LESSON CREATURE FEATURE

This lesson is comprised of four parts grouped to enable students to gain appreciation of the importance making accurate scientific observations, descriptions, and drawings.

Part 1 – THE TRUTH IS OUT THERE

Students will describe an object given to them by their instructor. This is an introduction to the importance of good descriptive skills in scientific observation.

Part 2 – WHO KNOWS?

Students will attempt to draw and identify a creature based on another student's description. It will become very clear that detailed accuracy is necessary.

Part 3 – TELL IT LIKE IT IS!

Students will find out why explorers and scientists need to make accurate observations and measurements of what they see as they try their descriptions again. This time, they will be encouraged to use tools to make more detailed descriptions (measure height, weight, mass, etc.).

Part 4 – TRUTH REVEALED

Students will assess the completeness of the more detailed descriptions.

Objectives

Students will be able to:

- Demonstrate their ability to make accurate and detailed observations
- Describe their observations in written form
- Draw and identify an unknown using a written description about the unknown
- Use various types of equipment and tools to aid in making observations
- Assess other students descriptive accuracy
- Optional -- Create a scientific name describing the creature, using Latin and Greek root words.

Suggested Time Part 1 and 2 one 60 – 90 minute session,
Part 3 and 4 one 60 -- minute session.

Background Please see Student Background in Part 3 Student Sheet -- Tell It Like It Is for a discussion of why scientists need to be careful observers and good recorders of scientific detail. (Page 7)

Part 1 –

THE TRUTH IS OUT THERE

About this Part

Students will be given a "creature", assembled ahead of time by the teacher, and be asked to describe it on paper without discussing it with others or letting others see it.

Optional: They may assign their creature a Genus and species name, based on its physical characteristics. Students should not be given Student Sheets from Activity 2 or 3 at this point.

Vocabulary

Hypothesis, procedure, data, observations, analysis, conclusion, cilia, flagella, Genus, species, fertile

Materials

- Small, opaque container with lid (one per creature)
- Student Sheet for Activity 1 The Truth is Out There (one per student)
- A variety of arts and crafts items to make creatures (for example: pipe cleaners; plastic beads of various sizes, shapes and colors; "googly" eyes, feathers, etc.)
- Pencil, highlighter and box of map pencils (one per student)

Procedure

Advanced Preparation

1. Make the creatures. You may have one creature per group or one per student. Try to make them in sets of two, using the same colors, but having slight variations in the length and or shape of body parts like "appendages" or "flagella". This will give students more of a challenge. (See Creature Feature images – a page on the CD or web site, below, associated with this lesson.)

   http://ares.jsc.nasa.gov/Education/Websites/AstrobiologyEducation/creature.htm

2. Place each creature into a container marked with an identification number and close the lid.
3. Decide on location for stations around the room (unless each student will have a creature).
4. Keep a log of the stations and the corresponding creature numbers.
5. Log the names of students assigned to those stations. Alternatively, record students at specific locations after they have found a station.
6. Copy Part 1. Student Sheet – The Truth is Out There

Classroom Procedure (one suggested system – may be easily adapted to other styles)

1. Form groups containing 3 or 4 students, assigning each a group and member a number if necessary (for students' identification purposes on assessment).
2. Using location key, give each group a container with a creature, cautioning students not to let anyone else in the classroom see the creature nor hear any discussion about its appearance.
3. Pass out Student Sheet The Truth Is Out There, directing students to make individual, written descriptions of the creature in their group's box. Students should not let any other student, including members of his/her own group, see what he/she writes.
4. Have each student create a secret individual code name for his/her creature and enter it on their Student Sheet. This will enable them to keep track of which creature belongs to them. They should not, however, put their own names on their sheet at this time. Remind them to remember their code name.
5. Teacher will collect all descriptions, verifying that no student placed his/her real name on the paper.

