

Lend Me A Lens!

K - 12th Grade

Lesson Plan by E. Dominic Black, MA Ed.

DURATION

Setup & Breakdown: 15 minutes

Lesson: 45 minutes

LOCATION

Museum, classroom or outdoors

MATERIALS

- Worksheet ([English](#) & [Spanish](#))
- [Pre-Visit Slides](#) (optional)
- Hand lenses
- Pencil or colored pencils
- Clipboards

STANDARDS

VAPA

PK.VA:Cr1.1

Prof.VA:Pr5

NGSS

Scale, Proportion & Quantity (MS-PS1-1,
MS-LS1-1)

VOCABULARY

- Scanning Electron Microscope
- Hand lens
- Focus

Overview

Scientists use specialized tools like the scanning electron microscope (SEM) to do research and make observations. While not everyone has the access to or training for using the SEM, a hand lens can be used by anybody to reveal the details around them! Scientists record careful observations as drawings in order to share their work with others. You can, too!

Objectives

- Students will create and share scientific illustrations as research based on their observations.
- Students will learn how to use a hand lens for close inspection.
- Students will understand that personal interest is important when selecting a research subject.

Concepts

- Scientists use specialized tools to do research and make observations.
- While the SEM requires special access and training, a hand lens can be used by anybody to reveal details in the miniature world.
- Recording observations with drawings allows a researcher to share their work with others and is a valid and important part of the scientific method.

Note: this lesson can be done anywhere students are able to view detailed objects up close—not only at the Museum. See “Variation & Extension Ideas” section for more information.

Outline

1. Briefly introduce the SEM Lab. You may look at the Pre-Visit Slides, as they provide an overview.
2. During a trip to the Museum, students will observe a specimen with their own eyes and through a hand lens, recording their observations with drawings.
3. *Time permitting:* allow students to explore further with the hand lens and draw what they see.
4. Post-Visit: Students create a classroom display of the artworks, modeled after the SEM Lab display at the Museum.

Pre-Visit

A **Scanning Electron Microscope** (SEM) is a powerful instrument that uses electrons to create a detailed image of incredibly small specimens. The Museum's [SEM Lab](#) features the microscope itself and highlights the scientists who use it for their research. You may choose to introduce this instrument in your classroom prior to your Museum visit. The Pre-Visit Slides are a resource for this introduction. You can also share with your students that they will be using scientific tools and art tools to work as scientific researchers and illustrators.

Visit

Begin your visit in the SEM Lab, which is located in the Gem & Mineral Hall. Explain that the SEM is a powerful tool used by scientists and that it requires special training and procedures for use. You can then introduce the hand lenses as tools available to everyone to help explore one's surroundings more closely. Explain the worksheet and read the instructions aloud for younger learners. Distribute the worksheets, pencils hand lenses, and clipboards (if available). Students will choose one specimen from a Museum exhibit to study and draw. Keep in mind you'll want to choose an exhibit where the distance from student to specimen is not farther than arm's length. Students will first draw the specimen by looking at it without the hand lens. Next, they will draw a portion of the specimen as seen through the hand lens. Encourage students to label their work. Once students have had sufficient time to complete their drawings, collect supplies and continue with your Museum visit. *For classroom and outdoor variations see below.*

Post-Visit

Ideally students will finish their drawings on-location while looking at their specimens. You may choose to allow students to take photos of their specimens and finish drawing after the Museum visit. Back in the classroom, students are encouraged to create a display of their artworks.

Variation & Extension Ideas

- In the Museum it may be helpful to start at the SEM, to connect students with the ideas of close-looking and magnification. Other Museum areas you may consider for this activity include the Nature Gardens and the insect displays in the Discovery Center.
- This activity can also be done in the classroom or outdoors, so long as students have access to objects they can observe in-person and close-up. Some examples are plants, shells and rocks.
- Students with mobile phones and/or those with tablets may use the camera to photograph and zoom into their images. Using an electronic device in this way is similar to using the hand lenses and especially useful for collections behind protective barriers. This also gives students the opportunity to finish the activity back in the classroom with a photo as their reference.

