideas that THEY find useful. Examples of strategies are: look around the room for round objects, imagine their room at home, share ideas with someone else, and so on.

Part B. Dots Puzzle*

Hand out one copy of Dots to each student. Give them about five minutes to work independently.

Have students compare their drawings with your neighbors' drawings. *Did any of you have the same idea? How many different ideas can you count?*

Hand out the final sheet, entitled "Create a Constellation." Discuss that this pattern of dots was recognized by Ancient Greek astronomers, who lived about 2000 years ago, as the Queen of Ethiopia, called Cassiopeia (Kasio-pee-ah). Cassiopeia is an especially easy constellation to find just about any time of the year.

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* The activities described in Part B have been adapted from "An Introduction to Constellation Study (or Isn't That Big Bird in the Sky?)" by Gerald Mallon. Published in *Science and Children*, November/ December, 1976, Vol. 14, No. 3, pp. 22-25.
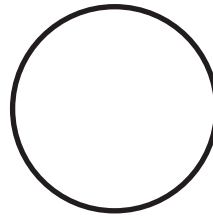
Circle Puzzle

Make each circle into a picture of something and write a name for what you draw underneath. The first two circles are completed as examples. Notice that each one is DIFFERENT and each one has a name.
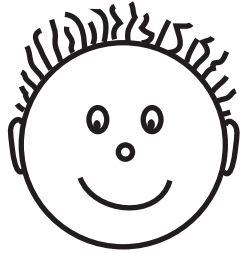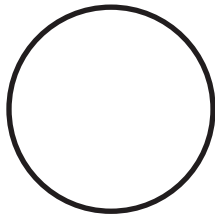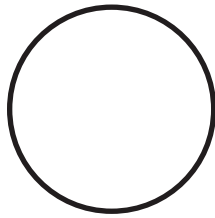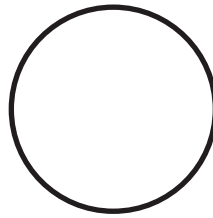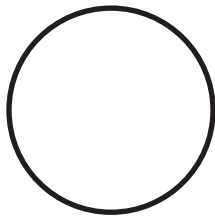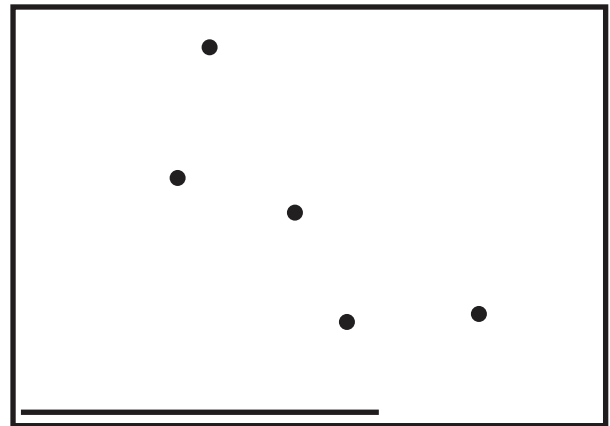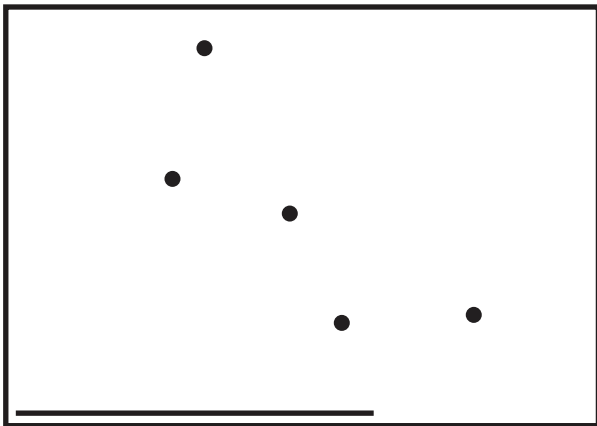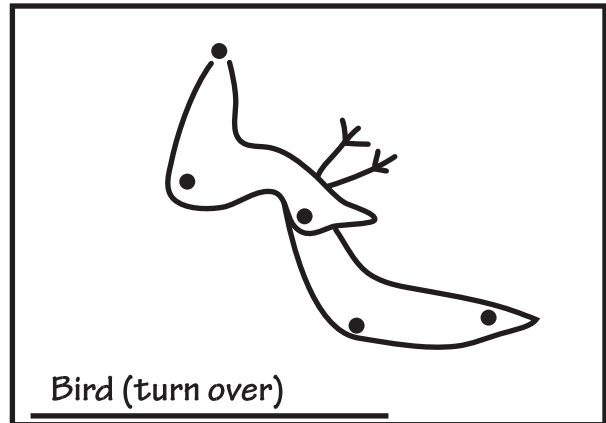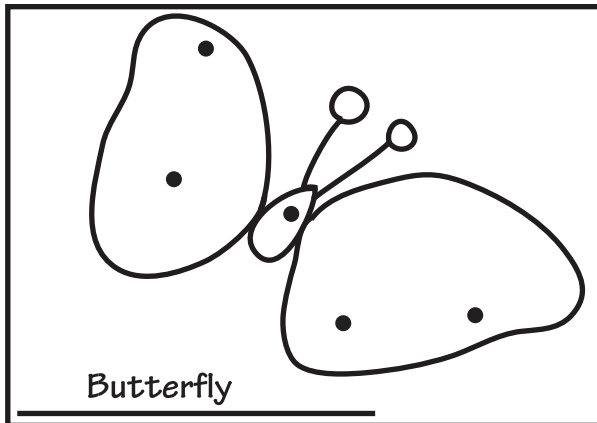
Boy
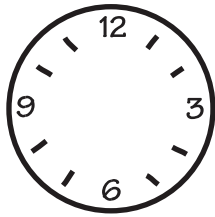
Clock
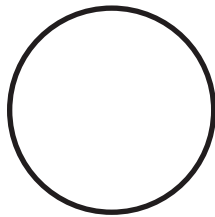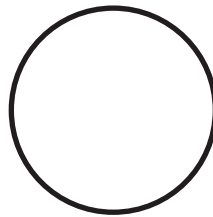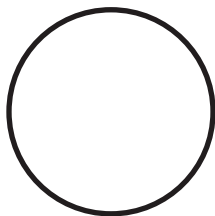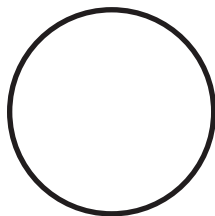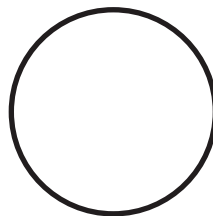
Dots Puzzle

