# UNIT 2

# CELLS

# TEACHER NOTES

PREVIEW

DETAILS FOR HOW TO BEST IMPLEMENT
THIS CURRICULUM IN YOUR CLASSROOM

Created by: IT'S NOT ROCKET SCIENCE®

# Included by Folder in Zip File:

## 1- Implementation

- Read First *(this document)* with **17** pages of teacher notes for how to implement this curriculum
  - Includes links to YouTube video lectures for each set of PowerPoint notes on ***page 18***
- Lab Details – 2 additional pages with tips for setting up the larger labs in the unit
- Distance Learning Tips
- NGSS Alignment Overview
- Unit Plans for CP and Honors, both 50-minute and 90-minute *(block)* pacing + editable versions
- How to Write a Great Study Guide resource
- Lab Report Checklist and Rubric

## 2-Packets

- Two packets, differentiated for CP *(39 pages)* and Honors *(40 pages)*, of all student handouts for the entire unit including:
  - Cornell note outlines, activities, labs, projects, and practice
- Packet answer keys
- 4-page guide to accessing and using the **paperless digital version** of the packets through Google Drive™

## 3-Notes

- Concept 1 CP Notes: Cell Theory and Organelles – 31 slide ppt
- Concept 2 CP Notes: Cell Transport – 17 slide ppt
- Concept 3 CP Notes: Cell Cycle and Cancer – 26 slide ppt
- Concept 1 Honors Notes: Cell Theory and Organelles – 31 slide ppt
- Concept 2 Honors Notes: Cell Transport – 21 slide ppt
- Concept 3 Honors Notes: Cell Cycle and Cancer – 27 slide ppt

*****All ppts have editable text and are fully animated in presenter mode*****

## 4-Activities

- 19 printable station cards for organelle notes *(CP and Honors versions)*
- 20 Organelle Task Cards
- 5 implementation slides for the Bioethics Research Activity
- 6 Cancer QR-Code based station cards + editable version

## 5-Assessments

- Organelle Quiz
- Unit 2 Test CP – Versions A and B (Multiple choice rearranged)
  - 5 page test of multiple choice and open response + 2 page answer sheet
- Unit 2 Test Honors – Versions A and B (Multiple choice rearranged)
  - 5 page test of multiple choice and open response + 2 page answer sheet

****All assessments come with an editable version and detailed answer key****

© It's Not Rocket Science®

# Teacher Notes:

## Overview:

This unit is designed to be everything you need to teach a cells unit in a high school Biology 1 course. Content covered includes: cell theory, prokaryote vs. eukaryote, organelles, feedback mechanisms, cell transport, stem cells, the cell cycle (mitosis), and cancer. This product includes PowerPoint notes (with corresponding lecture videos), a packet of student handouts for all activities, labs, practice, and projects, and unit tests. Everything is provided for two levels – CP (College Prep, or "on grade level") and Honors (advanced). The student packets also come in paperless digital versions that can be used in Google Drive™ and/or Microsoft OneDrive™.

## Packet instead of Interactive Notebook:

I started creating packets for my students over six years ago, and I love them so much more than interactive notebooks. While interactive notebooks are great resources that work for many teachers, I have found the packet strategy to be a more appropriate tool for using in the secondary classroom setting with my students. I love using the packet for many reasons:

1. I only have to make copies **one time** each unit instead of copying handouts every day. Even though it takes a while to copy the packets for each student, it saves so much time on a day to day basis. (Also I've often recruited seniors to be my "Teacher's Aide" and have trained them to copy all of my packets for me. I haven't seen a copier in YEARS and it's glorious!) You can also now go **DIGITAL** and **PAPERLESS** with the Google Drive™ version of the packet, if you prefer!
2. It puts responsibility back on the students to maintain their biology binder with their packet, while also aiding them in practicing organization skills. It has been incredibly effective for my lower level students especially. Even though it is a lot of papers to receive at once, I can watch them put it in their binder and leave it there, rather than having to hang on to numerous individual papers passed out each day. It has really eliminated the need for a textbook too, so students really only have to remember to bring ONE thing to class – their binder with their packet!
3. It makes it so easy to be absent last minute. If you or your child gets sick, sub plans are a breeze. You don't have to send your teacher neighbor to make copies for you – because your students already have everything they need. You just have to tell the sub which pages the students need to work on for the day. It was especially helpful for my long-term substitute when I was on maternity leave!
4. The structure of the packet provides a more helpful method than interactive notebooks in preparing students for college – which should be one of our goals as high school teachers. The packet helps students learn how to structure notes (one of the reasons why I love teaching them how to write Cornell notes) and how to stay organized.
5. They are a time saver in so many ways – no more time wasted regularly passing out handouts or having to cut and paste things into a notebook.
6. Students do a better job keeping up with returned graded work because every page is numbered, so they can put graded assignments right back into the packet where it came from, setting them up to more likely refer back to graded work as they study.
7. You no longer need a filing cabinet – you can keep all of your curriculum and keys organized into easy to grab binders! See picture on ***page 18.***