STUDENT SHEET—PART 1

THE TRUTH IS OUT THERE

Part 1

Creature's code name _____ (Do not record the code number!)

You are a mission specialist aboard the exploration spacecraft, "Rover". Your specialty is Biology. Your ship is currently in orbit around the planet designated as RXV-12098.
Although you have not come across any life forms that appear to have intelligence, you have found a creature that is highly unusual.

Part of your job is to make daily entries into the ship's log, giving descriptions of the new life forms encountered on this voyage. You have been asked by the Captain to keep all information confidential until it can be reviewed back on Earth.

In the space provided below, describe the creature in the container on your table. You may not take the creature out of the container and you may not discuss it with others in the crew, including those in your group. Do not let anyone else see your description.

Part 2 –

WHO KNOWS?

About this Part **This is a continuation of Part 1**

Students will identify another student's creature by using their description to create a picture, and then matching it with the creature it most resembles.

Vocabulary

Hypothesis, procedure, data, observations, analysis, conclusion, cilia, flagella, Genus, species, fertile

Materials

- Student Sheet Who Knows, one per student
- Written descriptions of creatures from Part 1 Student Sheet -- The Truth Is Out There
- Creatures from Part 1, containers may be open or creature may sit on or by labeled container
- Log of student names, creature code numbers and code names

Procedure

Advanced Preparation

1. On log, add creature code name from Part 1 Student Sheets beside each students name and creature code number. Check to make sure there are no student names on the papers.
2. Copy Part 2. Student Sheet -- Who Knows?

Classroom Procedure

1. Re-distribute students' descriptions, making sure that they do not get their own.
2. Pass out Student Sheet -- Who Knows?
3. Ask students to silently and carefully read the description they have been given, without discussing the information with classmates.
4. On the Who Knows? Student Sheet, students will then draw a picture of the described creature, labeling the drawing with the code name given on the description.
5. Select one of the following options and aid students in matching their drawings with the actual creature in the description:

Option 1 6a. Teacher will direct students to move about the room, comparing the various creatures to their descriptions and drawings. Once a student has determined which creature "fits" his/her description and picture, he/she should sit in a seat at that station and record the creature code number.

7a. Should two or more students select the same creature, the teacher will guide students to work together in the identification process, i.e., comparing the descriptions for specific details, etc.

8a. After students have completed Part 2 Student Sheet, the teacher will supply the matching code numbers and code names from the teacher log.

Option 2 6b. Students remain seated, rather than moving around the room.
7b. Moving from station to station, teacher will display each creature one at a time. Teacher will give the creature code number for students to record.
8a. After students have completed Part 2 Student Sheet, the teacher will supply the matching code numbers and code names from the teacher log.

Students should compare their drawings to the actual creatures to determine the accuracy of the descriptions they were given.

STUDENT SHEET—PART 2

WHO KNOWS?

Code name of creature in description on Student Sheet – The Truth Is Out There: _____

Procedure

1. Using the information given in the description provided on Student Sheet – The Truth Is Out There, make a drawing in the space below of the described creature. Draw only what is described. Do not add anything else.

2. Identify the creature that best fits the description you were given, write its code number here: _____

3. Compare the drawing you made with the actual creature. Do you think you were successful at identifying the described creature? Circle YES or NO

   - *If "Yes" – complete Questions 4, but skip Question 5.*
   - *If "No" – skip Questions 4, and complete Question 5.*

4. List the key pieces of information that allowed you to accurately identify the creature.

5. If you think you were unsuccessful, what information was missing?

6. Write the correct code number for the description provided to you. _____

7. Does your answer in question 2 above agree with the correct code (Answer 6)? Circle YES or NO

8. If No, what happened?

Part 3 –

TELL IT LIKE IT IS!

About this Part **This Part is a continuation of Part 1 and 2**

In the Background, students will be given information about the process of exploration and the importance of making good observations in science. After using tools to measure their original creature, they will make a more accurate description. As an option, they may name their creature using Latin or Greek root words.

