Unit 3 Module B - Cell Basics

Learning Goals	**3B**: Plan and carry out an investigation to determine how cells maintain homeostasis in changing conditions by the transport of materials across the cell membrane. (2.4)
I Can Statements	• I can describe the structure and purpose of a cell membrane. • I can explain what homeostasis is and why it is important to a cell • I can plan an investigation to test how cells maintain homeostasis in changing conditions by using the cell membrane to transport materials. • I can model the different types of movement across the cell membrane • I can explain how different structures move various materials in and out of the cell. • I can determine how cells maintain homeostasis in changing conditions.
State SEEd Standards	**Bio 2.4 Plan and carry out an investigation** to determine how cells maintain stability within a range of changing conditions by the transport of materials across the cell membrane. Emphasize that large and small particles can pass through the cell membrane to maintain homeostasis. (LS1.A)
Module Length	About 2 weeks
Phenomenon and Essential Questions	How do different materials affect slugs? (eggs, cells, etc) Phenomenon: Slugs die in salt/orbeez investigation
Assessment Options	3B Cell Membrane Assessment Project 3B Cell Transport Assessment

Unit 3 Module B Activity Guide
All Links found in Teacher Guide Below

	Approx Time	
Activity 1	2 days	Orbeez Lab - Setup & Data Collection
Activity 2	45 mins	Bubble Membrane Lab
Activity 3	40-60 mins	Playin' with Doh
Activity 4	45 mins	Cell Membrane Simulation(s)
Activity 5	45 mins	Cell Transport Notes
Activity 6	45 mins	Orbeez Lab Conclusion & Peer Review

Activity 1 - Orbeez Lab

Teacher instructions	Introduce the slug phenomenon to students by showing the slug videos. Students will answer the questions and you can go over the questions as a class as well. Introduce the lab to students. Explain that they will be planning an experiment to explore why salt kills slugs/snails. Tell the students that they can design the experiment however they'd like, but that it needs to be reasonable and be approved by the teacher before they can start. Ensure that students include a control group & 3 trials. Once students are in their lab groups, have them fill out the first page and a half of the lab worksheet. When they're done, instruct them to bring their work to the teacher to be approved. If the experiment needs modifications, have the students make those modifications before approval. Some common feedback is: include specific measurements, specify what you will be putting in each beaker, include what you will measure and when, etc.. Once the approval is given and students have the teacher's signature, they may set up their experiments. When students are beginning to set up their experiments, ensure that they are recording data on their orbeez prior to putting them into the various solutions/beakers. They should record a starting diameter as well as a starting mass. These initial measurements should be recorded in the data table. Let the experiments sit until the next class period. In the next class period, students collect data on their experiment. Instruct students to be careful when removing the orbeez from the solutions as to not break them. Once students have collected their data and cleaned up their materials they will need to make their bar graphs & analysis. Do not have students complete the conclusion. They will come back to the conclusion at the end of the unit once they have learned more information.
Approx Time	Split between 2 class periods - setup 1 day and collect data the next day
Lesson Goal	Plan an investigation to determine how cells maintain homeostasis in changing conditions.
Materials	Beakers Orbeez (Large/Jumbo Orbeez on Amazon work best) hydrated prior to the experiment Rulers Gram scale Salt Other materials as students request or as available (ideas for materials: sugar, corn starch, vinegar, baking soda)
Starter	Possible starter questions: • Use slug video & questions as the starter • Why do you think salt kills slugs?
Student Activity	3B.1 Orbeez Lab 3B.1 Obreez Lab Teacher Slug Facts: the Land GASTROPOD | Animal Fact Files
Formative Assessment	Experiment teacher check off (Day 1) Analysis question on lab sheet (Day 2)

