

This science activity is designed for students in grades three through eight. It can be presented by teachers with no special preparation in science. Creating Constellations is keyed to concepts in the planetarium program, *Constellations Tonight*, so it will probably be most effective if presented just before or just after visiting the planetarium. Each teacher may wish to adapt the language and pace of the activity to his or her particular class.

Creating Constellations

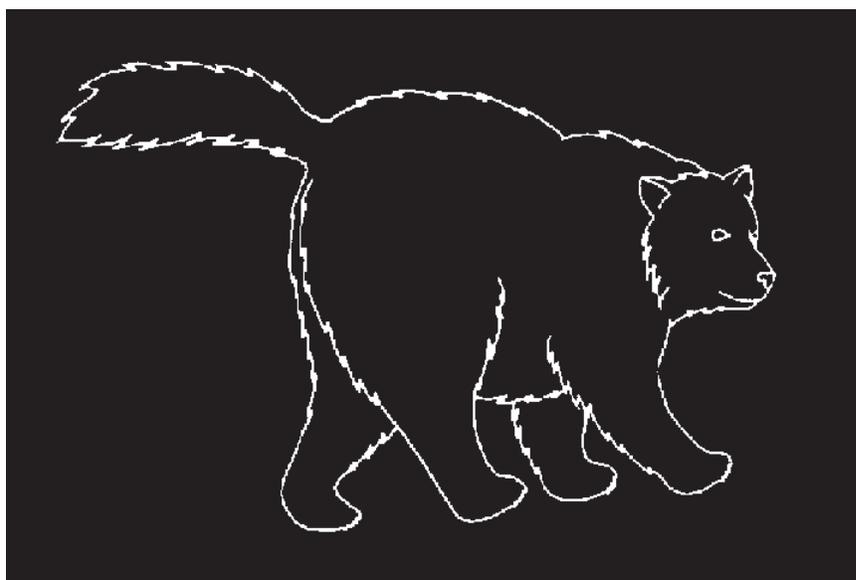
Objectives

This activity involves the stage of scientific thinking in which many different ideas, or hypotheses, are generated. It focuses on the type of problems that have many equally good solutions (like naming a new animal) in contrast to problems that have only one right answer (like finding the North Star). After the lesson, the students will be able to:

1. Recognize that several different ideas may be equally good solutions to the same problem.
2. Recognize when they need to “break set”—that is, to find a new approach to the problem. (Set breaking can be thought of as “getting out of a mental rut.”)
3. Recognize that the constellations which they invent can be just as useful as the ancient Greek and Roman constellations.

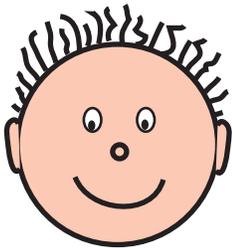
Before Class

1. Duplicate one copy of the Circle Puzzle, Dots Puzzle, and Create a Constellation for each student (masters on pp. 2, 4, and 6 respectively). Prepare large sheets of paper and crayons.
2. Have board space and tape ready to display the students’ work.
3. On a different section of the blackboard draw three or four circles, about 18-20 inches in diameter.

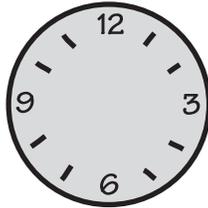


Circle Puzzle

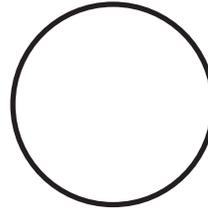
Make each circle into a picture of something and write a name for what you draw underneath. The first two circles are completed as examples. Notice that each one is DIFFERENT and each one has a name.

