



THE ART OF SCIENCE

A Picture is Worth a Thousand Words

OVERVIEW



Art has always played a significant role in the development of science and how information and discoveries are shared. Art helps make the topics accessible and engaging to audiences of all levels. It can be used to explain complicated topics to the general public in a simple way, but it can also to help educate scientists or medical professionals in training with highly detailed images or animations.

In this activity students will learn about and practice the art of scientific illustration through drawing an item in nature.

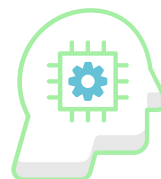
INTERESTED IN LEARNING MORE?

Check out the following *Art of Science Fact Sheet!*



GUIDING QUESTION(S): How does art help to communicate science concepts?

LESSON OBJECTIVES



Students will:

- Observe and learn how art is used in science
- Understand that art is an import tool for communicating science
- Learn the basic elements of scientific illustration
- Practice observing and drawing the natural world
- Comment on the artwork of their peers

Targeted Grade Level: 4-12

Lesson time: two 1-hour sessions

Materials:

- Pictures that represent artistic representation of science, including examples of scientific illustration
- Art supplies such as paper, pencils, pastels, paint, etc.
- Student direction sheets
- Art of Science PPT
- Art of Science Pictures
- Naturalist pictures

Highlighted NGSS

Crosscutting Concepts:

- Patterns
- Scale, Proportion, & Quantity

Science and Engineering Practice:

- Obtaining, Evaluating, & Communicating Information

Contact:

SMILE Program

<http://smile.oregonstate.edu/>



Part 1: SCIENTIFIC ILLUSTRATION

PROCEDURE



Tell students that throughout history, drawings have had a way of connecting people. Regardless of language or education level, or age, you can look at a piece of scientific art and gain knowledge, in many cases, a picture is indeed worth a thousand words!

Have students **pair up** to observe and discuss a variety of scientific illustration. **Ask:**

- What do you notice about the illustrations?
- What do you think they are trying to communicate?
- Which one are you most drawn to? Why?

Give students 5 minutes to observe and talk and then invite them to share with the larger group. Discuss how art and science are often seen as opposite fields, but art has helped us envision and learn about science for millennia. Scientific illustrations and creative art have shaped history, allowed us to pass down scientific knowledge and inspired curiosity and wonder. As the saying goes, a picture is worth a thousand words!

Tell students that both art and science depend on observing the world around us. Let them know that in the first part of the activity, they are going to combine these to disciplines to do a scientific illustration. Ask students to reflect on their own feelings around creating art by finishing the sentence:
-when I am asked to draw I feel...

Let students know that drawing is a skill that can be improved with practice, just like anything else. Have them keep in mind that scientific illustration isn't about creating an attractive picture as much as it is about observing and communicating accurate and detailed information. Go over the "ABC's of scientific illustration" and the activity directions in the student handout at the end of the lesson. Release students to begin drawing!

ABC's of Scientific Drawing

Accurate- describe the true nature of an object – size, shape, texture, etc.

Big- take up the entire page so that that the details can be seen. If it is larger than the actual item, record "not to scale".

Colorful- this communicates more information.

Detailed- use words and drawing to make your sketch as detailed as possible. e.g. If there is hole in the leaf, indicate it, add numbers to petals and edges, use a ruler to make and record precise measurements.

Explained- add labels, observations you have made, and questions that you have. Use the following sentences:

- I notice.....
- I wonder....



Teaching Tips



Consider how your own feelings about art may impact your students. Many of us do not see ourselves as artists, it is important to remember and to communicate art as a SKILL that with practice, we will get better at.

For older students have them focus in on the structures and functions on the item that they are illustrating. Encourage them to use identification guides or the [*iNaturalist*](#) app to classify and further describe their item.

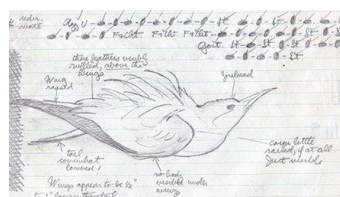
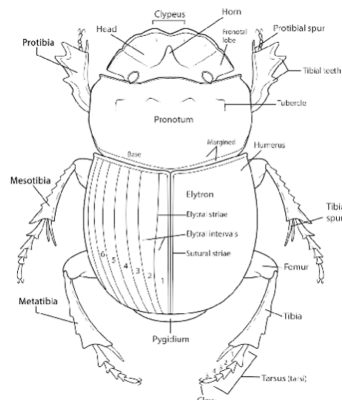


Give students as much time as you can to work on their drawings providing encouragement along the way, pointing out the detail and effort that you notice and the ways that they are using the ABC's of science drawing.

When students are done invite them to post their drawings for everyone to see during a gallery walk. Provide post it notes and encourage students to make observations about the work of others. *What do they notice or wonder about what the artist is communicating?*

If students all drew the same item (e.g. leaves, flowers, branches) invite them to do the "match up" extension activity.

Discuss that scientific illustration is more than just artwork. It is a way to communicate complex concepts, details, and subjects in an engaging and comprehensible way. Artwork can go beyond the complex language often used to describe scientific topics and allow for a greater understanding of the subject.



Invite students to **reflect** on their experience:

- *Something I struggled with while doing this activity was _____*
- *Something I enjoyed about this activity was _____*

Discuss that scientific illustration is more than just artwork. It is a way to communicate complex concepts, details, and subjects in an engaging and comprehensible way. Artwork can go beyond the complex language often used to describe scientific topics and allow for a greater understanding of the subject. Tell students that in the next activity they will have a chance to focus on creative art that is inspired by science.

