

Cell Transport Unit

- Cells can increase their SA to Vol ratio by...
 - Folding like the cells in your intestine.



- Endocytosis: (Endo - means to bring in) Energy requiring process where a cell engulfs a particle.

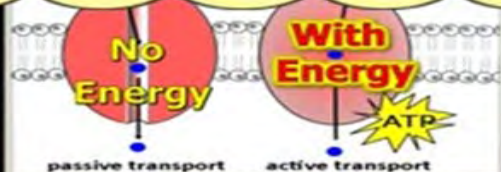
Endocytosis

Active Transport?

Requires Energy



- Bacteria, Plants, Fungi, and some Protista have cell walls.



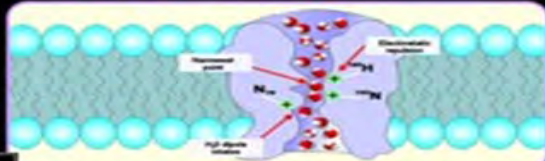
After Procedure:

- Gently remove the Gummy Bear or worm from the container by pouring out the liquid
 - (Caution they are Fra-Gee-Lay)
- Dry gently with paper towel and record the height in centimeters on work bundle.
- Observations



7 Lessons

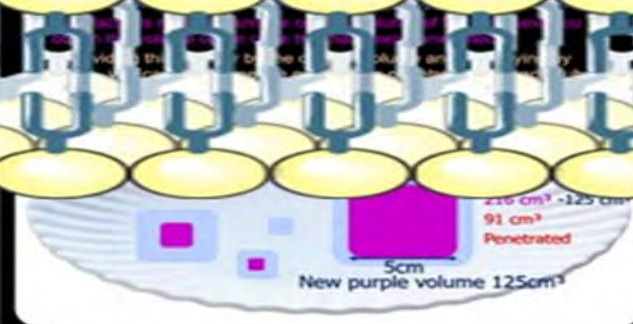
through the phospholipid bilayer.



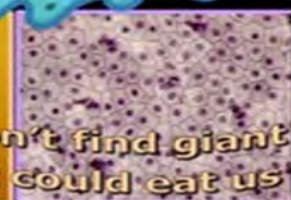
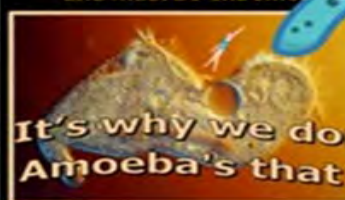
Follow-up Questions:

- What moved into and out of the dialysis tubing? How do you know?
- The water moved both into and out of the dialysis tubing. The iodine moved into the tubing but the starch was unable to leave the tubing.

could test for the presence of glucose

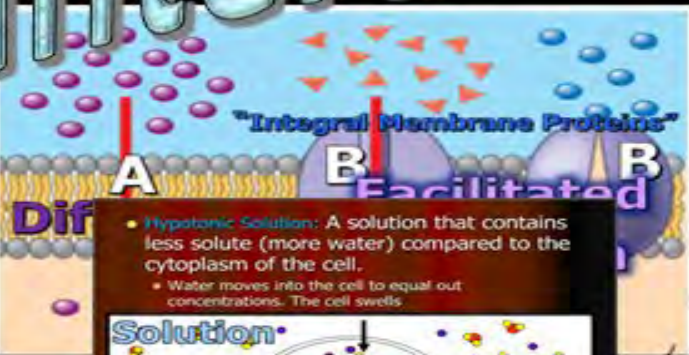


- By being a multicellular creature, animals and plants have overcome the problems of cell sizes and surface area. V... all cells and even... fea... / ratio and must be extremely



It's why we don't find giant Amoeba's that could eat us

Interactive Slideshows



- Hypotonic Solution:** A solution that contains less solute (more water) compared to the cytoplasm of the cell.
- Water moves into the cell to equal out concentrations. The cell swells.



- Cells volume
- If the volume will decrease and the exchange of materials the cell membrane will decrease. (Cell may)
- Cells tend to divide and remain small to maintain a high surface area to volume ratio.



- Calculate the following.

Bee Size at Start	Volume	Surface Area
Small 1cm L x W x H	1x1x1=1cm ³	1x1x6=6cm ²
Medium 2cm L x W x H	2x2x2=8cm ³	2x2x6=12cm ²
Large 4cm L x W x H	4x4x4=64cm ³	4x4x6=96cm ²
Extra Large 6cm	6x6x6=216cm ³	6x6x6=216cm ²

$$96/64 = 1.5$$



- Endocytosis:** (Endo - means to bring in) Energy requiring process where a cell engulfs a particle.



As a cell grows, its volume (units³) increases faster than surface area (units²), leading to a **decreased** SA:Vol ratio

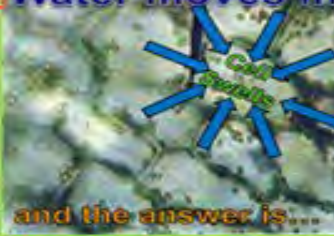
- If metabolic rate exceeds the rate of exchange of critical materials and waste (low SA:Vol ratio), the cell will eventually die.
- Growing cells tend to **divide** and remain small in order to maintain a **high** SA:Vol

Now measure cm after soaking

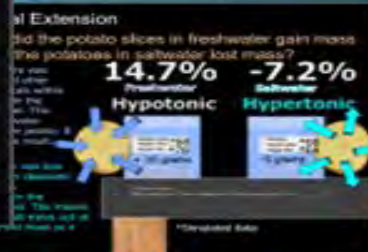
GUMMY BEAR	Before	After
Height before soaking =	2cm	3cm
Height after soaking =	5cm	3cm
Width before soaking =	2cm	3cm
Width after soaking =	2cm	3cm
Water %Change in height		
(After soaking height - before soaking height) / before soaking height x 100 =		
(5cm - 2cm) / 2cm x 100 =		150%
Saltwater %Change in height		
(After soaking height - before soaking height) / before soaking height x 100 =		
(1.5cm - 2cm) / 2cm x 100 =		-25%
Baking Soda and Water %Change in height		
(After soaking height - before soaking height) / before soaking height x 100 =		
(3cm - 2cm) / 2cm x 100 =		50%
Vinegar %Change in height		
(After soaking height - before soaking height) / before soaking height x 100 =		
(4.5cm - 2cm) / 2cm x 100 =		125%
Other % Mystery/Optional		
(After soaking height - before soaking height) / before soaking height x 100 =		
(7cm - 2cm) / 2cm x 100 =		250%

- The Solution that these plants cells are in must be...
- A. Hypotonic
- B. Hypertonic
- C. Isotonic
- D. Facilitated
- E. None of the above.

Water moves in



13



Circle the shape that best represents a cell? Why? Explain below using the best lab as a focus. Please use words Surface Area, Volume, Diffusion, Cell Size, Membrane, bleach, Beets.



Use below to assist you

- When a cell grows, its volume (units³) increases faster than surface area (units²), leading to a decreased SA:Vol ratio
- If metabolic rate exceeds the rate of exchange of critical materials and wastes (low SA:Vol ratio), the cell will eventually die.
- Growing cells tend to divide and remain small in order to maintain a high SA:Vol ratio suitable for survival.

Function

Activity! Revisiting the egg in vinegar. Did the egg gain or lose mass? Describe the egg's properties. How else has it changed?



Follow Along Bundle

Surface Area to Volume Ratio

As a cell grows, its surface area and volume increase. However, the surface area does not increase as fast as the volume. This means that the surface area to volume ratio decreases as the cell grows. This is why cells are small.

Surface Area to Volume Ratio

Side Length (cm)	Surface Area (cm ²)	Volume (cm ³)	SA:V Ratio
1	6	1	6:1
2	24	8	3:1
3	54	27	2:1
4	96	64	1.5:1
5	150	125	1.2:1

As the side length increases, the surface area to volume ratio decreases. This is why cells are small.

Diffusion

Diffusion is the movement of particles from an area of high concentration to an area of low concentration. It occurs in all states of matter.

Diffusion in Solids

Diffusion in solids is very slow. It occurs because the particles are packed closely together and can only move by jumping from one position to another.

Diffusion in Liquids

Diffusion in liquids is faster than in solids. The particles have more space to move and can move more easily.

Diffusion in Gases

Diffusion in gases is the fastest. The particles have a lot of space and move very quickly.

Diffusion in a Gelatin Cube

A gelatin cube is used to demonstrate diffusion. The cube is made of gelatin and contains a small amount of potassium dichromate. The cube is placed in a beaker of water. The potassium dichromate ions diffuse out of the cube into the water.

Diffusion in a Gelatin Cube

The diagram shows a gelatin cube with potassium dichromate ions (orange dots) inside. The cube is placed in a beaker of water. The potassium dichromate ions diffuse out of the cube into the water.

Weight of tubing with starch and water solution

The weight of the tubing increases as the starch diffuses out of the tubing into the water solution. This is because the water solution is denser than the starch solution.

Weight of tubing with starch and water solution

The diagram shows a piece of tubing with starch solution inside. The tubing is placed in a beaker of water solution. The starch diffuses out of the tubing into the water solution.

Diffusion in a Potato

A potato is used to demonstrate diffusion. The potato is placed in a beaker of water. The water diffuses into the potato, making it heavier.

Diffusion in a Potato

The diagram shows a potato in a beaker of water. The water diffuses into the potato, making it heavier.

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Transport through the plasma membrane

Transport through the plasma membrane can be passive or active. Passive transport does not require energy, while active transport does.

