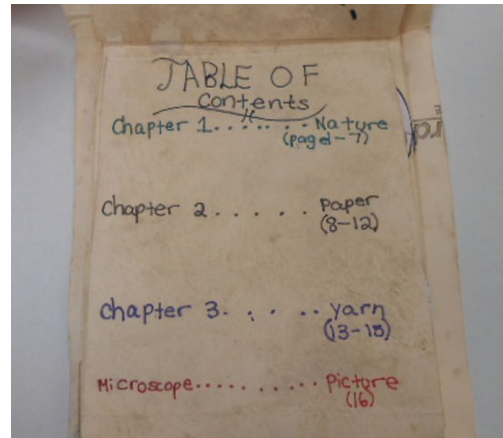


Lesson 9: Micrographia Project (Day 1)

Summary

This is a multi-day lesson during which students work on a project. Following in the footsteps of Robert Hooke and other pioneers, they choose a variety of things to investigate under the microscope. They make careful drawings, write descriptions, and create a book detailing their findings.

It is recommended that students have at least 2 or 3 periods of class time to work on this project and a week or so to finish it for homework.



Next Generation Science Standards

Disciplinary Core Ideas

- ETS.2.A: Interdependence of Science, Engineering, and Technology

Science and Engineering Practices

- Asking questions
- Constructing explanations

Cross Cutting Concepts

- Patterns, similarity, and diversity
- Scale, proportion, and quantity

Materials

- ★ microscopes (ideally 1/pair, but 1/table would work)
- ★ materials for students to look at under the microscope (students can bring in additional materials with your permission)
- ★ half-sheets of unlined paper (recommended) for book pages
- ★ colored pencils
- ★ construction paper, colored paper, fabric, etc. for students to make book covers
- ★ stapler, holepunch, string, yarn, and other binding materials

- ★ Micrographia Project handout (1 per student); add due date

- ★ copies of the Circles handout (1 per student with some extras) or unlined paper and circle templates for drawing circles

Engage (5 min.)

- Students brainstorm in advance of the project assignment.

OPENER

- ❖ Imagine you live in the 1600's. You are lucky enough to have a microscope, an invention that has just recently been improved! You have the opportunity to look more closely at objects around you. What objects would you like to look at? Write down a few ideas.

- Discuss as a class. Write down some ideas and encourage students to think of more.

Explore (35 min.)

- Introduce the Micrographia Project and give students the handout. Set the due date and number of points.
- Point out that class time is when students have use of the microscope. The detailed descriptions, coloring, etc. can be done at home if students don't finish in class.
- **SWD** For students with disabilities, require fewer drawings or offer additional lab time outside of class.
- **EL** Make sure English language learners understand the instructions. Let them know their descriptions can be shorter and less detailed, based on their English language skills. If you wish, offer that some of the writing can be done in their first language.
- Invite students to bring in additional items they would like to investigate, with your permission.

1. Today you will have class time to work on your project. Use your class time to look at different things under the microscope, make careful drawings, and take notes about what you see.
2. What other things would be interesting to look at under the microscope? With your teacher's permission, you can bring them to class.
3. After your drawings and descriptions are done, begin working on your cover.

Explain/Elaborate/Evaluate (5 min.)

- Let students share their progress and ask questions.
- Look at students' progress before they leave. If they have not gotten as far as expected, help them to problem solve so they can make better progress in the remainder of the time.
- **SWD** Assess which students may require additional support or modifications to successfully complete the project.

Extend

- Encourage students to do more than the 6 required drawings, and to be creative in their writing and bookmaking.

For students who finish early:

EXTENSION

- ❖ Research the history of the lens and of the microscope. How long ago was each one invented?

Homework

HOMEWORK

- ❖ Work on your Micrographia project. Cut out each circle and paste it on a different page.
- ❖ Color your drawings. Rewrite your descriptions more neatly and completely.
- ❖ Bring any additional things you want to look at under the microscope. (You will need your teacher's permission.)

Science Project: *Micrographia*

You are an explorer of small things in the mid 1600's! Choose your name and the place. As Robert Hooke did, use the microscope to explore. Put your drawings and observations together in a book called *Micrographia*.

- ❑ **Cover:** Include the title *Micrographia* and your chosen name. (Put your real name and period on the back cover!)
- ❑ **First page:** Include either a relevant quote or a dedication.
- ❑ **Drawings and Descriptions:** Include 6-10 drawings of things you've observed under the microscope. Draw carefully and accurately, and use color wherever applicable. Write descriptions and commentary about each of your drawings.
- ❑ **Microscope diagram:** Include a drawing of the microscope you used with the parts labeled.
 - **Attention to detail:** Be careful and detailed in your drawings!
 - **Interesting commentary:** Be inventive! Create an imaginative character.
 - **Effort:** 6 drawings is the minimum.