Other Considerations

- Visually impaired students with limited sight might especially appreciate using hand lenses to explore their world up-close.
- Although hand lenses are a scientific tool, there are many inexpensive styles available.
- Some of the minerals on display in the Gem & Mineral Hall are touchable. Students with sensory sensitivity might select one of these specimens to complement their visual observations with information learned through touching.

SEM Lab FAQs

1. Will my students be able to use the Scanning Electron Microscope during their visit?
 - a. No, the SEM is a powerful research tool used only by Museum staff who have specialized training and expertise. The SEM is always visible to Museum visitors through the window in the SEM Lab.
2. Will a scientist be demonstrating how the Scanning Electron Microscope works during our visit?
 - a. There may be a Museum scientist working with the SEM during your visit, but there is no scheduled programming. You will be able to look at the SEM from behind glass and learn how the SEM works through exhibit pictures and text.

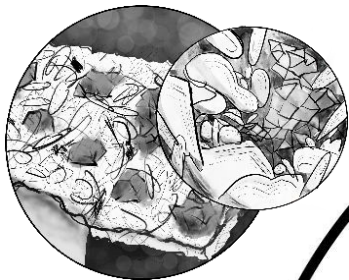
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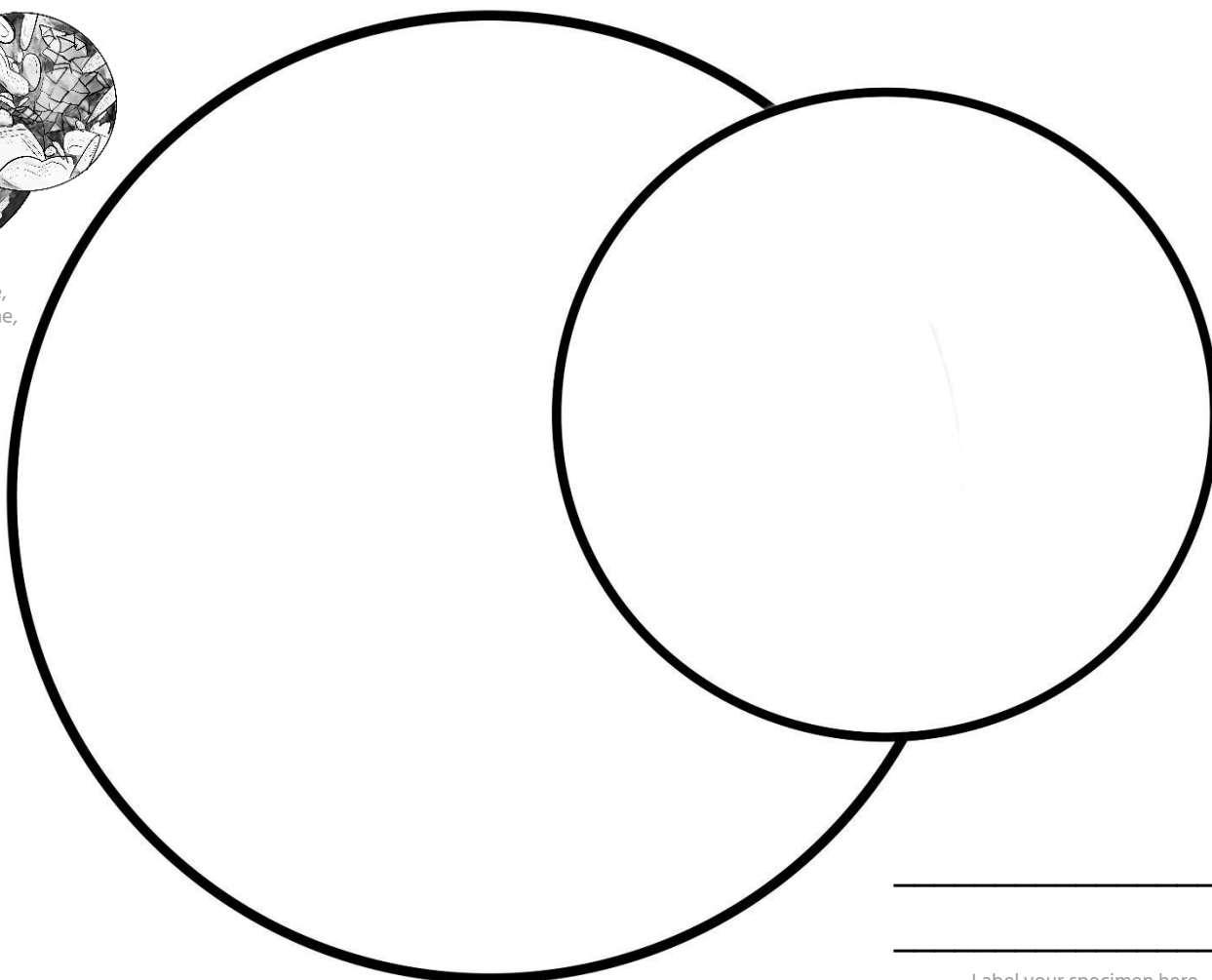
K - 12th Grade