Transport through the plasma membrane

The diagram shows a cell membrane with various transport proteins. Some transport is passive, and some is active.

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Part 2 Review Game

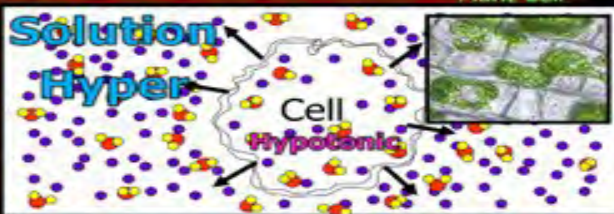
A review game for Part 2 of the course. It consists of a grid of questions and answers.

Part 2 Review Game

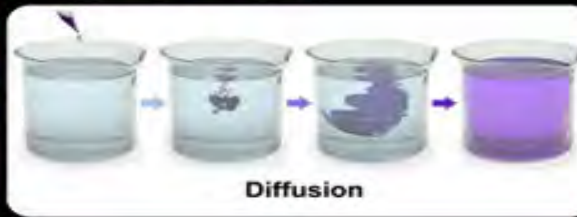
The diagram shows a grid of questions and answers for the Part 2 review game.

Activities, Labs, Assessments, Keys and more all built-in

- Hypertonic Solution: Concentration of the cell is less than outside of the cell.
 - Water moves out of the cell to try to even out the concentration. Cell Shrinks (**Plasmolysis**)



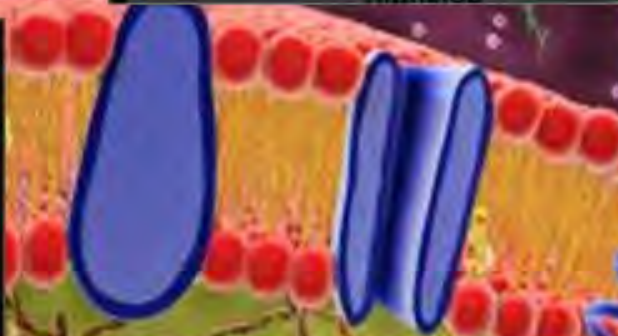
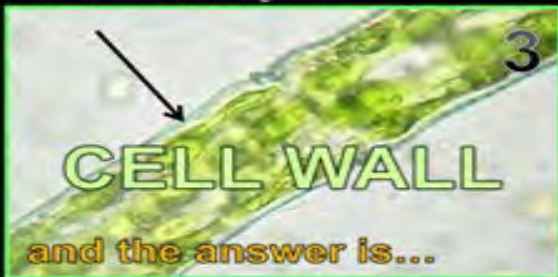
- Follow-up Questions:
 - Use the word "diffusion" in a sentence that has to do with this lab.



- Answer: Because lipids are nonpolar. They don't mix with water.
 - The membrane becomes a water proof barrier between two liquid areas.



- Name this cellular organelle?



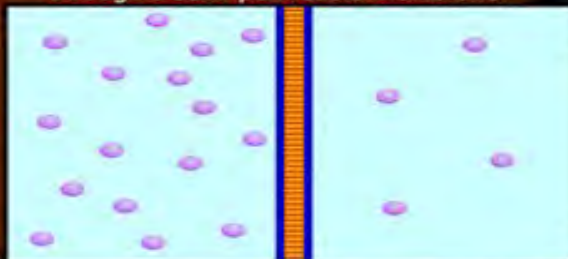
- Made of a phospholipid bilayer.



Phospholipids have two ends, one of which is **hydrophilic**, or attracted to water, and one of which is **hydrophobic**, or repelled by water.

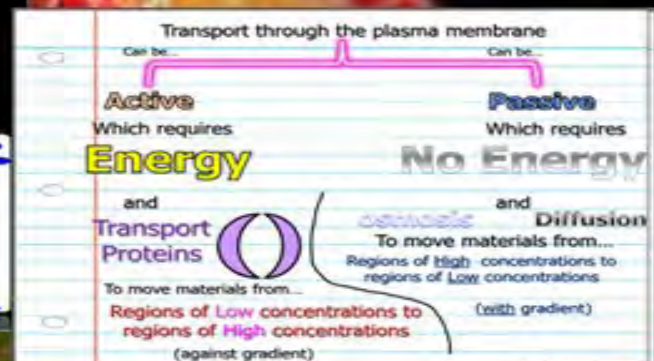
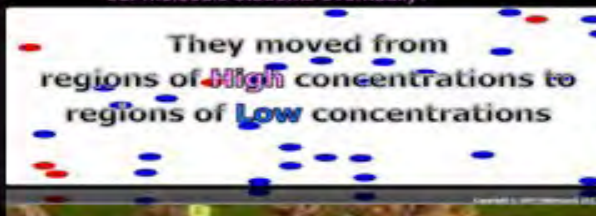


- Osmosis: The movement of water through a semi-permeable membrane.



- Activity! (Optional) Bumper Boats.
 - Teacher will assign a few students to move in one direction. If they bump into another student or object they change directions.
 - Open doors in the classroom. What will happen to our molecule students eventually?

They moved from regions of **High** concentrations to regions of **Low** concentrations



Interactive Slideshows

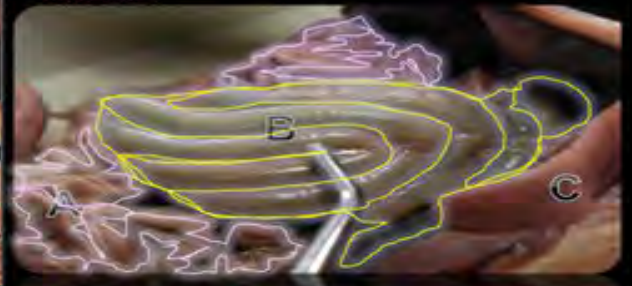
- Which is the cecum, small intestine, and large intestine?



- What is this?



- Which is the **large intestine**, which is the small intestine?



On your food get broken
all substances (molecules)
and are absorbed into your bloodstream.

- Proteins to Amino Acids
- Starches to simple sugars
- Fats to Fatty Acids and Glycerol

Once these are put into your bloodstream, they then can be used
for energy and other purposes (building blocks).

Food

Digestion

Growth
Repair
Reproduction

- When you swallow (swallow), your tongue (tongue) move food into your throat cause your epiglottis to close.

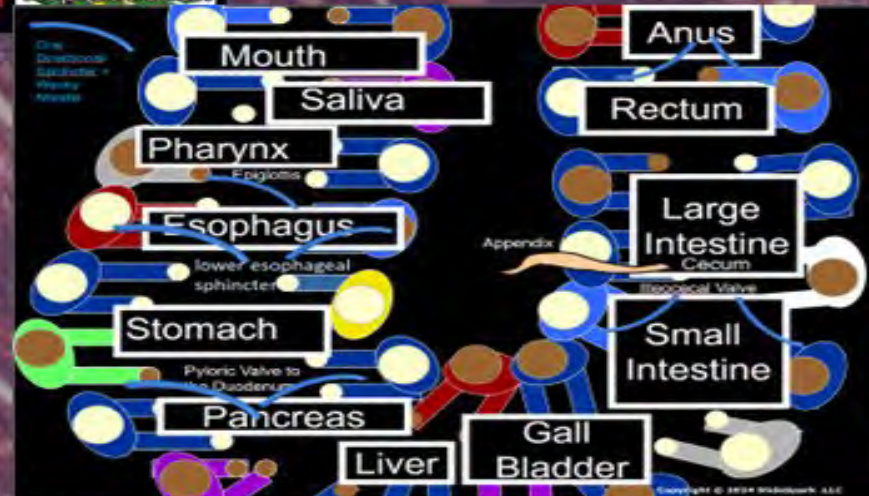


- Appendectomy: Surgery to remove the appendix.
 - Usually performed in an emergency / appendicitis



3 minute Appendectomy Surgery (No Audio)
<https://www.youtube.com/watch?v=73jhy1bi2MY>

- Stomach: A sac-like part of the alimentary canal in which food is stored.



Part 2: Cell Biology Unit: 7 Lessons of 50 minutes and 17 Page Follow Along Work Bundle Placing Eggs into Vinegar for Later in Unit, Surface Area to Volume Ratio, Why Surface Area Matters, Reasons for being multi-cellular, Explanation of Surface Area and Volume, Introduction to Diffusion, Beets in Bleach Lab Activity / Demonstration, Calculating Surface Area to Volume Ratio, Finding the % Bleach penetration into the Beets, How various cells increase their surface area to volume ratio, Set-Up for Gummy Bears in water, saltwater, vinegar, soda Lab in two Days, Potato Slices in Water vs. Salt Water Lab, Cytoplasm, Capsule Slime Layer in Bacteria and Need for good oral hygiene, Cell Wall, Functions of the Cell Wall, Set-up of Osmosis and Diffusion lab with Iodine Solution and Starch / Dialysis Tubing, Cell Membrane, Aquaporins, Phospholipid Bilayer, Hydrophilic vs. Hydrophobic, Transport Proteins, Polarity of the Phospholipid, Oil vs Water demo, Selectively Permeable, What might go in and out of a cell, Diffusion, Diffusion Demo, Bumper Boats Diffusion Activity, Visiting the Iodine and Starch Lab, Sketching Out the Dialysis Tubing, Osmosis, Calculating the % Change in Mass, Passive Transport, Permeable vs. Impermeable, Facilitated Diffusion, Active vs. Passive Transport with Visuals, Finding % Change of Gummy Bears placed in various Solutions, Hypertonic Solutions, Hypotonic Solutions, Isotonic Solutions, Built-In Visual Quiz, Cells Walls preventions in Lysis, Prefixes Visual Quiz, Why we can't drink Saltwater, Set-up Syrup in Dialysis Tubing Demo, Revisiting Potato Slice in Water and Salt Water and calculating % change in Mass, Visiting Eggs in Vinegar and explanation of what occurred, Find % change, Active Transport, Sodium Potassium Pump, Class Simulation of Active Transport, Cell Communication, Endocytosis, Phagocytosis, Class Engulfs a Particle Activity, Pinocytosis, Transmembrane Proteins Receptor Mediated Endocytosis, Exocytosis, Movement through a cell Flow Chart, Box Game Review, Crossword Puzzle, End Unit Assessment