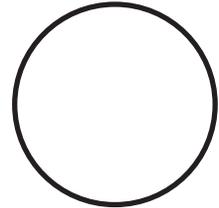


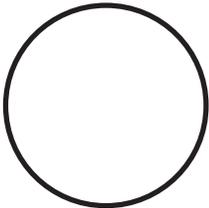
Boy

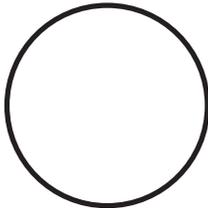


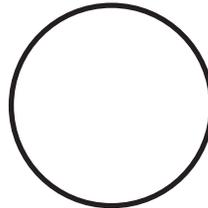
Clock

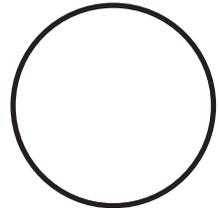


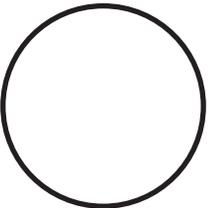


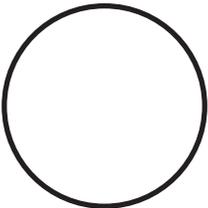


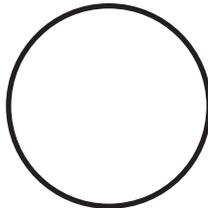


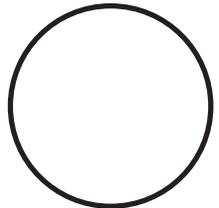


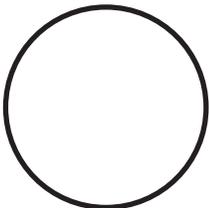


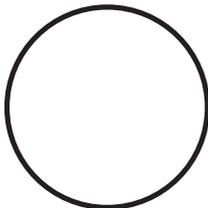


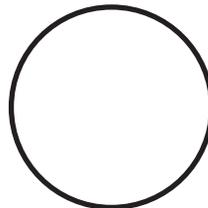


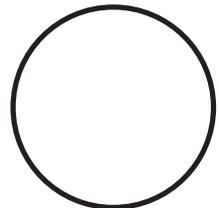












Part A. Circle Puzzle

Here is a puzzle that has many equally good answers. Make each circle into a different picture, and name what each picture shows.

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

Who would like to come to the board to show one of their ideas?

Have three or four students draw in the prepared circles on the blackboard.

Share your papers with your neighbors to see how many different ideas you can count.

How many did you find? How many different possibilities do you think there are?

How many of you thought of 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?

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

Part B. Dots Puzzle*

Directions for this puzzle are very similar to the Circle Puzzle, only you create figures out of dots instead of circles.

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

Now compare your drawings with your neighbors' drawings.

Did any of you have the same idea? How many different ideas can you count?

Let the students discuss their ideas with their neighbors for a minute or two. Then, hand out the last sheet, entitled "Create A Constellation."

On this sheet you will probably recognize the same pattern of dots that you saw in the Dots Puzzle. This is actually a pattern of stars visible in the sky. Ancient Greek astronomers, who lived about 2000 years ago, saw the Queen of Ethiopia, called Cassiopeia (pronounce: Kasio-pee-ah) in this pattern of stars.

Cassiopeia is an especially easy constellation to find just about any time of the year.

