Unit 2 – Day 1 - Lesson Plan

1. Focus Question
   How do you use a microscope?

2. Learner Objective(s)
   Students will be able to properly set up and use a microscope using low and medium objective lenses.

3. MN Standard(s)
   Grade 7
   Strand 4. Life Science
   Substrand 1. Structure and Function in Living Systems
   Benchmark 2. All living organisms are composed of one or more cells which carry on the many functions needed to sustain life
   7.4.1.2.3. Use the presence of the cell wall and chloroplasts to distinguish between plant and animal cells. For example: Compare microscopic views of plant cells and animal cells.

4. Main Ideas (This should be written in age appropriate language and include connections to the students’ real world.)
   • History of the Microscope:
   • Uses of the Microscope
   • Care of the Microscope
   • How to make a slide
   • Procedure for lab

5. Materials (List of materials needed for this lesson and numbers of each.)
   • microscopes
   • small beaker of water with eye dropper
   • slides and cover slips
   • handout for every student, scissors to cut out diagram, and tape to put handout into notebook
   • several specimens to choose from: salt, sugar, hair, toilet paper, regular paper, cork

6. Safety/Special Considerations
   • Take care when handling glassware such as slides and beakers.
   • Take care when using scissors
   • Do not run with scissors, wave them around, or cut inappropriate things.

7. Lesson Sequence: 5E, 7E or other (Remember to focus on what the students will be doing.)
   ENGAGE: Powerpoint with photos of organisms in regular size and microscopic view of tissue, microscopic pictures, history of microscope invention and discovery of the cell (which is the main unit that this lesson is a part of)
EXPLORE: Fill in The Parts of the Microscope handout, answer Greek questions and fill in observation. Then do lab, picking four specimens to compare and draw under low and medium power.

EXPLAIN  Learn the care of a microscope and how to make a wet slide.

ELABORATE – Talk about how this will be a tie in to their unit on cells.

8. Assessment(s) (This may be included above in the 5E or 7E model.)
   Formative Assessment will take place during laboratory activity to see if students are doing the work correctly and handling the microscope as taught.

   See “Notebook Setup” below (#11) to see the Assessment that was added to this lesson.

9. Closure
   5 minutes before end of class, ask for volunteers to review what we did today/what they learned

10. Daily Reflections (This can be a few sentences to a page in length.)
   be sure to reflect and write on both the personal and professional aspects of your teaching.

Reflections on Content and Structure of Units Taught
Description of how you chose content for lesson and why you structured the lesson the way you did: The content for this lesson was chosen by Mr. North because we had to accommodate his curriculum. He was beginning a unit on cells and gave Tien and me two days to teach the use of the Microscope as part of that unit. Day 1 was my day. My lesson plan included a Power Point to explain the microscope’s history, purpose, parts, and use/care. I created a handout of pieces compiled from the internet of the parts of the microscope left blank for the students to fill in and the definitions of the different parts, (see attached handout).

How did your knowledge of brain/child development guide your activities? I am familiar with this class of students and of what a 7th grader can realistically do. I focused on keeping in mind what the students were doing instead of focusing on what I was going to say. I wanted them to be interested in the PowerPoint, so I included my wiener dog in the slides (my trademark) and kept the presentation to the basics of what they needed to know, tying it in to how it will help them study cells. It was crucial that they understood how to properly use the microscope, so I demonstrated the handling of each part on a microscope and had them fill in the handout as I moved through the slides.

How did key learning tasks in your plans build on each other to support students’ development of learning of science concepts, inquiry skills, and related academic language? How did students use the science concepts and inquiry skills to make sense of one or more real world phenomena? Describe specific strategies that you used to build student learning across the learning segment. As needed, reference the instructional materials you have included. I wish that we had more time to teach and more time to observe Mr. North. There simply isn’t time in Mr. North’s schedule. He only teaches 7th grade on Purple Days. We are there for 1st hour only, because his other 7th grade classes occur after his prep time and lunch, so they interfere with our own classes at the U. On Gold Days, he teaches only 9th grade Biology. Because of these extenuating circumstances combined with the fact that Tien and I have to alternate days to teach, I was only able to make a lesson plan for one day. Therefore, I cannot comment on how I was able to make my lessons “build student learning across the learning segment.” Tien and I did, however, build our lesson plans to support student development across the two days we
taught. My day focused on the basics (mentioned above) and in his lesson, he reviewed and built on the concepts that I taught and added the use of the high power objective. I taught about the purpose for microscopes in science and used inquiry in having the students think about what it would be like to live in a world in which no one knew that anything microscopic existed. This encouraged them to think about the real world and how microscopes help scientists study the parts of the real world that we can't see with our eyes. Tien added in the concept of how scientists work, solving problems and making mistakes.