Additional and Printables



Part 2 Lesson 1 Cell Membrane



Part 2 Lesson 2 Osmosis



Part 2 Lesson 3 Gummy Bear Lab



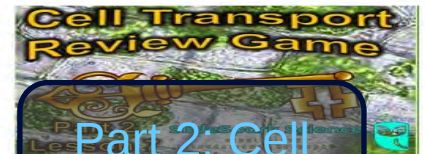
Part 2 Lesson 4 Extensions



Part 2 Lesson 5 Active Transport



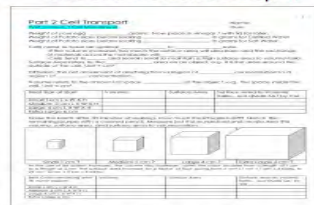
Part 2 Lesson 6 Review Game



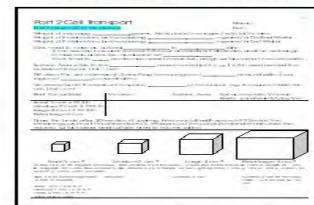
Part 2: Cell
Biology Unit



Part 2 Work Bundle Answers



Part 2 Work Bundle Digital



Part 2 Work Bundle Print

SlideSpark Science

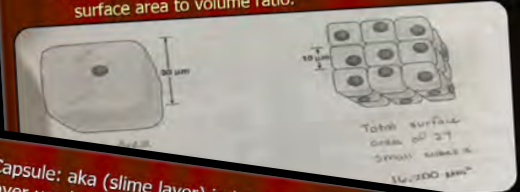


MIDDLE-LEVEL EDUCATIONAL RESOURCES

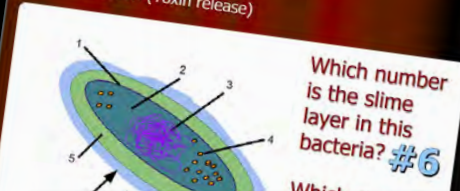
Interactive slideshows provide the roadmap for an amazing learning experience for students in grades 5-9. A Detailed set of work bundles chronologically follow the digital learning, providing a clear and intuitive roadmap to understanding. As the teacher or student advances through a slideshow, exciting hands-on activities, fantastic visuals, fill-in notes, review opportunities, video links, assessments, and much more are strategically placed throughout. Interactive learning unfolds step by step and supported by the work bundle to reach all types of learners. Everything you need to run to an amazing learning experience is provided in this one-of-a-kind science curriculum.

Each unit in the curriculum is designed to help teachers deliver the best possible learning experience for their students. Our interactive science slideshows are filled with questions and answers, important fill-in notes, hands-on activities, projects, games, built-in quizzes, and end of the unit assessment pieces. Students follow along with a work bundle that documents the entire learning experience for a fantastic review and assessment piece.

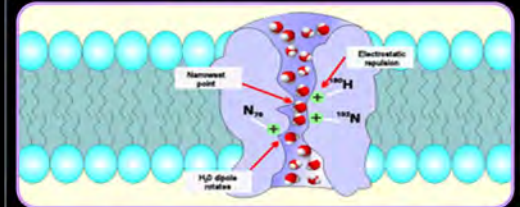
- Cells need to have an optimal surface area to volume ratio.
- If the volume increases too much the surface area will decrease and the exchange of materials across the cell membrane will decrease. (Cell may die)
- Cells tend to divide and remain small to maintain a high surface area to volume ratio.



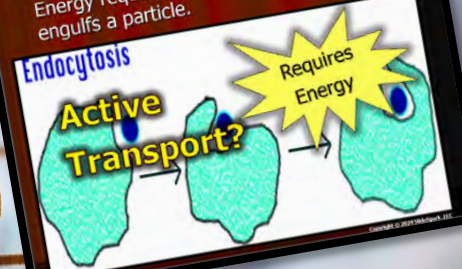
- Capsule: aka (slime layer) in bacteria: A thick layer used for sticking cells together.
- Food reserve
- Protection (Toxin release)



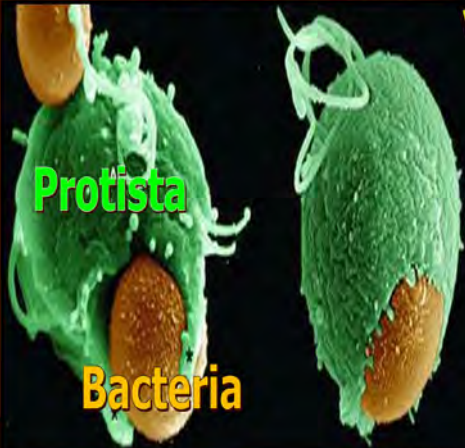
- Aquaporins: The plasma membranes of many cells also contain water channel proteins through which water molecules cross the membrane more rapidly than they can diffuse through the phospholipid bilayer.



- Endocytosis: (Endo - means to) Energy requiring process where a cell engulfs a particle.



- Phagocytosis: Type of endocytosis.
- Membrane surrounds large particles (solids).



Using organisms constantly receive and interpret signals from their _____.

Signals can be light, heat, water, odor, and touch.

Cells also receive signals from other _____ to divide and signals to differentiate.

Endocytosis: (Endo - means to bring in) Energy requiring process where cell _____ a particle.

Phagocytosis: Type of endocytosis. Membrane surrounds large particles. _____

Pinocytosis: Membrane surrounds a _____.

Phagocytosis and pinocytosis are both types of _____.

Endo _____

Transmembrane Protein Receptor Mediated Endocytosis: Protein receptors facilitate endocytosis.

Please name the correct form of endocytosis below:

Exocytosis (Exo - means to take out) Cell _____ particle. Use _____.

Please describe endocytosis in the space below:

Endocytosis

--	--	--	--	--

Red Slide Notes: Help students record important information in a fun and easy-to-understand way. Designed red-colored slides contain a few pieces of crucial information that students must record into their work bundle to complete the notes. Students will use these important notes throughout the work bundle.

The set-up of the slideshows are designed to make learning fun and interactive for students. With a mix of questions and answers, teachers can use these slides to get their students thinking and actively participating in their education. Plus, the answers are always revealed on the next slide, providing students with immediate feedback and helping teachers assess their understanding.

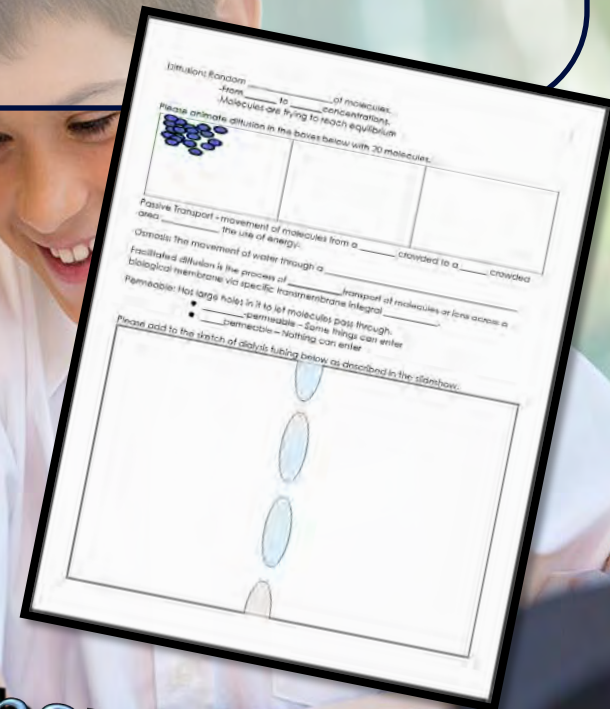
- Follow-up Questions:

- What moved into and out of the dialysis tubing? How do you know?



- Follow-up Questions:

- What moved into and out of the dialysis tubing? How do you know?
- The water moved both into and out of the dialysis tubing. The iodine moved into the tubing but the starch was unable to leave the tubing.
- I know this because the iodine solution turned the starch blue / purple.