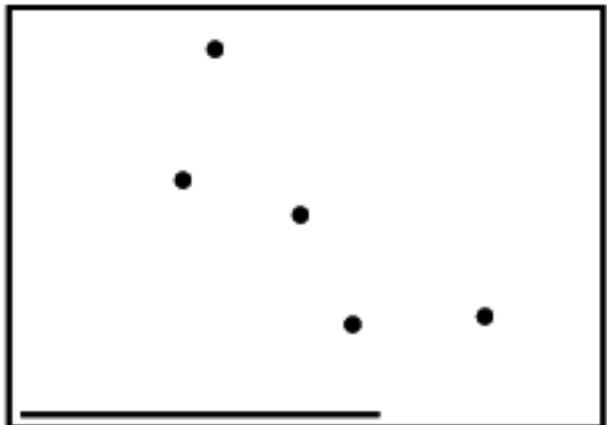
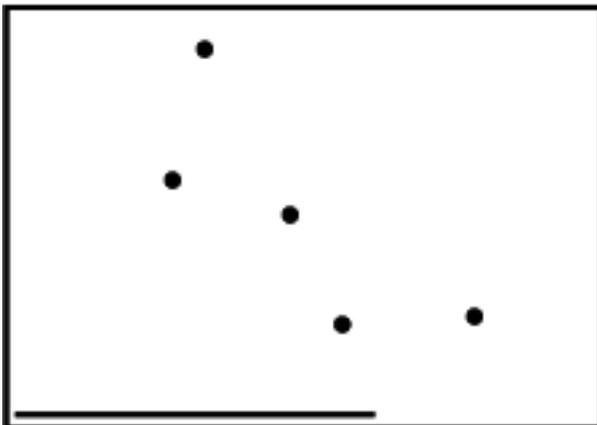
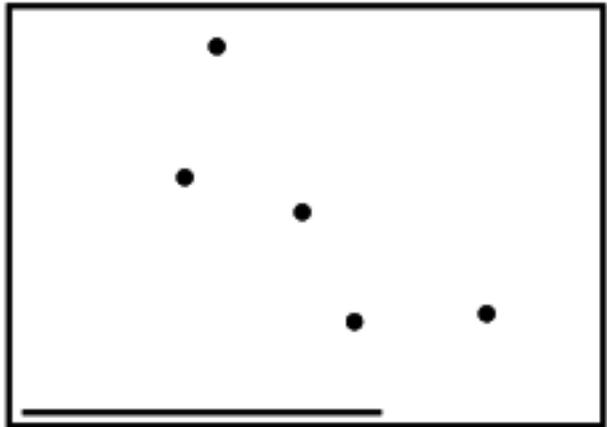
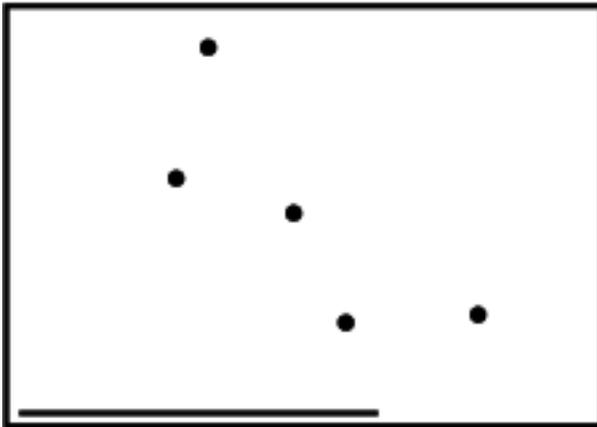
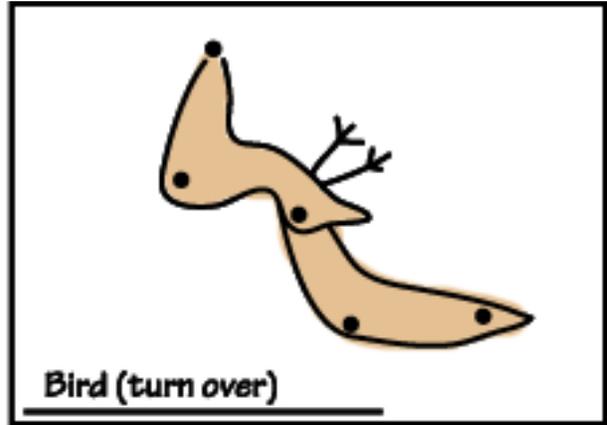
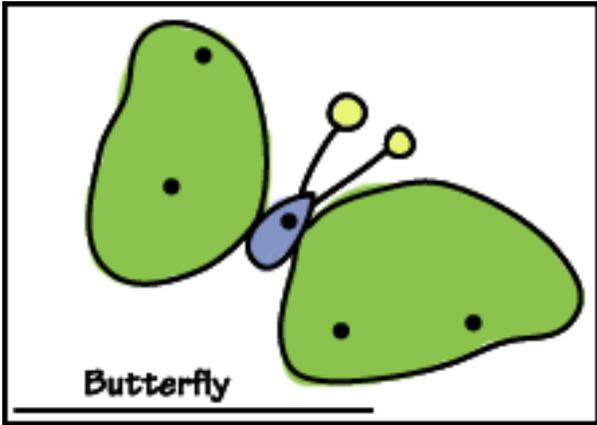
* The activities described in Part B have been adapted from "An Introduction to Constellation Study (or Isn't That Big Bird in the Sky?)" by Gerald Mallon. Published in *Science and Children*, November/December, 1976, Vol. 14, No. 3, pp. 22-25.

