MS-LS1-1 Conduct an investigation to provide evidence that living things are made of cells; either one cell or many different numbers and types of cells.

- Indicates opportunities for integrated English language development (reading, writing, listening & speaking).

# Lesson 1: Cell Theory

Engage

(Whole group activity to activate schema and engage students in the focus of the topic, skill, concept, or process to learn. Hook students into the learning and grab their attention. This can be a hands-on activity, can be tied to phenomena, video, etc...)

**In-person or online activity:**
**Introduce Phenomenon**

**Part #1**
Cell Theory Google Slides
Show the phenomena picture of sand from **slide 2** from the Google Slide link above. (This is a picture of how sand looks under a microscope, but DO NOT tell the students what it is)

Give the students about 2 minutes with their table to generate questions that they have about the picture (possible questions: what is that, why is it colored, why are there so many, is it alive)

Allow students to share their answers and guess at what they think it is. Then show **slide 3** and reveal that it is sand.

Tell them that they will be learning about things that are living and nonliving and even seeing how living and living things look under a microscope (slides 4 and 5).

**Part #2**
Have students look at the picture of the seed on slide 2 (presentation) and ask them if it is alive? Encourage each student to give a reason for their answer. Have students work in small groups to record their answers on a shared document via Google Classroom. Each student needs to select a box, add their name and record their answer in his/her box. Alternatively, the teacher can pre-assign boxes with student names.

Assign **one student** in each group to make a copy of the shared document with the class responses and share it with the members of their group and the teacher. Within their shared document students will compare and analyze the class responses creating categories that the responses can be classified under.

For example some students might say " A seed is a living thing because it grows", while another might say "A seed is alive because it gets bigger", students could create a category that living things change to fit both ideas into a broader category (Slide 4 of the presentation holds an example of what this can look like).

During this time if students want to add more ideas in their group they can, they can also delete ideas if the group agrees and can justify a reason why it should be deleted. This activity can be completed in-person or virtually and will be revisited in Explore #2.

Explore #1

(Independently, with partners, or in small groups, students participate in a shared experience to actively manipulate materials and explore new topics, skills, concepts, or processes. Students engage in science activities at this point. Students are DOING the science, manipulating materials, "playing." This is the very student centered part of the lesson).

**In-person on online activity:**
**Student exploration**

Today students will work independently**.** Make an announcement in-person or via Google Classroom that they will be learning about things that are living and nonliving and even seeing how living and nonliving things look under a microscope (presentation).

**Explore Day 1 -**

Present Slides 4 - 8 of the Cell Theory Google Slides: At their tables, students will explore 10 pictures of things under a microscope (Microscope Pics). These pictures will need to be printed and cut out for each group. Each picture is labeled with a number. 5 of the pictures are of living things, and 5 are of nonliving things. The students need to work as a group to try and correctly sort their pictures into those two groups. Once they have their two groups, they will work on the worksheet Exploring Living and Nonliving Things, but save the follow up

questions for later.

An online version of this activity is also attached below: Exploring Living and Nonliving Things.
You can create an assignment for this activity in Google Classroom if you want to have students turn it in, but make sure to "make a copy for each student". Students can use this version for small group, in-person instruction or virtual instruction using breakout rooms. This version is a digital sort with the pictures included along with the follow-up questions.

Once groups have had time to complete the assignment, go over slides 9 and 10 on the Cell Theory Google Slides to give them the right answers. Then allow the students time to do the follow up questions

 **Explore Day 2-** In person or online, have students share how they classified the pictures. Review slides 9 and 10 and ask them to reflect on their own classification of the pictures. Some questions you can have them discuss in small groups in person or in Zoom breakout rooms for 4 minutes or so:

- ***What do you notice about the non-living things?***
- ***What do you notice about the living things?***
- ***What are the living things made of?***

Call students back to the whole group and have them share answers.

Once the discussion is complete and you feel that students understand the concept that all living things are made of cells, ask to answer the follow-Up questions via Google Forms as an exit ticket for the day. Review submitted responses to determine students' progress.
Teacher note:

- If day 2 **can not be completed during class time**, post slides and questions to Google Classroom. Be sure to edit the slides to reflect that living things contain cells.

Explore #2

(Independently, with partners, or in small groups, students participate in a shared experience to actively manipulate materials and explore new topics, skills, concepts, or processes. Students engage in science activities at this point. Students are DOING the science, manipulating materials, "playing." This is the very student centered part of the lesson).

**In-person or online activity**

**Student Exploration**

**Day 3 -** Students will focus on the concept that all living things respond to stimuli. Ask students to log on to the virtual lab and read the intro and collect the data only on the virtual lab worksheet. This assignment can be completed in-person or online.

**Days 4-5 -** Have students in pairs or groups discuss and answer the questions together. Each student must submit their written answers. Monitor students as they work together in breakout rooms or small groups, to prompt them to review the data collected to answer the questions. This activity can be completed independently as well.

**Day 6-** Direct students to open their shared document with their categories from day 1. Today students in their original groups will be adding two categories to the first row, if they do not already have them listed: "living things all respond to stimuli" and "living things are all made of cells".

Have students view the videos provided in the playlist and cite examples of each new characteristic they see in the videos. Begin by asking students "What do you notice? What do you wonder?". For each video they will come up with as many examples of each characteristic that they can add to their document.