Activity 2 - Bubble Membrane Lab

Teacher instructions	Create the bubble solution beforehand (900mL water, 100mL dish soap, & 25 mL corn syrup). Create enough to give a tray of bubble solution to each lab group (trays can be reused for each class period, but you may need to add more solution). You will either have to construct the straw squares prior to the lab or tell the students how to make the squares. Have students get with their groups. All groups will follow the first prompt together. After each group has performed the first instruction, discuss together as a class using the teacher questions on the 2nd page. After discussing as a class, have students write down what the important thing to remember about the cell membrane is. Repeat this process for each prompt and each of the teacher questions.
Approx Time	45 mins
Lesson Goal	Explore the cell membrane and its features
Materials	Cell Membrane Bubble Lab - Set up help, provide for students who were absent 3B.2 Bubbles and Cell Membrane Lab Dish soap Corn syrup Bendy straws String Trays - Amazon link (use any large flat tray you already have)
Starter	Possible starter questions: • What is the function of the cell membrane?
Student Activity	3B.2 Bubbles and Cell Membrane Lab Cell Membrane Bubble Lab - video for students who were absent
Formative Assessment	Responses on the sheet about the features of the cell membrane.

Activity 3 - Playin' with Doh

Teacher instructions	Give each student a tub of Play 'Doh. Have students construct models of the various structures of the cell membrane. They will upload a picture of their structures to the assignment and repeat for all 6 structures. You may also want to provide a short reading about the structure of the cell membrane and/or a diagram of a cell membrane cross section.
Approx Time	40-60 mins
Lesson Goal	Model the various structures of the cell membrane.
Materials	Play 'Doh, Student Whiteboards (optional)
Starter	Possible starter questions: • In the simulation, what allowed the particles to cross the cell membrane? • Why do you think a cell membrane would need channels?
Student Activity	3B.3 Playin' With Doh - Modeling Cell Transport
Formative	Model #7 (included on assignment)

Assessment	This can be taken out of the assignment and printed on a half sheet of paper rather than included as part of the whole assignment.

Activity 4 - Cell Membrane Simulation(s)

Teacher instructions	2 simulations are included. Simulations are similar but one is more in depth than the other. The PHET simulation covers movements of molecules but does not talk as much about the specific structures of the cell membrane. The Cell Defense simulation discusses the cell membrane structures, energy required, molecules that can and cannot pass through the cell membrane. If you feel like students could benefit from more practice it may be beneficial for students to complete both simulations. For both simulations: Have each student open up the simulation on their Chromebook. Students will follow the assignment prompts and use the simulation to respond to the questions. It may be helpful to show students how the simulation works beforehand.
Approx Time	45 mins per simulation
Lesson Goal	Explore how the structure of the cell membrane aids in movement of molecules.
Materials	Chromebook for each student!
Starter	Possible starter questions: • What is the function of the cell membrane? • Why might a cell need to move things in or out?
Student Activity	3B.4 Membrane Channel PHET Simulation 3B.4 Cell Defense: Game Simulation Game Simulation- BioMan Biology Cell Defense Phet Simulation: Membrane Channels
Formative Assessment	Describe how the channels allow materials to travel across the cell membrane.

Activity 5 - Cell Transport Notes

Teacher instructions	Using the video students will fill out their note sheet on cell transport.
Approx Time	40 minutes
Lesson Goal	Explain the process of cell transport.
Materials	3B.5 Types of Transport Note Sheet Cell Transport
Starter	Possible starter questions: • How do structures in the cell membrane allow materials to pass through? • What did you learn from the simulation about how molecules pass through the cell membrane?
Student Activity	3B.5 Types of Transport Note Sheet

Formative Assessment	Choose 2 types of cell transport and describe them.

Activity 6 - Orbeez Lab Conclusion & Peer Review

Teacher instructions	Using the orbeez lab sheet from before, have students fill in the conclusion section now that they have gained more information. They should review their notes and their lab to write a high quality conclusion. Have students pair up with someone from a different lab group. With their partner they will go through the discussion protocol. It may be helpful to model (fishbowl) for the students what a good discussion looks like. Emphasize to students that they don't need to write down word-for-word what they discuss, rather summarize key points in the document. Time requirements can be included if desired as well.
Approx Time	45 minutes
Lesson Goal	Evaluate experimental designs & reflect on the process.
Materials	Discussion protocol sheet Timer (optional)
Starter	Possible starter questions: • What did not go well during your lab? • Why do scientists work in groups and not alone? • If you did this lab again, what would you do differently?
Student Activity	3B.6 Orbeez Lab Peer Review
Formative Assessment	Orbeez Lab conclusion Notes from the discussion