Next Slide

slideshow supports
Work Bundle

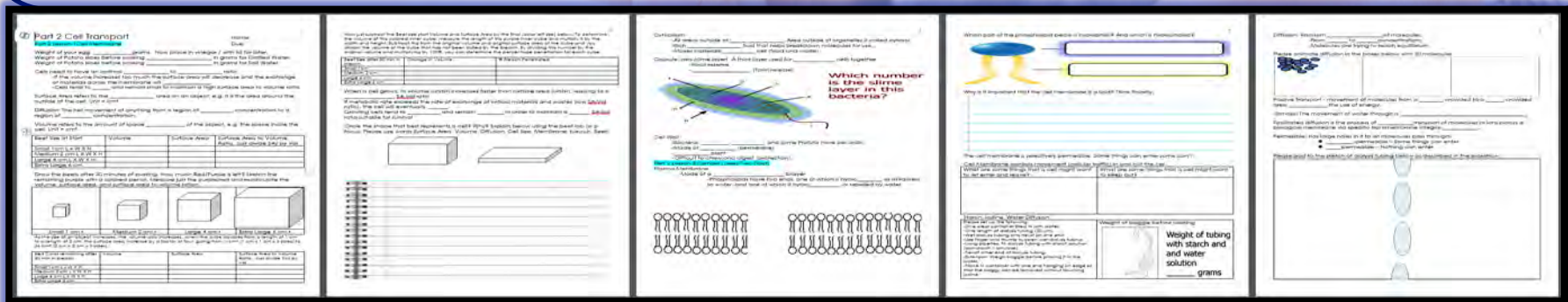
Lesson Planning

Daily lessons space exciting hands-on activities, red slide notes, video and academic links, projects, simulations, readings, built-in quizzes, and review opportunities throughout the slideshows. A typical day may have many different learning styles being targeted. Daily lesson planning becomes advancing through the slideshow roadmap the night before. Each lesson is roughly 50 minutes, but sometimes things can speed up or slow down. The best strategy is just to go at your classes own pace. The work bundle chronologically follows the interactive slideshow and you can always spend extra time assessing the quality of the writing within. If you don't quite finish a lesson, you can always pick it up the next day where you left off. The only real trick in timing is not starting a larger activity if you don't have the available time to complete. The slideshows have been designed to be a low stress, go at your classes own pace experience. Most activities are designed to be cost effective, using general materials that can be gathered from your local stores.



Follow Along Work Bundle

Each science unit comes with several work bundles. The bundles should be printed before the unit begins and distributed to the students on the first day of the unit. The work bundles will be due shortly after the completion of the unit. The work bundle will become a resource for the review games, crossword puzzles, and will be collected for assessment. The work bundle follows the entire learning experience and will be used every day. They are chronological to the lessons and provide places to record fill-in notes, answer questions, collect data, graph and much more. An answer version is provided that can that be distributed to your support professionals. A digital version of the work bundle and some writable .pdf versions are provided if you want to go paperless. These work bundles are perfect for students looking for an easy and organized way to track their progress and stay on top of their studies.



1. The cell is the basic unit of structure and function of all living organisms. It is the smallest unit of life that can perform all the functions of life.

Cell Structure:

The cell is bounded by a cell membrane. Inside the cell, there is a nucleus which contains genetic material. The cytoplasm is the fluid medium in which organelles are suspended. The cell wall is a rigid structure that provides support and protection.

Cell Function:

The cell performs various functions such as metabolism, growth, and reproduction. It takes in nutrients and releases waste products. The cell membrane controls the entry and exit of substances.

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with Answer Key

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Transport through the plasma membrane

Active which requires **Energy**

and Transport **Proteins**

To move materials from **Regions of Low concentrations of H₂O concentrations (lighter product)** to **Regions of High concentrations (darker product)**

Protein

Cytoplasm

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Cytoplasm

Review Game / Assessments

This unit concludes with a review quiz. Answers are provided in slideshow form so students can self assess. A blank template sheet is provided in the work bundle. Students can benefit from working together in small table groups with quiet communication. You can decide if you want to allow the use of work bundles or not. These are a nice review opportunity and get the students looking through their work bundles for the answers.



Part 2 Review Game

1-10 = 10 pts * = Bonus = 1 pt
Secretly write out in correct space = 1 pt
Final Question = 5 pt wager

Names: _____ Score: ____ / 100

INSIDE AND OUT	INSANE IN THE MEMBRANE	UNCOMMON SOLUTION	BIG-GULP	SOLUTION FLICKS (1 pt Bonus)
1) _____	6) _____	11) _____	16) _____	*21) _____
2) _____	7) _____	12) _____	17) _____	*22) _____
3) _____	8) _____	13) _____	18) _____	*23) _____
4) _____	9) _____	14) _____	19) _____	*24) _____
5) _____	10) _____	15) _____	20) _____	*25) _____

Final Question Wager: ____ / 5. Answer: _____

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Part 2 Review Game

1-10 = 10 pts * = Bonus = 1 pt
Secretly write out in correct space = 1 pt
Final Question = 5 pt wager

Names: _____ Score: ____ / 100

INSIDE AND OUT	INSANE IN THE MEMBRANE	UNCOMMON SOLUTION	BIG-GULP	SOLUTION FLICKS (1 pt Bonus)
1) Letter D	6) HYDROPHILIC HYDROPHOBIC	11) OSMOSS	16) ENDOCYTOSIS	*21) BACK TO THE FUTURE
2) Cytoplasm	7) Oxygen, Water, Food, Molecules, Protein, Minerals, Vitamins	12) HYPERTONIC	17) PHAGOCYTOSIS	*22) HONEY! SHRINK THE KIDS
3) Cell Wall	8) Washi, Viruses, Bacteria, Large Particles	13) HYPOTONIC	18) PHOCYTOSIS	*23) OSMOSS IONES
4) Plant, Bacteria, Cell-Axis, Supports, Protects	9) Letter E	14) ISOTONIC	19) RAW MEMBRANE PROTEIN RECEPTOR MEDIANED RESOURCES	*24) GHOSTBUSTERS
5) Phospholipid, B-layer, Membrane, Protein	10) High To Low Concentration	15) ACTIVE TRANSPORT	20) CELL WALLS	*25) BILLY MADISON

Final Question Wager: ____ / 5. Answer: **HYPERTONIC, HYPOTONIC, ISOTONIC**

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Cell Transport Review Game



- Which letter represents the shape of a typical cell? Why in two words? answer is...

1

A Length = 1mm
Surface area = 6mm²
Volume = 1mm³

B Length = 2mm
Surface area = 24mm²
Volume = 8mm³

C Surface area = 48mm²
Volume 8mm³

Why? D **Most Surface Area**

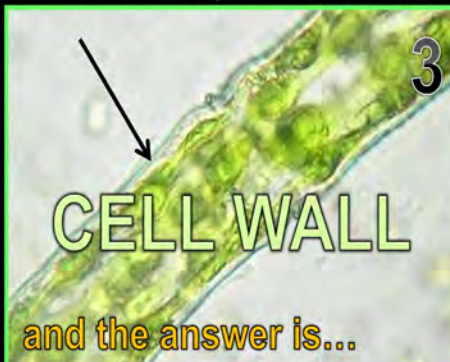
Length 16 mm
Width 4 mm
Height 0.125mm
Surface area = 133mm²
Volume = 8mm³

- This is the rich chemical fluid that helps breakdown molecules for use. **2**
– Moves materials through cell (food and waste)

Cytoplasm

and the answer is...

- Name this cellular organelle?



- Cell Walls... (1 point each)
- Found in plants, bacteria, and fungi
- Made of cellulose sugar (permeable)
- Supports and protects plants

4

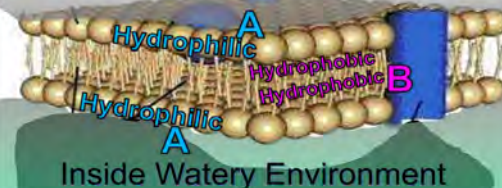


- Name A and B?



Outside Watery Environment **6**

philic = attraction to something
phobic = Afraid of / repelled



- Name some things an animal cell would want to let in. (1 point each) The cell wants to let in...

- Oxygen.
- Water.
- Food.
- Molecules
- Protein.
- Minerals
- Vitamins



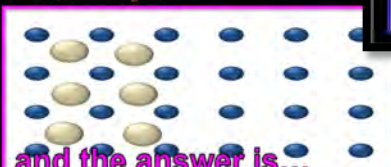
- The cell doesn't want to let in...

- Waste.
- Viruses.
- Bacteria.
- Large Particles



- The animation below best represents...

- A.) Osmosis
- B.) Diffusion** Also called passive transport
- C.) Active Transport
- D.) An unbalanced gradient
- E.) A balanced gradient



and the answer is...

- Molecules try to reach equilibrium.
– They go from areas of...(finish)

10

high concentration
to areas of low
concentration

and the answer is...

- What process is this?

Semi permeable membrane



Osmosis

11

- The Solution that these plants cells are in must be...

- A.) Hypotonic
- B.) Hypertonic
- C.) Isotonic
- D.) Facilitated
- E.) None of the above.



12

- The Solution that these plants cells are in must be...

- A.) Hypotonic
- B.) Hypertonic
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- D.) Facilitated
- E.) None of the above.



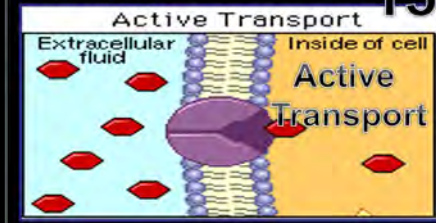
13

- Isotonic** Solution: The cell has an equal proportion of concentration with the area surrounding.
- Water continually moves in and out to keep concentration even.



14

- This uses energy to move molecules from areas of low concentration to areas of high concentration.



15

- Name this process.

and the answer is...



16

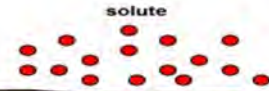
- This is the process where the membrane surrounds large solid particles.

and the answer is...



17

- Process where the membrane surrounds a liquid.