Each student needs to contribute an example to the document. Verify this by looking at the revision history of the document. Once students are done, review their answers to determine if they understand that living things respond to stimuli and living things are made of cells. Comment and provide feedback on the document to support student learning. **This assignment can be completed in-person or virtually.**

Explain

(Independently, with partners, or in small groups students verbalize their understanding of the content. Teachers direct instruction to teach new vocabulary and to explain topics, skills, concepts, or processes. This is the point where the science content mystery is solved. Students should be provided with content, academic vocab, resources, close read, etc.... This is the point where you are giving students the tools to understand what happened in the explore phase)

**In-person or online activity:**

**Direct Instruction:**

Use the following Google slides to explain the differences between unicellular and multicellular organisms. Students should take notes. The presentation could be recorded, using Screencastify or another application, to post for students who could not attend or provide an outline of the lesson and the clarification given to students who did attend the lesson.

In order to fulfill the standard (which is pretty short and simple), students need to understand that

- Living things are made of cells
- Living things can be unicellular or multi-celled
- Non-living things are not made of cells

**Interactive Reader pages -**

Post the Interactive Reader (IR) pages to Google Classroom as "create a copy for each student". Have students read and answer all questions on the IR pages The assignment can be completed independently. The grey boxes can be typed into to record student answers. As students read, have them use a separate document to keep a list of questions they have from the text or record things that they did not fully understand. Have students submit both documents when done. Each student needs to have at least 2 clarifying questions from the text.

After allowing students time to work on their assignment, review all the questions students had prior to the direct instruction. Facilitate the conversations so that students' learning depends on the six characteristics of living things. Post the student generated answers with reasons to Google Classroom for students who were absent. At the end of the discussion, have students go back and finish the IR pages on their own, if needed.

**Additional In-person or online activities:**

**Achieve 3000 Lesson Options-**

Have students complete the 5-step lesson. As the teacher, you will facilitate the learning through the lesson. Be sure to have students read both pages of the article.
***"Building a New Heart"*** *(6-8)**

***"Germs at Home"*** *(6-8)**

***"Ewww! Don't Touch That!"*** *(6-8)**

*must be logged into Achieve3000 to view.

**BrainPOP -** Students can watch the movie and complete the review or graded quiz as a check for understanding. There are additional activities and related readings that can be assigned as well.
Cells

**Zingy Learning** - Students can complete the interactive lessons and quizzes as a check for understanding. There are additional questions that can be used in a Google Form or Doc as an outline for note taking during the lessons.
MS, Subject-specific, Unit 17, Lessons 1-4

## Elaborate

(Students practice skills and extend thinking. The elaborate activity is an opportunity to develop a deeper level of understanding about the topic, skill, concept, or process. During this phase, students should tie what took place)

**In-person activity**:
**Microscope activity**
Have students view tissue samples under real microscopes in class. Choose various slides for them to view, and allow them to see various samples and see the cells. Be sure to have unicellular and multicellular specimens. Have them sketch a picture of what they see at each microscope.

**In-person or online activity:**
**Characteristics of Life activity**
Have students complete this assignment as independent practice. Students will identify the characteristics of life using various videos. Explain to students that they will be identifying the characteristics of life in both living and nonliving things. Encourage students to highlight the characteristics they see as they watch the videos and write a short justification for each.

The first one has been done as an example and a sentence frame has been added to the 2nd slide that students can copy paste, and complete to get them started on the remaining slides.

Have students work in groups to discuss each example and work on justifications. Have them discuss what characteristics they saw and the justification made. This is a good time to remind students that living things need cells and all characteristics need to be present in order for something to be classified as a living thing. This should be reflected in their justifications.

At the end of this phase, review student work and give feedback by commenting on their work. Once completed, send an announcement to students via Google Classroom to check their documents for corrections needed.

## Evaluate

Reflect and evaluate next steps for instruction based on student performance. Teachers assess for understanding of key concepts. Students assess their abilities and set new goals. Use the data to guide the next cycle of inquiry to teach and meet the individual needs of students.

**In-person or online activities:**

**Option #1 -**
Slide 16. As an evaluation tool, students can respond to a writing prompt. This goes perfectly with the standard that says students need to gather evidence. Now they can use the evidence to explain that living things are made of cells.

**Option #2 -**
**Reading Investigation**
Students will conduct a reading investigation to determine if a virus is a living thing. Students may work in pairs or independently to read the article "Are viruses alive?" and identify examples of the six characteristics of life. Monitor student progress as they work.

Once students are done you can direct them to look at a picture of viruses under a microscope. Be careful with the site though, the first image is of seeds.

**Claim-Evidence-Reasoning**
Go over with students how to write CER . If you feel they need

practice you may use this CER practice sheet first. Show students the rubric for grading responses. Ask students the question, "What is a living thing?" so that they can start to make connections to the characteristics of living things and that specifically living things are made of cells.

Students will be using CER to respond to the question "Are viruses alive?" Each student will receive the CER sheet and will use evidence collected from the reading investigation.

*Teacher note: Students should reach the conclusion that viruses are not living things based on the article and if you used the images from the provided website. Students in their responses should be using the characteristics of life as their evidence. Have students include each characteristic of living things in their response.*