NATURAL
HISTORY
MUSEUM
LOS ANGELES COUNTY

Use this worksheet with the [corresponding lesson](#) and take a closer look at your surroundings.



Spessartine, muscovite,
and schorl on microcline,
NHMLA Collection



Label your specimen here

INSTRUCTIONS:

1. Select a specimen to investigate. Look for something that is less than your arm's length away from you, so that you can observe it in detail. Be sure to select an item that you find personally interesting. Inspiration is everything!

2. In the larger circle above, draw the specimen, using only your eyes for observation. Pay special attention to the overall shape of the item and use your pencil to create light and dark areas to show the "highs and lows" of the specimen. See an example drawing next to the blank circles.

3. Next, use a hand lens to zoom in on a portion of the same specimen. Focus on a portion with interesting details. You may have to move the hand lens back and forth, or change your body position in order to focus the image and make it clearer.

4. Now draw what you see through the hand lens in the smaller circle above. Like the SEM images, you'll see how magnification shows us a "hidden world," not visible with our own eyes.

5. Practice good science by labeling your drawing with the specimen's name and any other important information.

¡Préstame una lupa!

Plan de la lección por E. Dominic Black, MA Ed.

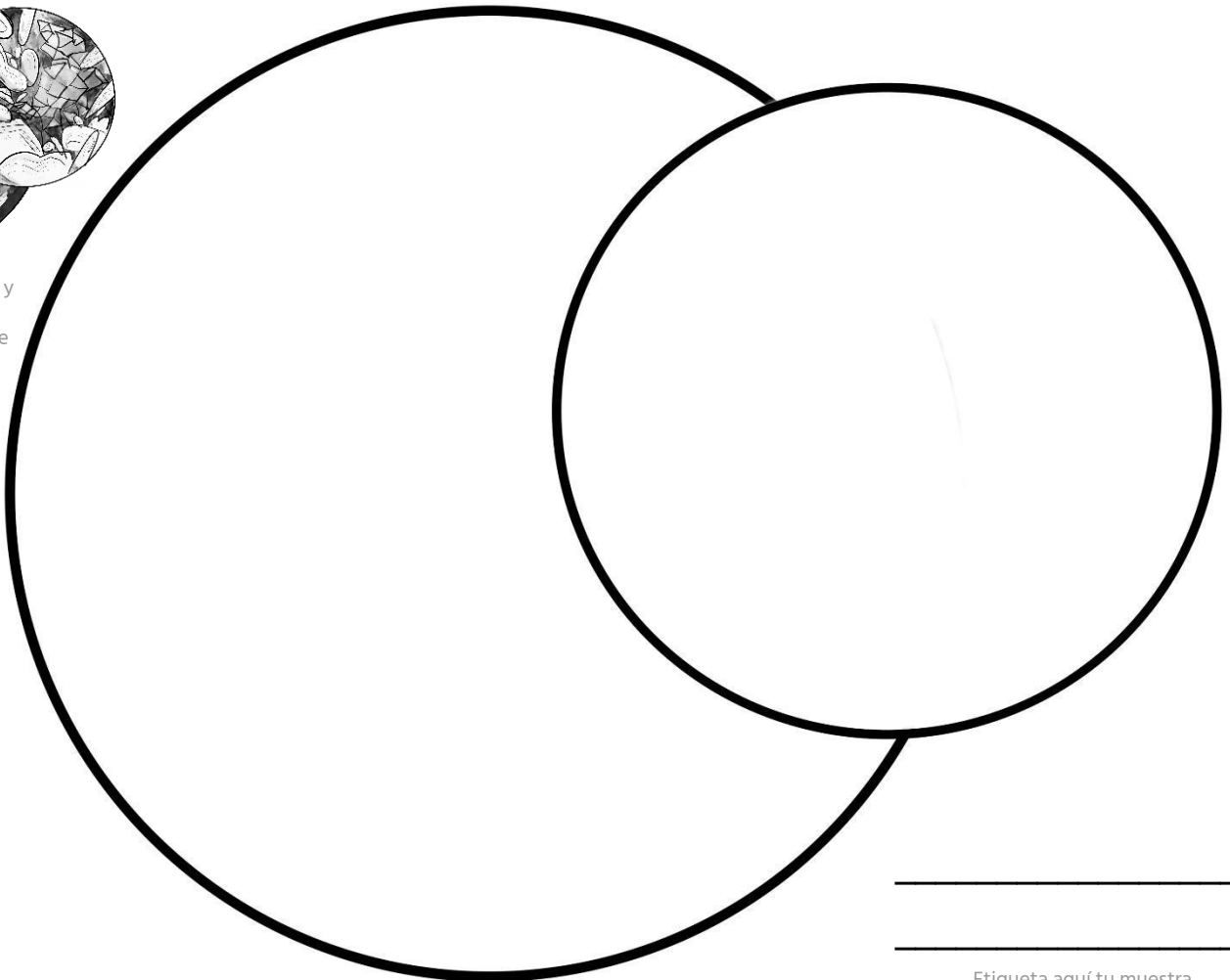
Grados K a 12°