Dots Puzzle

These six pictures all show the same pattern of dots. In the first two pictures, people have drawn something which the dots make them think of. They labeled their pictures with a name that tells what the drawing is supposed to be.

Invent four completely different things based on the same pattern of dots.

Draw your ideas in the last four boxes and label each one to tell what it is supposed to be a picture of.



For astronomers, the word “constellation” has a more specific meaning that refers to a particular region of the sky. To make it easy to refer to areas of the sky, the whole celestial sphere is divided into the 88 classic constellations.

Any arbitrary group of stars that form a picture other than those 88 constellations is referred to as an “asterism.”

For example, Ursa Major is a constellation, but the Big Dipper is an asterism within the constellation Ursa Major.

In colloquial usage, the word “constellation” is often used to mean the same thing as an asterism. In the following activity, we are not actually making up constellations in the narrow (astronomical) sense of the term. Astronomers all over the world will not recognize “made up” constellations!

Part C. Create a Constellation

A picture and name that anyone imagines when he or she looks at a pattern of stars is called a “constellation.” In the box at the bottom of the “Create a Constellation” handout page, draw the idea which YOU like best and name it. This is your own constellation which you can find in the night sky. When you are working by yourself, your own constellation invention is just as useful, perhaps even better, than the “classic” ones.

Would it sometimes be better for us all to agree on a single constellation for everybody to use? How would that be useful?

Possible answers to this question might be: “To tell someone else where to find certain stars, or directions in the sky.”