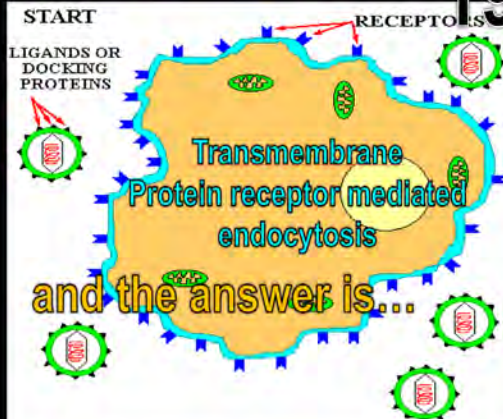


Pinocytosis

and the answer is...

18

- How did this virus enter the cell?



19

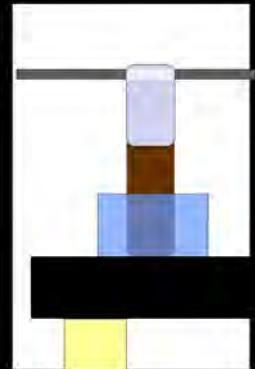
20 FULL



Why don't the plant cells burst?



- The corn syrup was hypertonic (more solute). Water was .
- The water moved into the dialysis tubing to equal the concentrations (.
- The fluid in the tubing rose.



Activities / Labs

Our science activities are designed to help students explore and understand complex scientific concepts in an engaging and interactive way. Each science unit includes several hands-on activities that encourage students to collect data and think critically about the world around them. Our easy-to-follow slideshow provides detailed visuals, simple materials, and clear directions, making it easy for both students and teachers to navigate the activities.

Activity! Osmosis and Diffusion in Gummy Bears.

Procedure:

- Everyone gets four Gummy Bears (Worms work?)
- Measure the height of each bear in cm.
 - They should be same but check to make sure.
- Label four cups or Petri dishes below and place gummy bear in each cup with that fluid.
 - Water
 - Saltwater
 - Baking Soda and Water
 - Vinegar
- Place a Gummy of the same color taped to the outside of the cup to compare at the end.

Now measure cm after soaking

Gummy Bear	Height before soaking	Height after soaking	% Change in height
Water	2cm	2cm	0%
Saltwater	2cm	1.5cm	-25%
Baking Soda and Water	2cm	2cm	0%
Vinegar	2cm	4.5cm	125%

Which bear was placed in Saltwater?

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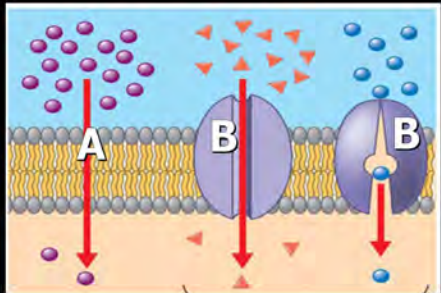
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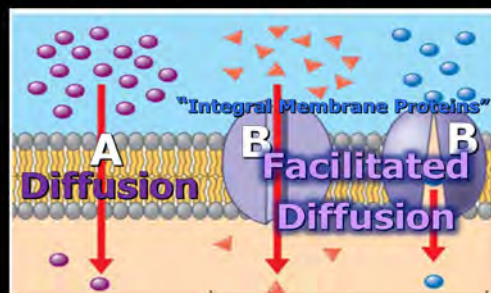
Built-in Assessment

Each unit contains several built-in assessment questions that students answer in their work bundle. With the question revealed before the answer, the teacher can easily call on individual students or table groups to respond. These provide an effective and efficient way for teachers to assess student learning.

• Which one is facilitated diffusion?



• Which one is facilitated diffusion?



Diffusion: Random _____ of molecules.
From _____ to _____ concentrations.
-Molecules are trying to reach equilibrium

Please animate diffusion in the boxes below with 20 molecules.

--	--	--

Passive Transport - movement of molecules from a _____ crowded to a _____ crowded area. _____ the use of energy.

Osmosis: The movement of water through a _____.

Facilitated diffusion is the process of _____ transport of molecules or ions across a biological membrane via specific transmembrane integral _____.

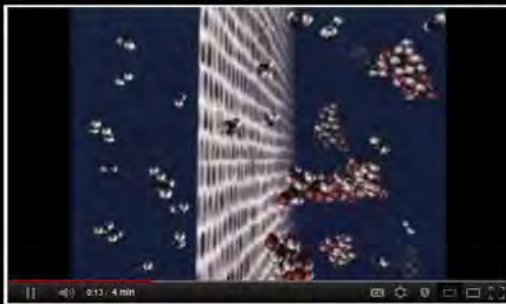
Permeable: Has large holes in it to let molecules pass through.
• _____ permeable - Some things can enter
• _____ permeable - Nothing can enter

Questions in Work Bundle

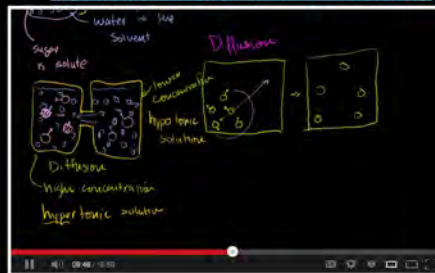
Built-in Video Links

Our science education program is designed with the modern, multimedia learner in mind, and our video links are a perfect complement to our educational materials. These short clips are embedded into the slideshow at just the right places for a fantastic review. Whether you're studying biology, chemistry or physics, our video links are an excellent way to reinforce your learning.

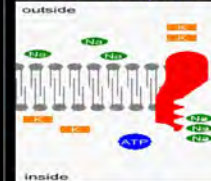
- Video Link! Osmosis (4 minutes)
– <https://www.youtube.com/watch?v=eQsAzXr0UCU>



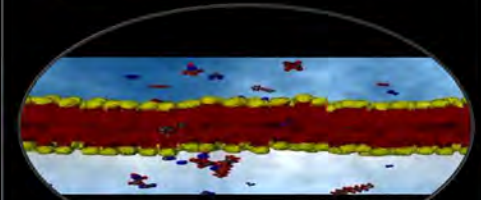
- Osmosis and Diffusion (Optional)
– <http://www.youtube.com/watch?v=aubZU0iWtI>



- Activity! Simulation.
– Please view the animation and then try and recreate what is occurring.
– Roles include, Na (Sodium), K (Potassium), ATP, Transport Proteins.

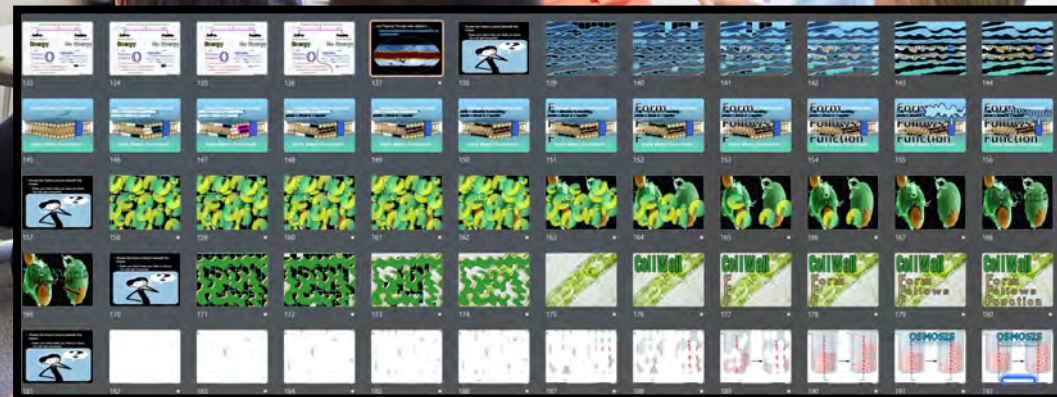
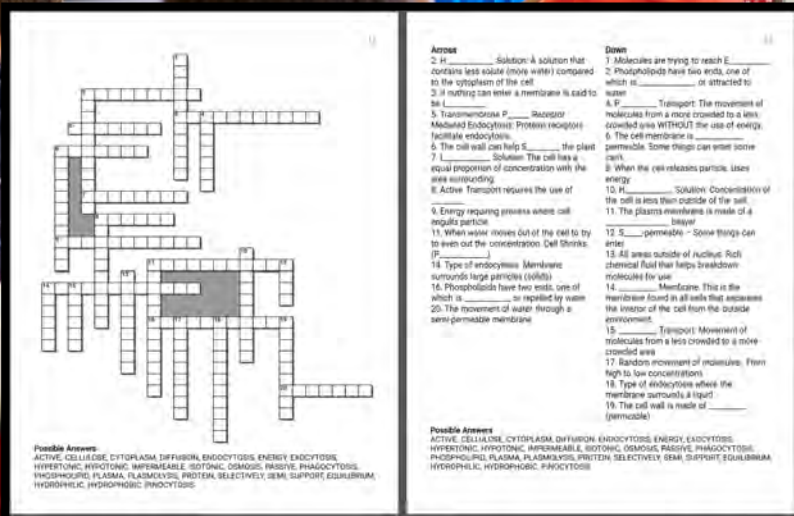


- Just Passing Through (site visitation)
– http://www.pbslearningmedia.org/asset/tdc02_int_membraneweb

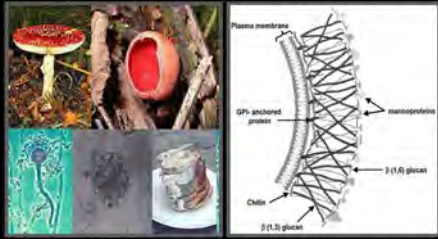


Games and Review

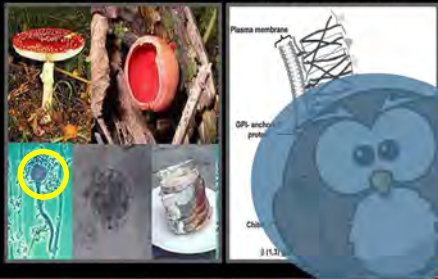
Games are a fantastic way for students to learn scientific concepts while having fun. We incorporate a variety of games into our curriculum, including interactive quizzes and puzzles that challenge students to think critically about the material. Our Hidden Box Games are a particularly popular feature, which conclude each unit by revealing a picture related to the topic. Students try to guess what the picture might be, making learning an engaging experience.