Rubric: 100 Project Points

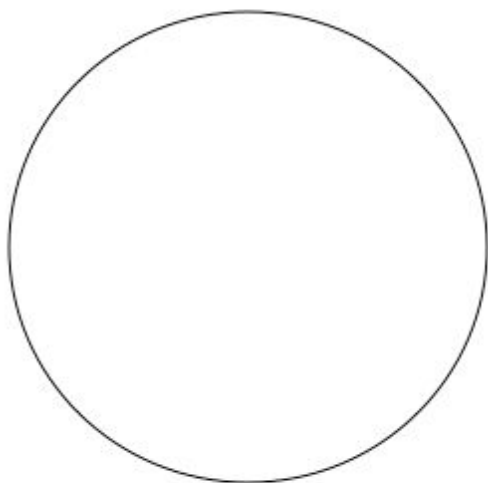
Each part:	For full credit
Drawings (40 points)	-at least 6 total drawings -close attention to detail and neat -color, where applicable *more drawings, unusual choices, extra detail and neatness
Written Commentary (40 points)	-complete sentences -neat handwriting, done in pen -clearly describes the drawing and the findings *shows creativity and curiosity
Microscope Drawing (10 points)	-neat diagram of the microscope used -all the parts are correctly and clearly labeled *diagram is colored: either color-coded OR lifelike colors chosen
Creativity and Neatness (10 points)	-the cover is creative and book is neatly bound (all parts intact) -the cover has the name of the book clearly printed as well as the author's name (your name and period go on the back) -overall project is neat *extra creativity is shown in the writing, drawing or how the book is made

* to receive the maximum points

Circles template

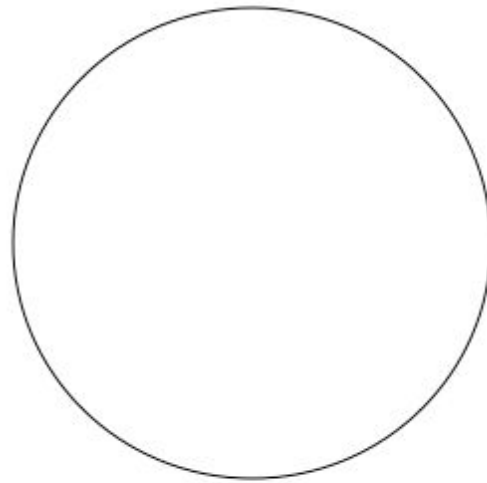
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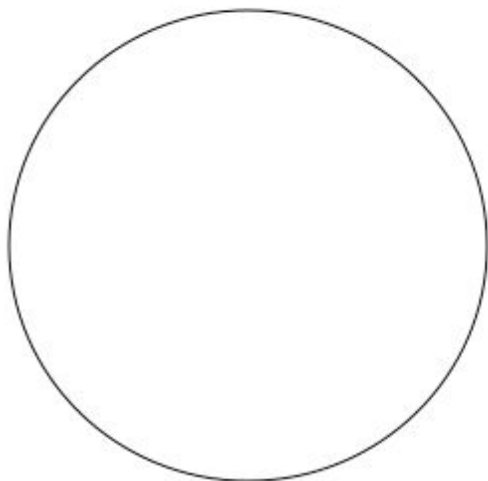
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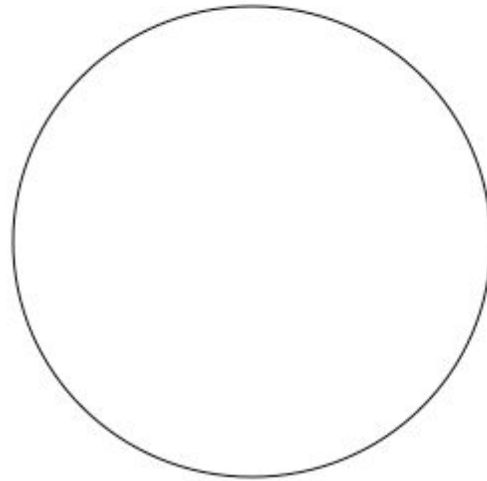
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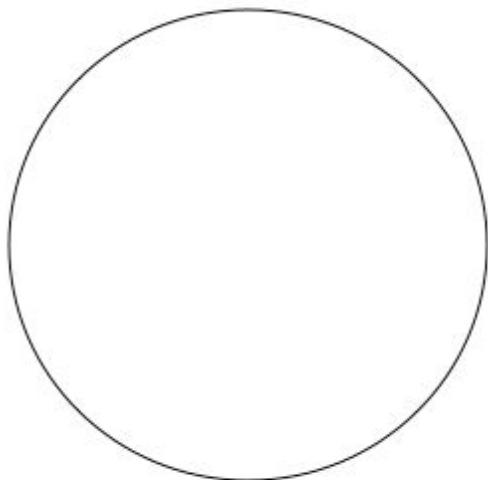
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