Lesson Plan Disparities and Decision Making
What were the disparities between your original lesson plan and what actually happened? And why did you make the decisions to change the plan? The changes I made just before class started were due to conversations with Mr. North. He suggested that I avoid using cover slips, so I edited my slides to take mention of them out. He also suggested that I have them just get used to using the microscopes by looking at different specimens instead of having to draw what they saw in their notebooks, so I edited that out of the notebook set up and a powerpoint slide. I also incorporated a simple and fun assessment that he suggested, which helped fill in the left page of the notebook and added an assessment to the lesson, which was important to see how well the lesson taught them.

During the lesson, I spontaneously asked them to fill in the handout called “the Parts of the Microscope” while I taught. I just hadn’t previously thought about when I would have them do the handout, and it turned out to be a perfect time. They had something to do and a reason to listen and pay attention as I taught (because they needed the answers) and I think it helped with retention. They were able to HEAR me say it, SEE it on the overhead, and WRITE it on the worksheet. When my powerpoint was done, I did a review holding up a microscope and pointing at the parts. They were engaged and shouted out the answers. There didn’t seem to be any hesitation. I also taught them how to calculate the power of magnification of each objective, and they definitely knew that concept well.

Modification of Future Instruction
Describes how content and structure(delivery) will be modified in the future as a result of the lesson. Include at least 3 changes you would make to the lesson in the future.

1. I would have a more structured left page of the notebook for them to copy down. I realized that many of them did not write down what specimens they looked at. If there was a table or at least numbers 1-4 vertically listed, they would feel more compelled to fill in the “answers” after the numbers in their notebooks as asked.

2. I would encourage them to look at more specimens. I had brought in a lot of really interesting materials for them to look at, but many didn’t get to look at more than a couple. I would make it clear what we had available and define how many they needed to see at a minimum.

3. I think it would make the lesson even more interesting to the students if I modeled looking at specimens on the microscope that is connected to the Smartboard. I would have them watch me do the first one and throughout the lab time, occasionally put up another specimen. I imagine they would have a sense of pride if they were able to get a similar image on their own microscopes.
Reflections on Student Assessment

Explain how the collection of assessments from your plan allowed you to monitor your students’ progress toward meeting learning objectives. 1. In the middle of the lesson, I drilled them as a class on the parts of the microscope, watching for participation. They really seemed to “get it” and had no hesitation answering my questions. That was my first indication that they were successfully learning the lesson. 2. The timed “quiz” at the end of class served to reinforce the lesson by making them review the steps needed to properly set up their microscopes. They were excited and motivated by the timer and compared times with each other. They delighted in “really screwing up” each other’s microscopes...some boys would not only turn off their classmate’s microscope, but would wrap the cord around the base to make the trial even harder. The point of the quiz was to practice adjusting everything successfully, thus demonstrating their learning. They wrote their times in their notebooks. Anyone with a time recorded had to have set up their microscope correctly. 3) Their exit ticket was to tell me on their way out what the microscope did to the letters they looked at on the piece of newspaper. (turned them upside down). By answering correctly, I knew that they had been able to set up and look at the newsprint under the microscope and therefore were likely able to use the microscope correctly.

Student Management

Reflect upon student management and provide successes and areas needing growth. Describe goals for future classroom management. This is such a great class! I really enjoy working with them and I think they don’t mind me as a teacher now and then. They really did not need much “management” outside of “eyes up here, please” to get their attention. It was an amazing day. In the future, I want to be sure that I get around to every student individually, not just the ones that are waving their hands in the air wildly. But I was pleased that so many said “Ms. Elliott!! Come look at this!!” and truly wanted to share their discoveries with me.☺ Warm fuzzy.