Part 2: ART INSPIRED BY SCIENCE

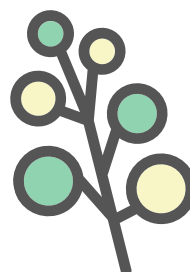
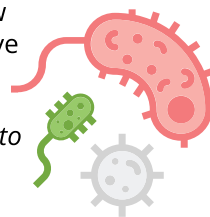


Remind students of what they learned about scientific illustration. Now that they have explored that realm of science art, they are going to have a chance to do creative artwork that is inspired by science.

ASK: *how might sketching as a scientist might be different from or similar to sketching as an artist?*

Let students know that while art inspired by science is different, for as long as artistic expression has existed, it has benefited from interchange with scientific principles such as experimentation with new materials, mathematics, or the discovery of techniques to offer different perspectives.

Additionally, artistic expression has long contributed to the work and communication of science. Scientific art has the ability to inspire curiosity, create feelings of connection to places, and it tell powerful stories that other forms of communication are less successful at.



Teaching Tips



When commenting on students work try to focus on the specific details such as, "I notice that you used lines here and circles here" rather than "I like your drawing".

EXTENSION: Match Up

Tell students to stand in a circle and toss their item in the middle. Invite them to place the sketches in a ring around the items. Tell students NOT to put their drawings next to their items.

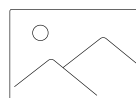
Give students 5-10 minutes to try to make a match by picking up the item and placing it on top of the sketch they think it belongs to. The scientist who created that drawing can tell them whether they are right or wrong. Once all sketches are matched with items, **discuss:**

- *What helped you make a match?*



Provide students with a variety of items or pictures for inspiration, or ideally, take them outside of the classroom to somewhere that they can observe.

- *What are they most inspired by?*
- *What type of art are they most drawn to? How does it make them feel?*
- *What feelings would they most like to inspire in others?*



Let students know that unlike in scientific illustration, they have creative freedom. Their work does not have to mimic what they see.

Provide students the handout at the end of the lesson and a variety of art tools such as colored and watercolor pencils, pastels, paint, etc. Allow them to spend 15 or more minutes working on their creations.

When students have finished their work invite them to find a partner who they will provide feedback to using the following sentence frames:

- *Something I notice about your drawing is _____*
- *Something I wonder about your drawing is _____*
- *Your drawing reminds me of _____*

Once one partner has commented have students switch roles. If time allows have them continue to rotate through partners continuing to share and provide feedback to one and other.

Bring the group back together and have them reflect on their overall experience.

- *What did they enjoy about the process?*
- *What did they struggle with?*

Have students think and share about which form of scientific art they preferred. Discuss the various perspectives that they all bring.

Teaching Tips



If you do this activity indoors, play music while your students work. Survey students to find out whether they prefer relaxing or upbeat music for inspiration.

CURRENT EVENTS CONNECTION

Galactic Art

The Hubble Space Telescope looked at a small patch of space for 12 days and found 10,000 galaxies, of all sizes, shapes, and colors. Some scientists think there could be as many as *one hundred billion* galaxies in the universe. Invite students to observe the new pictures of the universe taken by Hubble and create "galactic" art based on their observations. Use this as a jumping off point for further learnings about the universe and galaxies.

Check out NASA's Space Art program for inspiration.

Invasive Species

Talk to students about the *Emerald Ash Borer* beetle which was discovered in Forest Grove, OR. Invite them to create WANTED posters that include a detailed drawing of the beetle along with interesting information that they can find using the Fact Sheet.

Career Corner



Ask students what fields of science might incorporate scientific illustration? The subjects that incorporate scientific artwork are very diverse, spanning nearly all fields of science with medical illustration being the most common.

WOMEN IN STEM

REFERENCES

A Brief History of Scientific Illustration

Introduction to scientific sketching, California Academy of Science

Nature Drawing and Journaling by John Muir Laws

BEETLES Project, University of Berkely



THE ART OF SCIENCE

Student Handout: Scientific Illustration

Use the following steps to guide your drawing process

Scientific Illustration

CHOOSE a leaf, flower, stick, rock, etc. that interests you.

Quietly **OBSERVE**: Spend 2-5 minutes just observing and noticing the different parts of the item.

What do you **NOTICE** about the colors, shape, size? What key features stand out?

Place your item on a blank page, rather than tracing its shape, place little dots around it to get a general **OUTLINE** of the shape. Then remove it from the page and draw the centerline and connect it to the dots you drew.

Add more **DETAILS**, notice the large and small geometric shapes and pay attention to patterns. Choose an area where something unusual is happening, blow it up in a zoom bubble.

Use **WORDS** and **NUMBERS** to note any observations. For example, if the leaf has holes, add a note that says "hole" and indicate how many you see.

LABELS can indicate size, color, texture, etc. Record any questions that you may have about the item. "What caused the holes?"

Creative Art

CHOOSE a leaf, flower, stick, rock, tree, cloud, landscape, etc. that interests you.

Quietly **OBSERVE**: Spend 2-5 minutes just observing and noticing the different parts of the item.

Ask: *what do you notice about it? What do you like most? What do you feel inspired by?*

THINK about what story you would like to tell with your picture? What do you want people to learn, think, or feel when they observe it?

DRAW. Choose from the available drawing materials (you may want to start with pencil) and begin drawing. Play around with shapes and patterns.

CONSIDER, there is no right or wrong way, draw what is in your head inspired by what is there!



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Student Handout: *Art Inspired by Science*

The ABC's of Scientific Drawing

Accurate- describe the true nature of an object – size, shape, texture, etc.

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Colorful- this communicates more information

Detailed- use words and drawing to make your sketch as detailed as possible (e.g., if there is a spot on a leaf, add a note that indicates it is there. Use numbers to note the pointed edges or segments)

Explained- add labels, questions, and wonderings about what you see