NATURAL
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Utiliza esta hoja de trabajo con la [lección correspondiente](#) y observa más de cerca tu entorno.



Espesartina, moscovita y turmalina negra sobre microclina, colección de NHMLA



Etiqueta aquí tu muestra

INSTRUCCIONES:

1. Elige un espécimen para investigar. Busca algo que esté a una distancia de menos del largo de tu brazo para que puedas observarlo detalladamente. Asegúrate de seleccionar un objeto que te resulte interesante. ¡La inspiración lo es todo!

2. En el círculo más grande de arriba, dibuja el espécimen, observándolo únicamente con tus ojos. Pon especial atención a la forma general del objeto y utiliza el lápiz para crear zonas claras y oscuras que muestren las áreas "superiores e inferiores" del espécimen. Mira un dibujo de ejemplo junto a los círculos en blanco.

3. Después, utiliza una lupa para ampliar una parte del mismo espécimen. Concéntrate en una parte con detalles interesantes. Es probable que tengas que mover la lupa de un lado a otro o cambiar la posición de tu cuerpo para enfocar la imagen y que sea más clara.

4. Ahora dibuja en el círculo más pequeño de arriba lo que ves a través de la lupa. Al igual que en las imágenes SEM, verás cómo la ampliación nos muestra un "mundo oculto", que no vemos con nuestros propios ojos.

5. Aporta a la ciencia etiquetando tu dibujo con el nombre del espécimen y cualquier otra información importante.