- Fungi have a cell wall made of chitin.
 - Chitin is a complex sugar. (Polysaccharide)



- Fungi have a cell wall made of chitin.
 - Chitin is a complex sugar. (Polysaccharide)



The Owl - Each Part of the slideshow has a small clipart Owl hiding somewhere in a slide. The owl is incredibly small and blended into just the right slide. If a student spots the “Owl” they can raise their hand high into the air. When you call upon the student they can say “Owl” and be the student who spotted the Owl. Each PowerPoint Review game also has an owl hiding in it worth one point. Remind the students that they secretly write the word "owl" rather than yell it out during the review games. The Owl search is not included in every lesson. A slide at the beginning of the lesson will alert the students that today is an “Owl’ day. Everything arrives editable so delete if you wish. You will find that some students will become the expert owl hunters in the group.

Google Classroom Compatible

Our digital learning programs are designed for students to learn science in a flexible and engaging environment. Our Google Classroom-compatible units provide a seamless learning experience whether your students are in the classroom or learning from home. Our step-by-step slideshows and student work bundles ensure that students can complete their work independently. The PowerPoint Slideshows and step-by-step work bundles can easily be loaded to your Google Drive and posted in your Google Classroom. These are great for daily lessons, students who need additional time, and for a student who was absent and looking to catch up in their work bundle.



Part 2 Lesson 1 Cell Membra...
Google Slides



Part 2 Lesson 3 Gummy Bea...
Google Slides



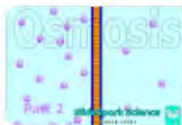
Part 2 Lesson 6 Review Game
Google Slides



Part 2 Lesson 5 Active Trans...
Google Slides



Part 2 Lesson 4 Extensions
Google Slides

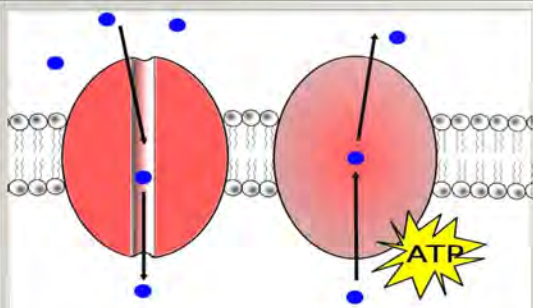


Part 2 Lesson 2 Osmosis
Google Slides

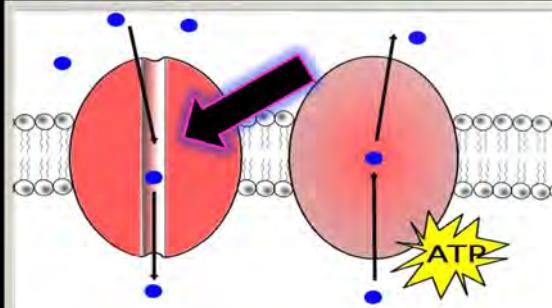
Built-in Questions and Assessments

Many slides will have relevant terms covered with a box. When advancing through the slideshow an outline around the box will glow with a bright color. The next slide will make the box disappear. These slides allow the teacher to call upon students or table groups / check for understanding before advancing. The team at SlideSpark has found that using this technique helps to keep the students focused. Constantly recalling and reviewing information learned is necessary when moving through a large unit. The slideshows don't just give everything away for free. Students should be able to demonstrate knowledge before moving on. Some slides have full questions instead of just covered terms. In these slides, the teacher should encourage small group work. The teacher can then call upon one or two groups to share before advancing the slide. The next slide will always reveal the correct answer.

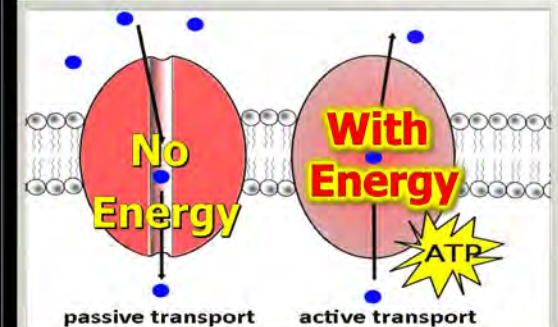
- Which is active and which is passive transport?



- Which is active and which is passive transport?



- Which is **active** and which is **passive** transport?



Cellular Biology Unit

Cell Biology Unit



30 Lessons 3 Parts. (8th-10th Most Difficult) Part 1 is an Introduction to Cells and contains 8 Lessons and 20 Page Work Bundle. Part 2 about Cell Transport and contains 7 Lessons and 17 Page Work Bundle. Part 3 explores Cellular Organelles and has 5 Lessons and 13 Page Work Bundle. Part 4 Finishes exploring Cell Organelles and wrap up. It contains 11 Lessons and 18 Page Work Bundle.

Part 1: Cell Biology Unit: 8 Lessons of 50 minutes and 20 Page Follow Along Work Bundle, What is Life, Sewer Lice / Raisins in Ginger Ale Activity, What is an Organism, Introduction to CHNOPS/SPONCH biologically Important Atoms/Molecules, % of CHNOPS graph in Animals, Characteristics of Living Things, Spontaneous Origin, Case Study of Francesco Redi Experiment, Case Study of Pasteur's Swan Necked Flask Experiment, Needs of Living Things, Cheek and Onion Cells Under the Microscope Activity, Differences between Plants and Animal Cells, Plant and Animal Cell Venn Diagram, Visual Tour of Types of Cells, Introduction to Forms Follows Function Concept, Forms Follows Function Object Activity, Multicellular vs. Unicellular, Kingdoms of Life Step by Step Diagram, Adding of Bacteria to Venn Diagram, Eukaryotic Cells vs. Prokaryotic Cells, Energy Flow of Life through Cells, Chemosynthesis, Deep Ocean Life at Hydrothermal Vents, Archaea, Domains and Kingdoms Diagram, Autotrophic vs. Heterotrophic, Levels of Biological Organization, Introduction to the Cell Theory, Microscope Creation by Hans and Zacharias Janssen, Robert Hooke, Anton van Leeuwenhoek, Schleiden and Schwann, Rudolf Virchow, Robert Remak, The Modern Cell Theory, Three Big Principles of the Cell Theory, Introduction to the Cellular Organelle Poster Project, Cell City Project, Students design a cell modeled after the Jobs and Functions of a City, Box Games, Crossword Puzzle, End Unit Assessment

Part 2: Cell Biology Unit: 7 Lessons of 50 minutes and 17 Page Follow Along Work Bundle Placing Eggs into Vinegar for Later in Unit, Surface Area to Volume Ratio, Why Surface Area Matters, Reasons for being multicellular, Explanation of Surface Area and Volume, Introduction to Diffusion, Beets in Bleach Lab Activity / Demonstration, Calculating Surface Area to Volume Ratio, Finding the % Bleach penetration into the Beets, How various cells increase their surface area to volume ratio, Set-Up for Gummy Bears in water, saltwater, vinegar, soda Lab in two Days, Potato Slices in Water vs. Salt Water Lab, Cytoplasm, Capsule Slime Layer in Bacteria and Need for good oral hygiene, Cell Wall, Functions of the Cell Wall, Set-up of Osmosis and Diffusion lab with Iodine Solution and Starch / Dialysis Tubing, Cell Membrane, Aquaporins, Phospholipid Bilayer, Hydrophilic vs. Hydrophobic, Transport Proteins, Polarity of the Phospholipid, Oil vs Water demo, Selectively Permeable, What might go in and out of a cell, Diffusion, Diffusion Demo, Bumper Boats Diffusion Activity, Visiting the Iodine and Starch Lab, Sketching Out the Dialysis Tubing, Osmosis, Calculating the % Change in Mass, Passive Transport, Permeable vs. Impermeable, Facilitated Diffusion, Active vs. Passive Transport with Visuals, Finding % Change of Gummy Bears placed in various Solutions, Hypertonic Solutions, Hypotonic Solutions, Isotonic Solutions, Built-In Visual Quiz, Cells Walls preventions in Lysis, Prefixes Visual Quiz, Why we can't drink Saltwater, Set-up Syrup in Dialysis Tubing Demo, Revisiting Potato Slice in Water and Salt Water and calculating % change in Mass, Visiting Eggs in Vinegar and explanation of what occurred, Find % change, Active Transport, Sodium Potassium Pump, Class Simulation of Active Transport, Cell Communication, Endocytosis, Phagocytosis, Class Engulfs a Particle Activity, Pinocytosis, Transmembrane Proteins Receptor Mediated Endocytosis, Exocytosis, Movement through a cell Flow Chart, Box Game Review, Crossword Puzzle, End Unit Assessment