Goals for next lesson

Write 3 specific Goals for the next unit that you would like to work on.
1. CONTINUE TO MAKE ENGAGING, RELEVANT POWERPOINTS/MATERIALS: Mr. North said that my powerpoint was engaging and interesting. In my next lesson, I want to be sure that I do that again. My slides were not too complicated, but had relevant graphics and key words.
2. MOVE AROUND THE ROOM WHILE TEACHING: In my next lesson, I want to move around the room more as I am teaching. I didn’t move from the front of the room because I was operating the powerpoint. But I think there is a remote control that would let me advance to the next slide from a distance. I will use that next time.
3. DELIVER A MORE ENGAGING OPENING: I want to have a more engaging opening next time, perhaps a discrepant event. This lesson, I opened with asking them what they thought it would be like if nobody knew about the microscopic world. I felt lucky that they seemed interested in that question, but think I could have done a better job.

11. Teaching Materials (Attach copies of visuals/PowerPoint/student handouts/quizzes/keys etc...) Red text tells about the modifications I made at time of teaching.

- Parts Of Microscope handout: students will cut out and place in notebook at beginning of class. I made this handout by compiling resources I found on the internet. Because they do Greek/Latin root words, I included “micro” and “scope” on the top and added a question for them to answer on the side. I thought it would be helpful for them to have
the definitions of the parts in their notebooks for reference, but that it was too tedious to have them copy them down, so I included the definitions at the bottom, under the diagram of the microscope.

- Powerpoint presentation will guide the teaching part of the lesson. The powerpoint started with the Greek root words, then went through history of the microscope, parts of the microscope, and how to use and care for the microscope.

Write on Daily Board Mr. North had these (in red) already written on the board when I came in. I felt it was petty to change them to my ideas (in black) so I left them.

Purpose Question: How do you use a microscope? Have you ever seen the hairs on a fly's legs?

Learning Goal: Learn how to use a microscope and when microscopes were invented. Learn how to use a microscope properly.

Today’s agenda: Learning Time with Ms. Elliott test results Microscope Lab! intro to microscope/ microscope activity

Word of the Day: microscope micro/macro

Notebook Setup: (diagram of two-page spread drawn daily on whiteboard)

Left side: Circles to draw their observations of specimens under low and medium power. Modified prior to teaching due to discussion with Mr. North. He said that they do not know yet how to draw what they see…. “that could be a whole lesson in itself.” So I changed the left page of the notebook at his recommendation to be just “What I looked at”, where they were instructed to simply list the items they chose to look at under the microscope. I also added to the left page near the bottom “Quiz: time: ___ Upside down or Rightside up?” He recommended that I do a fun little quiz of their microscope knowledge in which I invite them to “screw up each other’s microscopes. Then, looking at the digital clock on the classroom monitor, time yourself on how long it takes you to set up your microscope properly on low power, and find and focus on a letter from the piece of newspaper I give you. Record your time in your notebook and answer the question as to whether the letters appear upside down or right side up.” The students LOVED this!

Right side: Tape or glue in handout “The Parts of the Microscope”

Write on Lesson Board:

Specimens
- newspaper
- notebook paper
- toilet paper
- paper towel
- marker/pencil/pen/colored pencil marks on paper
- salt
- hair – human, pet hair from your clothes
- sugar
- thread
- dust
- cork slice
- celery slice
The Parts of the Microscope

GREEK: micro- _____________________
scope ___________________

Observation: When you move a slide left, what direction does the image appear to move?

**arm** - this attaches the eyepiece and body tube to the base.
**base** - this supports the microscope.
**body tube** - the tube that supports the eyepiece.
**coarse adjustment knob** - a knob that makes large adjustments to the focus.
**diaphragm** - an adjustable opening under the stage, allowing different amounts of light onto the stage.
**fine adjustment knob** - a knob that makes small adjustments to the focus (it is often smaller than the coarse focus knob).
**high-power objective** - a large lens with high magnifying power.
**low-power objective** - a small lens with low magnifying power.
**light source** - this directs light upwards onto the slide.
**ocular lens (eyepiece)** - where you place your eye.
**revolving nosepiece** - the rotating device that holds the objectives (lenses).
**stage** - the platform on which a slide is placed.
**stage clips** - metal clips that hold a slide securely onto the stage.
The Parts of the Microscope

Observation: When you move a slide left, what direction does the image appear to move? It appears to move to the right.
microscope

from Greek:

micro-  “small”
-scope  “instrument for viewing”

A microscope is an instrument used to view objects that are too small to be easily seen with just our eyes.
like...