Vocabulary

Hypothesis, procedure, data, observations, analysis, conclusion, cilia, flagella, Genus, species, fertile

Materials

- Items used in Part 1
- Part 3 Student Sheets -- Tell It Like It Is! (total of 3) (one per student)
- Optional: List of Greek and Latin root words
- Observation tools such as:
  - ◊ Rulers
  - ◊ Measuring tapes
  - ◊ Magnifying lenses
  - ◊ Scales or balances

Procedure

Advanced Preparation

1. Place observation and measuring tools in an easily accessible location
2. Copy Part 3 Student Sheets – Tell It Like It Is!

Classroom Procedure

1. Distribute Part 3 Student Sheets – Tell It Like It Is!
2. Display creatures.
3. Re-distribute the original creature descriptions from Part 1 Student Sheet – The Truth is Out There to the original authors.
4. Have students take turns reading aloud sections of the background information given on their Part 3 Student Sheet – Tell It Like It Is!
5. Make students aware that a variety of tools are available for them to use for making observations about their object.
6. Students should record any data they collect about their creatures in the appropriate area on their Part 3 Student Sheet. All information should be kept confidential and not shared with other students, even in their own group. After making the new observations and measurements, have students re-write their descriptions in a more scientific detailed style. Make it clear to students that their second description should not be exactly the same as their first one, as the new one should include the data gathered using the tools. They should also assign their organism a scientific name, using the list of Greek and Latin root words provided.

STUDENT SHEET PART 3
Page 1

TELL IT LIKE IT IS!

Student Background

When scientists explore and experiment they may discover new things. It is important to the process of research science that scientists make good observations, write accurate descriptions, make detailed drawings or take meaningful images. These records, along with other data, are included in the reports and scientific papers that share the author's original hypothesis, scientific procedures, analysis, as well as interpretations and conclusions. The ideas and information reported in the papers are often reviewed and tested by other scientists.

A primary reason for exploration is to find out what's going on in places where we've never been before. Once we've learned new things, we can come back home and share what we've learned. In order to do these two things properly, we need to learn how to observe things and then describe them to others accurately. Some folks prefer just to tell others what they found. They generally become good storytellers. Among scientists, however, we need to be sure that we have a detailed record of everything that happened or was discovered, so that other scientists can verify what we've done. That way, they can tell us if they find anything we might have missed in our own exploration, or if they had the same findings.

Scientists commonly write down everything they observe while they're actually seeing it. When living organisms are found, every detail of their appearance must be documented, such as how many appendages (arms, legs, fins, flippers, etc.) If they are microscopic organisms, then the explorer might describe their shapes. Identifying structures that can be seen internally or externally, such as cilia (short, hair-like projections that cover the outside and are used to "row" the organism through a liquid environment) or flagella (long, tail-like structures that whip back and forth to propel the organism), are also important.

Then, the scientist will use similarities and differences with known organisms to classify the unknown and assign it a Genus and species name. A species is a group of similar organisms that can undergo the process of reproduction and produce fertile offspring. Fertile means that the offspring can also reproduce. A Genus is a group of closely related species (i.e., house cats, lions and tigers are all in the same Genus, but are different species). Scientific names are usually based on Latin or Greek root words that describe the organism's relationships and something about its characteristics. The Genus name always begins with a capital letter and the species name is written entirely in lower case letters. The name is either written in italics, or both Genus and species are underlined separately.

Finally, when scientists are through exploring, they organize all of the new information and data, and write a report for other scientists to read. The paper would tell what they thought they might find (hypothesis), everything they did and how they did it, (procedure), everything they saw, or any measurements taken (observations and data). The paper would also interpret the data and give considerations about the meaning of what they saw, and if the results supported the prediction (analysis and conclusion).

STUDENT SHEET –PART 3
PAGE 2

TELL IT LIKE IT IS!