[Parts 3 and 4: Cellular Organelles](#) Part 3: 8 Lessons of 50 minutes and 20 Page Follow Along Work Bundle, Special Functions of Cellular Organelles in a Cell, Nucleus, Functions of the Nucleus, Information Flow of Life, DNA-RNA-Proteins, Transcription, Translation, Important Role of Proteins, Chromosomes, Chromatin, Unwinding 6 feet of string Chromosome activity, Nuclear Membrane, Nucleolus, Ribosome Creation, Visuals Matching Activity, Nuclear Pores/Openings, Phospholipid bilayer, Nucleoplasm, Rough Endoplasmic Reticulum, The Lost Art of Maze Making Activity, Smooth Endoplasmic Reticulum, Ribosomes, Flow of Information Class Simulation to Music, Gene Expression, Review of Transcription and Translation, Protein Synthesis, Initiation, Step by Step Drawing Protein Synthesis, Elongation, Termination, Review of the Steps with Visuals, Importance of Protein in our Diet, Hormones, Golgi Apparatus, Cis Face, Trans Face, Build Golgi Body Fanny Packs Activity, Visual Review of the flow of molecules, Box Game Review, Crossword Puzzle, End Unit Assessment

[Parts 3 and 4: Cellular Organelles](#) Part 4: 11 Lessons of 50 minutes and 18 Page Follow Along Work Bundle Special Functions of Cellular Organelles in a Cell, Lysosomes, Function of Lysosomes and the Breakdown of Materials, Cytoskeleton, Microfilaments, Intermediate Filaments, Microtubules, Flagellum, Cilium, Centrioles, Role in Mitosis, Endosymbiotic Theory, Step by Step Visual, Mitochondria, Chloroplast, Optional Chromatography Activity to see Plastids in Leaves, Plastids, Thylakoids, Granum, Photosynthesis Equation, Learning the Equation with M&M's Activity, Description of Photosynthesis Main Parts, Video Options for Photosynthesis in more detail, Four Main Steps of Photosynthetic Process, Cellular Respiration, Foods Macronutrients, Mitochondria, Function of Mitochondria, Cristae, Learning the Respiration Equation, M&M's again as a manipulative, Blowing a balloon with Yeast Demo, Step by Step of Calvin Cycle, Review of Cellular Respiration, The Carbon Dioxide and Oxygen Balance of Life, Aerobic vs. Anaerobic Respiration, Fermentation, Fermentation Equation, Activity with Cabbage Indicator and Yeast, Venn Diagram of Anaerobic and Aerobic Respiration, Dangers of Botulism, Vacuoles, The Many Functions of Vacuoles, Turgid Pressure in Plants, Contractile Vacuoles, Name that Organelle Visual Quiz, Box Game Review, Crossword Puzzle, Unit Assessment

Cellular Biology Unit

- **Organism:** An organism is any individual entity that embodies the properties of life.
 - Organisms are classified by taxonomy into groups such as multicellular animals, plants, and fungi, or unicellular microorganisms such as prokaryotes, bacteria, and archaea.
- **Form Follows Function:** Means that the form of a body part or structure is related to its function.
 - The form or shape of a structure within an organism is correlated to the purpose or function of that structure.
- **Cellular Organelles:** A membrane-bound compartment or structure in a cell that performs a special function.
 - They **Support** **Manufacture** **Make** **Breakdown** **and Transport** **Materials** **Communicate** **within the cell.**
- **Answer:** Because lipids are nonpolar. They don't mix with water.
 - The membrane becomes a water proof barrier between two liquid areas.
- **Spontaneous** organisms are produced / generated from non-living sources.
 - Do flies emerge from meat?
 - Do turtles come from the sand?
 - Life comes from life.
- **DNA makes RNA, RNA has information to make proteins.**
- **Form Follows Function**
 - Answer: Eukaryotic cells have a nucleus, and are much larger and have more organelles. (More complex)
- **DNA (Double Strand)**
 - The RNA molecule (Single Strand)

30 Lessons of 50 minutes

With Follow Along Work Bundles

Part 1 Intro to Cell Biology

The Cell Theory

Form Follows Function

68 Pages

With Follow Along Work Bundles

68 Pages

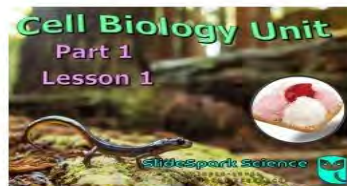
Truly Interactive Slides

- **Schleiden and Schwann** improved the cell theory.
 - They observed both plants and animals are made of cells.
- **Use the terms from class to describe A and B.**
 - It has to do with how many cells it has.
- **The 3 big principles of the cell theory.**
 - All living organisms are composed of one or more cells.
 - The cell is the most basic unit of life.
 - All cells arise from existing cells.
- **Surface Area to Volume Ratio with Beets**
 - Wear Safety Goggles!
 - Brown cut four uniform-sized beet cubes.
 - 1 cm cube, 2 cm cube, 4 cm cube, 6 cm cube.
- **This organelle packages and transports proteins and other macromolecules?**
 - **Golgi Apparatus**
- **Venn Diagram**
 - **Animal** **Plant**
 - Learn more differences / similarities at: <http://www.differencebetween.com/cell-theory/>
 - Which is a cheek cell, and which is an onion cell? What is the difference?
- **Diffusion** **Facilitated Diffusion**
 - Which one is facilitated diffusion?

Part 1: Cell Biology Unit: 8 Lessons of 50 minutes and 20 Page Follow Along Work Bundle, What is Life, Sewer Lice / Raisins in Ginger Ale Activity, What is an Organism, Introduction to CHNOPS/SPONCH biologically Important Atoms/Molecules, % of CHNOPS graph in Animals, Characteristics of Living Things, Spontaneous Origin, Case Study of Francesco Redi Experiment, Case Study of Pasteur's Swan Necked Flask Experiment, Needs of Living Things, Cheek and Onion Cells Under the Microscope Activity, Differences between Plants and Animal Cells, Plant and Animal Cell Venn Diagram, Visual Tour of Types of Cells, Introduction to Forms Follows Function Concept, Forms Follows Function Object Activity, Multicellular vs. Unicellular, Kingdoms of Life Step by Step Diagram, Adding of Bacteria to Venn Diagram, Eukaryotic Cells vs. Prokaryotic Cells, Energy Flow of Life through Cells, Chemosynthesis, Deep Ocean Life at Hydrothermal Vents, Archaea, Domains and Kingdoms Diagram, Autotrophic vs. Heterotrophic, Levels of Biological Organization, Introduction to the Cell Theory, Microscope Creation by Hans and Zacharias Janssen, Robert Hooke, Anton van Leeuwenhoek, Schleiden and Schwann, Rudolf Virchow, Robert Remak, The Modern Cell Theory, Three Big Principles of the Cell Theory, Introduction to the Cellular Organelle Poster Project, Cell City Project, Students design a cell modeled after the Jobs and Functions of a City, Box Games, Crossword Puzzle, End Unit Assessment



Additional and Printables



Part 1 Lesson 1 Sewer Lice SPONCH



Part 1 Lesson 2 Characteristics of Life



Part 1 Lesson 3 Cheek and Onion



Part 1 Lesson 4 Form Function Archaea



Part 1 Lesson 5 Domains and Kingdoms



Part 1 Lesson 6 Cell Theory



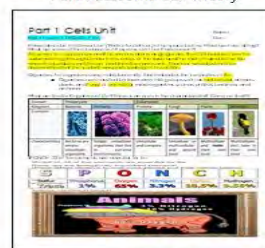
Part 1 Lesson 7 Cell City Project



Part 1 Lesson 8 Review Game



Part 1 Lesson 9 Review Game Answers



Part 1 Work Bundle Answers



Part 1: Cell Biology Unit

Part 2: Cell Biology Unit: 7 Lessons of 50 minutes and 17 Page Follow Along Work Bundle Placing Eggs into Vinegar for Later in Unit, Surface Area to Volume Ratio, Why Surface Area Matters, Reasons for being multi-cellular, Explanation of Surface Area and Volume, Introduction to Diffusion, Beets in Bleach Lab Activity / Demonstration, Calculating Surface Area to Volume Ratio, Finding the % Bleach penetration into the Beets, How various cells increase their surface area to volume ratio, Set-Up for Gummy Bears in water, saltwater, vinegar, soda Lab in two Days, Potato Slices in Water vs. Salt Water Lab, Cytoplasm, Capsule Slime Layer in Bacteria and Need for good oral hygiene, Cell Wall, Functions of the Cell Wall, Set-up of Osmosis and Diffusion lab with Iodine Solution and Starch / Dialysis Tubing, Cell Membrane, Aquaporins, Phospholipid Bilayer, Hydrophilic vs. Hydrophobic, Transport Proteins, Polarity of the Phospholipid, Oil vs Water demo, Selectively Permeable, What might go in and out of a cell, Diffusion, Diffusion Demo, Bumper Boats Diffusion Activity, Visiting the Iodine and Starch Lab, Sketching Out the Dialysis Tubing, Osmosis, Calculating the % Change in Mass, Passive Transport, Permeable vs. Impermeable, Facilitated Diffusion, Active vs. Passive Transport with Visuals, Finding % Change of Gummy Bears placed in various Solutions, Hypertonic Solutions, Hypotonic Solutions, Isotonic Solutions, Built-In Visual Quiz, Cells Walls preventions in Lysis, Prefixes Visual Quiz, Why we can't drink Saltwater, Set-up Syrup in Dialysis Tubing Demo, Revisiting Potato Slice in Water and Salt Water and calculating % change in Mass, Visiting Eggs in Vinegar and explanation of what occurred, Find % change, Active Transport, Sodium Potassium Pump, Class Simulation of Active Transport, Cell Communication, Endocytosis, Phagocytosis, Class Engulfs a Particle Activity, Pinocytosis, Transmembrane Proteins Receptor Mediated Endocytosis, Exocytosis, Movement through a cell Flow Chart, Box Game Review, Crossword Puzzle, End Unit Assessment