These six pictures all show the same pattern of dots. Two examples are given.
Create four completely different pictures based on the same pattern of dots. Label each one.

Butterfly

Bird (turn over)
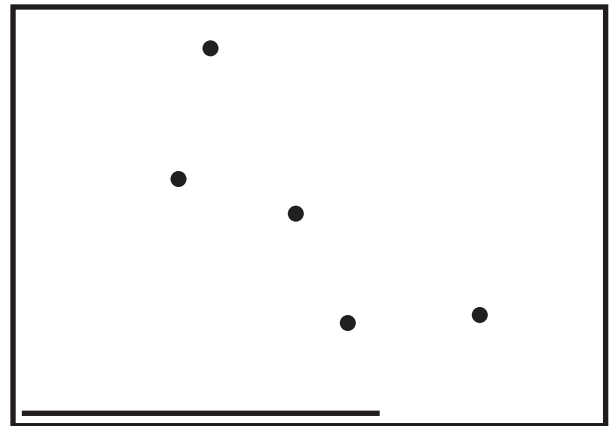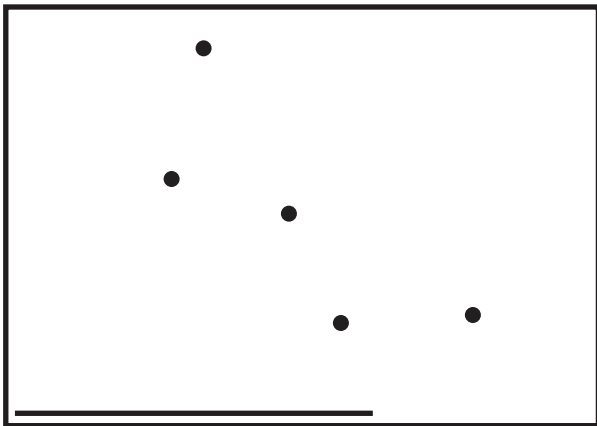
Create a Constellation

The pattern of dots from the "Dots Puzzle" is really a pattern of stars that you can find in the sky. The Ancient Greeks saw this pattern as a beautiful queen, Cassiopeia, sitting on a throne. In the box below, create your own constellation for the same pattern of stars.