Procedure

1. Re-read your first description from Student Sheet – The Truth is Out There.
2. Re-examine the creature you described on Part 1 Student Sheet -- The Truth is Out There. Keep in mind the background information you read about why it is important for scientists and explorers to be able to make accurate descriptions and report them.
3. Use the tools provided to make various measurements that will help with observations about the creature. You may choose the tools you want to use.
4. Cooperate with the members of your group and share data, making your observations as accurate and detailed as possible. Try to do your measurements in such a way that other groups cannot see your creature. Record the data on your Student Sheet – Tell It Like It Is! without discussing it with any of your classmates, including the members of your own group.
5. On the Student Sheet – Tell It Like It Is! re-describe your creature, using the new information you have. Once again, do not share any part of your description with others in the class.
6. If Latin or Greek descriptive words are provided, use them to give your creature an official Genus and species name. Be certain that you choose a name that is descriptive of the organism in some way. Write that name in the appropriate spot on your sheet. Remember the name.
7. When requested, give the teacher your description sheet.

Creature Code Number _____

Data

Note: You may make whatever observations are appropriate. Not everyone will use every type of observation.

Mass

Length

Width

Height

Circumference(s)

Diameter(s)

Appendages

Present yes no (circle one)

How many_____

Type _____

STUDENT SHEET – PART 3
PAGE 3

TELL IT LIKE IT IS!

Sensory organs

Present yes no (circle one)

How many _____

Type _____

Coloration _____

Texture of exterior _____

General shape and appearance

Appearance under magnification

Any identifying marks or features

Final Description

Genus and species names _____ (Optional)

Part 4 –

TRUTH REVEALED

About this Part **This Part is a continuation of Part 3**

Using the Peer Assessment Sheet, students will review another student's creature descriptions.

Vocabulary

Scientific, objective, assessment

Materials

- Part 3 Student Sheets – Truth Revealed pages 2 and 3
- Part 4 Student Sheet, one per student
- Log of student names, creature code numbers, and code names

Procedure

Advanced Preparation

1. Assemble Part 3 Student Sheets making sure there are no names on the papers.
2. Copy Part 4 Student Sheets – Truth Revealed

Classroom Procedure

1. Distribute Part 3 Student Sheets – Tell It Like It Is! Making sure no student gets their own papers.
2. Distribute Part 4 Student Sheets – Truth Revealed
3. Follow procedure on Part 4 Student Sheet – Truth Revealed
4. Have log ready to verify the matches students make. Redirect and or assist students as needed.
4. Remind students to be scientific and objective in their assessments.
5. If desired read or have students read some descriptions.
6. Gather all Part 4 Student Sheets for a grade or their portfolio.

STUDENT SHEET – PART 4
Peer Assessment Sheet

TRUTH REVEALED

After your teacher has given you another student's final description, attempt to match the description with a creature. When you think you have a successful match, note the Creature code number and check with the teacher before proceeding with the assessment.

Fill out the following assessment about the description and then give it to the student who wrote the description. Please be polite, scientific and objective in your comments.

Creature Code Number_____

Record scientific name of organism from Part 3 Tell It Like It Is description (if provided).
_____

1. Was the description you were given clearly written and easy to understand?

   0 1 2 3 4 5 6 7 8 9 10
   not at all *somewhat* *very much so*

2. Was the description detailed and accurate?

   0 1 2 3 4 5 6 7 8 9 10
   not at all *somewhat* *very much so*

3. Were measurements given in the description?

   0 1 2 3 4 5 6 7 8 9 10
   not at all *somewhat* *very much so*

4. Could you tell from the description that tools were used to collect more information about the creature?

   0 1 2 3 4 5 6 7 8 9 10
   not at all *somewhat* *very much so*

5. Were you able to accurately identify the creature, based upon the description?

   0 1 2 3 4 5 6 7 8 9 10
   not at all *somewhat* *very much so*

Comments about the description: *(Be polite!)*