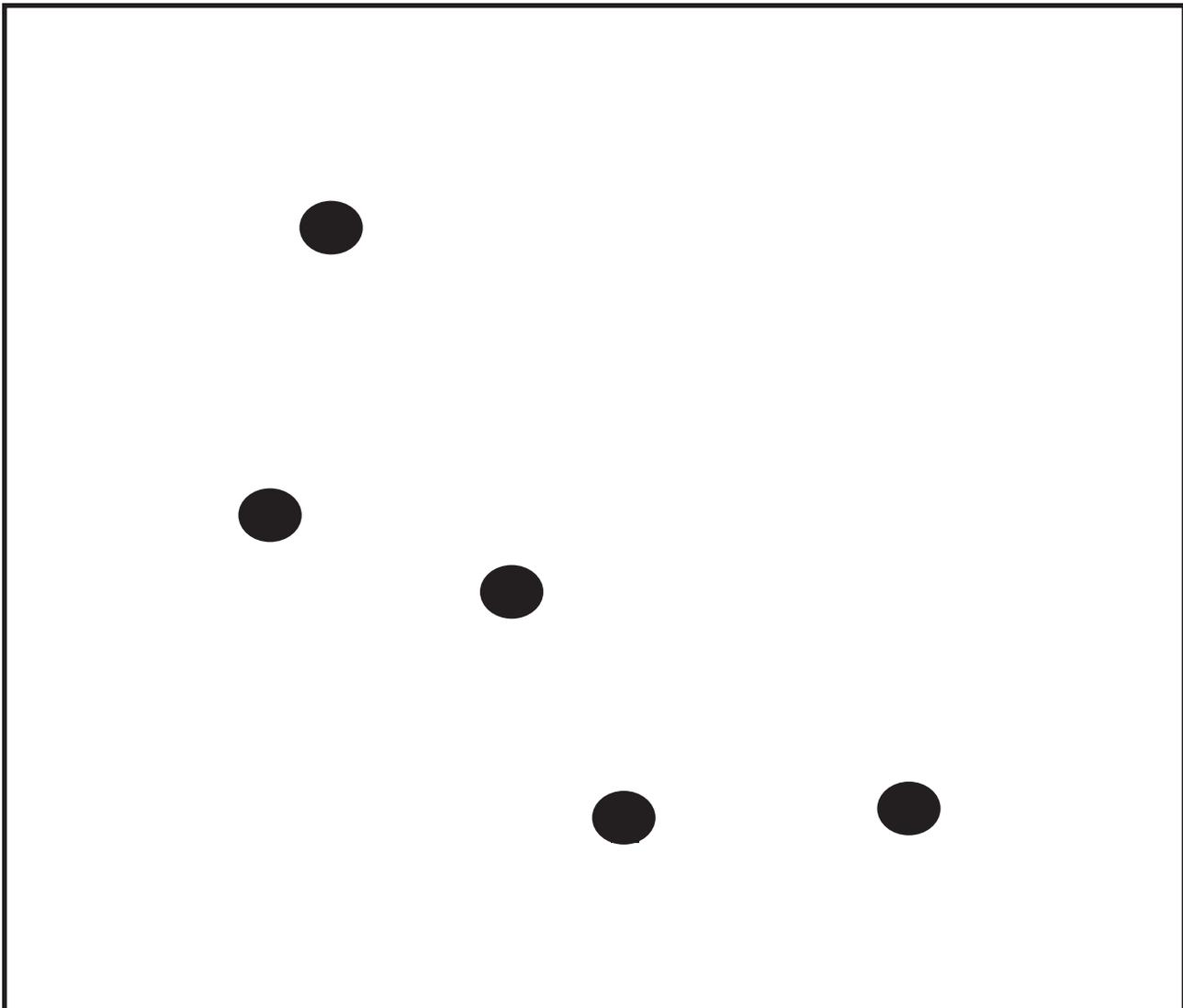
Create a Constellation

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.



The Queen Cassiopeia
Sitting On Her Throne



Follow-Up Activities

1. Have the students invent myths which tell the story of their constellations. This activity might be preceded by having them read ancient Greek, Roman, or Native American star myths which appear in many anthologies for children.
2. Have the students draw or paint more detailed pictures of the constellation figures they have created to illustrate their stories. Instruct them to show where the stars appear in the pictures.
3. The “Astronomy Quiz” classroom activity may be used as a pre-test and/or post-test to find out how well your students understand the concepts in this program. Please note that some questions refer to “Creating Constellations,” while others refer to “Using a Star Map” or Constellations Tonight. You should revise this test as needed to fit your particular classroom situation.
4. Sheldon Schafer of the Lakeview Museum in Peoria, Illinois recommends the following activity, best done just after the circle puzzle, to demonstrate the value of using constellation figures.
 - a. Draw a random assortment of dots on the board.
 - b. Ask the students to memorize the arrangement. Allow a minute or two. No notes should be taken.
 - c. Erase the dots COMPLETELY.
 - d. Ask for a volunteer to recreate the pattern on the board or have all students do so on a piece of paper.
 - e. Compare the results with the original.
 - f. Draw a new pattern of dots on the board, this time connected into some kind of figure.
 - g. Repeat steps b-f.
 - h. Compare the results of the first trial with those of the second. Usually there will be an easily noticeable difference between the two.

Make a Constellation

Edna DeVore from Independence Planetarium in San Jose, California contributes this activity in which individuals or teams of students make constellation projectors:

1. Students select (or are assigned) a constellation from a star map.
2. Using a pencil or straightened paper clip, students transfer the star pattern to the aluminum foil. For the Viewer type, the pattern must be smaller than the can diameter.
3. To project: place aluminum squares on overhead projector, turn on light and ask students to identify with their star maps.

To view: place aluminum foil over the end of the can and secure it with a rubber band. View by looking toward a bright light. Identify the pattern by using star maps. Be careful to place the pattern “right-side-up” or “right-side-out” so that the images are seen correctly, not a mirror image.

Materials (for each student or team):

For Projection Constellation

- overhead projector
- square of aluminum foil (25x25cm)
- star map for the season
- paper clip or sharp pencil
- rubber band

For Viewer Constellation

- soup cans without ends or similar sized tubes
- square of aluminum foil (10x10cm)
- star map for the season
- paper clip or sharp pencil