Additional and Printables



Part 2 Lesson 1 Cell Membrane



Part 2 Lesson 2 Osmosis



Part 2 Lesson 3 Gummy Bear Lab



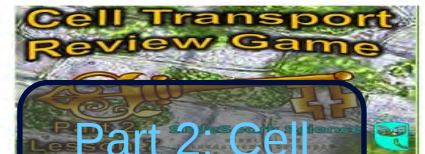
Part 2 Lesson 4 Extensions



Part 2 Lesson 5 Active Transport



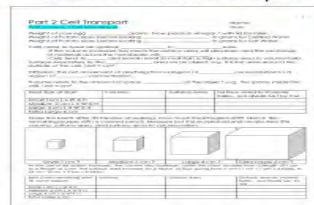
Part 2 Lesson 6 Review Game



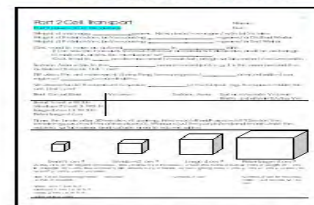
Part 2: Cell
Biology Unit



Part 2 Work Bundle Answers



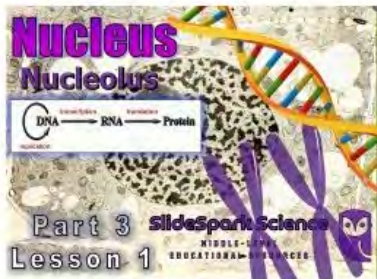
Part 2 Work Bundle Digital



Part 2 Work Bundle Print

Parts 3 and 4: Cellular Organelles Part 3: 8 Lessons of 50 minutes and 20 Page Follow Along Work Bundle, Special Functions of Cellular Organelles in a Cell, Nucleus, Functions of the Nucleus, Information Flow of Life, DNA-RNA-Proteins, Transcription, Translation, Important Role of Proteins, Chromosomes, Chromatin, Unwinding 6 feet of string Chromosome activity, Nuclear Membrane, Nucleolus, Ribosome Creation, Visuals Matching Activity, Nuclear Pores/Openings, Phospholipid bilayer, Nucleoplasm, Rough Endoplasmic Reticulum, The Lost Art of Maze Making Activity, Smooth Endoplasmic Reticulum, Ribosomes, Flow of Information Class Simulation to Music, Gene Expression, Review of Transcription and Translation, Protein Synthesis, Initiation, Step by Step Drawing Protein Synthesis, Elongation, Termination, Review of the Steps with Visuals, Importance of Protein in our Diet, Hormones, Golgi Apparatus, Cis Face, Trans Face, Build Golgi Body Fanny Packs Activity, Visual Review of the flow of molecules, Box Game Review, Crossword Puzzle, End Unit Assessment

Parts 3 and 4: Cellular Organelles



Part 3 Lesson 1 The Nucleus



Part 3 Lesson 2 Nuclear Membrane ER



Part 3 Lesson 3 Protein Synthesis



Part 3 Lesson 4 Golgi Apparatus



Part 3 Lesson 5 Review Game



Part 3 Lesson 6 Review Game Answers



Part 3 Work Bundle Answers



Part 3 Work Bundle Print

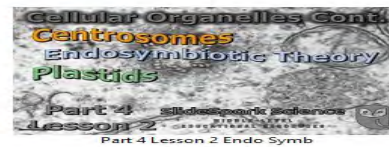
Parts 3 and 4: Cellular Organelles Part 4: 11 Lessons of 50 minutes and 18 Page Follow Along Work Bundle Special Functions of Cellular Organelles in a Cell, Lysosomes, Function of Lysosomes and the Breakdown of Materials, Cytoskeleton, Microfilaments, Intermediate Filaments, Microtubules, Flagellum, Cilium, Centrioles, Role in Mitosis, Endosymbiotic Theory, Step by Step Visual, Mitochondria, Chloroplast, Optional Chromatography Activity to see Plastids in Leaves, Plastids, Thylakoids, Granum, Photosynthesis Equation, Learning the Equation with M&M's Activity, Description of Photosynthesis Main Parts, Video Options for Photosynthesis in more detail, Four Main Steps of Photosynthetic Process, Cellular Respiration, Foods Macronutrients, Mitochondria, Function of Mitochondria, Cristae, Learning the Respiration Equation, M&M's again as a manipulative, Blowing a balloon with Yeast Demo, Step by Step of Calvin Cycle, Review of Cellular Respiration, The Carbon Dioxide and Oxygen Balance of Life, Aerobic vs. Anaerobic Respiration, Fermentation, Fermentation Equation, Activity with Cabbage Indicator and Yeast, Venn Diagram of Anaerobic and Aerobic Respiration, Dangers of Botulism, Vacuoles, The Many Functions of Vacuoles, Turgid Pressure in Plants, Contractile Vacuoles, Name that Organelle Visual Quiz, Box Game Review, Crossword Puzzle, Unit Assessment



Additional and Printables



Part 4 Lesson 1 Lysosomes



Part 4 Lesson 2 Endo Symb



Part 4 Lesson 3 Chloroplast



Part 4 Lesson 4 Photosynthesis Cont



Part 4 Lesson 5 Mitochondria



Part 4 Lesson 6 Respiration Cont



Part 4 Lesson 7 Anerobic



Part 4 Lesson 8 Vacuoles



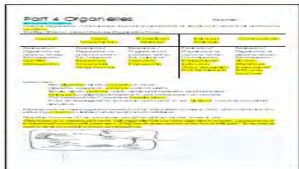
Part 4 Lesson 9 Wrap Up and Visual Quiz



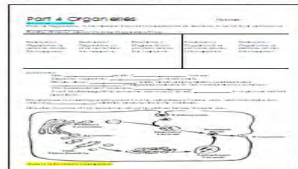
Part 4 Lesson 10 Review Game



Part 4 Lesson 11 Review Game Answers



Part 4 Work Bundle Answers



Part 4 Work Bundle Digital



Part 4 Work Bundle Print

Parts 3 and 4:
Cellular
Organelles

Curriculum Guide

Number of Lessons in each unit (50 min, daily lessons) and difficult rating scale / intended grade level.

 =Easier,

 = More difficult,

 =Most difficult

Earth Science Units	Daily Lessons	Intended Grade	
Geology Topics Unit	60 Lessons	6-8 medium difficulty	
Weather and Climate Unit	40 Lessons	6-8 medium difficulty	
Astronomy Unit	60 Lessons	6-8 medium difficulty	
Weathering, Soil Sciences	28 Lessons	5-7 easier	
Rivers and Water Quality	25 Lessons	5-7 easier	
Water Molecule Unit	20 Lessons	5-7 easier	

Life Science Units

Life Science Units	Daily Lessons	Intended Grade	
Ecology Feeding Levels Unit	13 Lessons	5-6 easier	
Ecology Interactions Unit	30 Lessons	5-6 easier	
Ecology Abiotic Factors Unit	24 Lessons	5-6 easier	
Botany Unit	50 Lessons	5-7 easier	
Evolution and Natural Selection	40 Lessons	5-7 easier	
Taxonomy and Classification	50 Lessons	6-8 medium difficulty	
Infectious Diseases Unit	30 Lessons	7-9 more difficult	
DNA and Genetics Unit	42 Lessons	8-10 most difficult	
Human Body Systems Unit	85 Lessons	6-8 medium difficulty	
Cell Biology Unit	30 Lessons	8-10 most difficult	

Physical Science

	Daily Lessons	Intended Grade	
Laws of Motion and Machines Unit	33 Lessons	8-10 most difficult	
Matter Energy and the Environment	58 Lessons	7-10 medium difficulty	
Atoms and Periodic Table Unit	44 Lessons	8-10 most difficult	
Science Skills Unit	30 Lessons	5-7 medium difficulty	

[Physical Science Curriculum](#)

[Entire SlideSpark Science Curriculum](#)



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Our fully editable .pptx and .doc resources are perfect for educators looking to bring enthusiasm and creativity to their lessons. We encourage you to make changes to fit your needs and style. As science educators, we're committed to providing students with the tools they need to succeed in the classroom and beyond. Each unit in the curriculum includes a range of resources that have been developed through extensive research and use in a busy classroom. Our teaching approach is designed to make science education engaging and exciting for learners of all ages. We offer a one-of-a-kind science curriculum that will challenge, inspire, and educate students to become tomorrow's scientists and leaders. Join us today and learn more about how our program can help you achieve your classroom goals.

With appreciation,

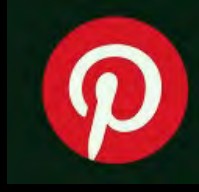
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Thank you for your time and interest in our Science curriculum. We strive to provide students with engaging and informative lessons that will spark their curiosity and encourage scientific exploration. Should you have any questions or concerns, please do not hesitate to contact us. Thank you again for considering our curriculum, and we wish you all the best in your educational journey.

Sincerely,

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