Like Wolfie the Wiener Dog??

(He IS pretty small!)

NO!
we use microscopes to see more detail in things we can see everyday

sand

sand under a microscope
or

tree

wood under a microscope
or to look at things we can’t see at all..

- household dust
- bread mold
- plankton
- cancer cell
- cat flea
History of the Microscope

1590 - Two Dutch eye glass makers, Zaccharias Janssen and his son Hans experimented with multiple lenses placed in a tube.

The Janssens observed that viewed objects in front of the tube appeared much BIGGER!

Their discovery was used to create the compound MICROSCOPE and the TELESCOPE
ROBERT HOOKE
an English physicist, looked at a sliver of cork through a microscope lens. He found that cork was made up tiny boxes that reminded him of prison cells. He called them **CELLS**, and we still call them that today!

Hooke is called “the English Father of Microscopy.”

**CELL**: the building block of all animal and plant life
ANTON VAN LEEUWENHOEK

1674

He is known as “the Father of Microscopy”

built a simple microscope with only one lens to examine blood, yeast, insects and many other tiny objects. Leeuwenhoek was the first person to describe bacteria.

blood cells

yeast

dust mites looking for human skin cells on a bedsheets
Parts of a Compound Microscope
Compound Microscope

- A microscope is a very powerful magnifying glass
- A microscope helps you see things, like cells, up close
What’s my power?

power of the 
ocular lens $\times$ power of the 
objective lens = power of 
magnification

What are the powers of 
magnification for the 
objectives we have on 
our microscopes?

Low power objective

$10 \times 4 = 40 \times$

Medium power objective

$10 \times 10 = 100 \times$

High power objective

$10 \times 40 = 400 \times$
Comparing Powers of Magnification

We can see better details with higher the powers of magnification, but we cannot see as much of the image.

Which of these images would be viewed at a higher power of magnification?
Eyepiece

- View the specimen through the EYEPİECÊ
Stage Clips & Objectives

- **STAGE CLIPS** hold the slide in place.
- **LOW POWER OBJECTIVE** is used to focus the microscope.
- **HIGH POWER OBJECTIVE** is used to view details of a specimen.
Coarse Adjustment, Fine Adjustment, & Base

COARSE ADJUSTMENT focuses the view

FINE ADJUSTMENT fine tunes focus

BASE
  the bottom of the microscope; its foot
Stage

STAGE
where the slide rests

LIGHT SOURCE
directs light upwards onto the slide
Diaphragm

- DIAPHRAGM allows light in
Nosepiece

- **NOSEPIECE** is the rotating device that holds the objectives (lenses)
Arm

- ARM is the part you use to carry the microscope
Can you name the parts of a compound microscope?
Observation: When you move a slide left, what direction does the image appear to move? _______
Care of the Microscope

• CARRY with two hands: one on the arm of the scope and one under the base.
• NEVER touch lenses or wipe them with materials other than lens cleaning supplies. The oils from your hands can smear the glass and/or attract dust, which can scratch the lens.
• WHEN YOU ARE DONE, CLEAN UP! Unplug the microscope, wrap the cord up, and return it to where you found it. Clean your slides and wipe your table.
• BE CAREFUL with slides and cover slips. They break easily.
Making A Slide

- **SPECIMEN:** put a very small piece of the specimen on the slide. If your piece is too big, the light won’t shine through it and you will not see much!

- **WATER:** Drip enough water off your finger to completely cover the specimen

- and **YOU ARE READY TO ROCK!**
Now get your scope ready!
Let’s give it a try …

1 – Turn on the microscope and then rotate the nosepiece to click the red-banded objective into place.

2 – Place a slide on the stage and secure it using the stage clips. Use the coarse adjustment knob (large knob) to get it the image into view and then use the fine adjustment knob (small knob) to make it clearer.

3 – Once you have the image in view, rotate the nosepiece to view it under different powers.

Be careful with the largest objective!

Sometimes there is not enough room and you will not be able to use it!

4 – When you are done, turn off the microscope and clean up the slides you used.