© It's Not Rocket Science®

# Teacher Notes:

## In short...

The best statistical evidence I have in support of why I love the packet strategy so much is that I had a **96% pass rate** on my state's standardized End-of-Course Biology exam for non-Honors students and a **100% pass rate** for Honors students, using this same strategy in my Biology 1 course. This was at a South Carolina public school with over 50% of the students being below the poverty line. My average score on the EOC (all 200+ students combined that I taught during my time there) was a 90%. I believe this success is due to multiple factors, but I attribute a lot of it to the packet-based curriculum I have designed. Honestly, I could go on and on about the packet as an organizational resource and why I love it so much, but I think you will find that you feel the same if you choose to test it out!

## Next Generation Science Standard Alignment:

This unit covers content related to the following NGSS Standards:

- **HS-LS1-2**: Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms.
- **HS-LS1-3**: Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis.
- **HS-LS1-4**: Use a model to illustrate the role of cellular division (mitosis) and differentiation in producing and maintaining complex organisms.

You can find more information about the incorporation of the crosscutting concepts, science and engineering practices, and suggestions for teaching with phenomena in the **"NGSS Alignment"** document in the **Implementation** folder.

## Prior Knowledge:

This is the second unit I teach in Biology, so I would expect students to have prior knowledge on topics covered in my **Biology Basics unit**, including basic lab equipment, safety, measurement, experimental design, water properties, and macromolecules. You will see questions on this content in the cumulative section of the unit test. I also do not presume that all of the students in my course have a solid background in learning through the NGSS style. Because of this, I try to scaffold how I instruct my students throughout the year. At the beginning of the year with my freshmen I provide a lot more support and guidance as we move towards greater autonomy and critical thinking skills by the end of the year. You will see this reflected in the way this 2nd unit is designed vs. how the extension mini-units (that I use to end the year) are designed.

## When to use:

This is designed to be the second unit in my Biology course, but it doesn't have to be in yours. I believe the resources I have provided in this product are everything you need to teach this unit. ***However***, if you know that your students don't have the prior knowledge I've mentioned above, or if you teach through a section of this unit and realize your students want to go deeper or need more support, you may need to make some additions for your students. Every class is different and some will need more support than others – and that is totally okay! An editable version of the student packet cannot be provided, due to the reasoning detailed in the product description, but you can easily add pages manually prior to copying the packet for your class.

© It's Not Rocket Science®

# Teacher Notes:

## Assessment:

I did not include point values on any of the handouts in the packet in order to provide you the freedom to grade things how you so desire. On the next few pages I am going to provide you an overview of **my** grading strategy for you to reference. Feel free to adopt this or do entirely your own thing. It is completely up to you!

After much research and number crunching over the last few years, this is the simplest and most accurate grading technique that I have come up with. I divide my gradebook into two simple categories: **MAJOR** grades and **MINOR** grades. Within each category, different assessments are worth different amount of points based on length, depth, and complexity. Below I will give you an idea of what goes into each category.

**Major Grades** = 60% of the student's overall grade

- **Tests** = **100 pts**
  - Unit 2 only has 1 test, which would count as a 100 pt major grade.
- **Quizzes** = **25 pts**
  - Unit 2 has one quiz on organelles, which I would count as a 25 pt major grade
- **Projects** = **50-100 pts**
  - I like to do at least 1 project per quarter to give students an opportunity to show their understanding of the content in a non-traditional way. For this unit I grade the Project: Cell Organelles as a 50 pt major grade. You could also have your students write a formal lab report for the Inquiry Investigation: Feedback Mechanisms or the Lab: Exploring Osmosis (see in student packet), which I would count as a 100 pt major grade. You can see how I grade my formal lab reports by checking out the **Lab Report Checklist and Rubric** in the **Implementation** folder.

**Minor Grades** = 40% of the student's overall grade

- **Activities/Labs/Practice** = **10-100 pts**
  - The amount of points I give students is **completely dependent** on the length and depth of the activity. I also do not grade many of the in-class assignments the students do, because there are so many of them! Instead, we would just go over them as a class. If I did want to assign a grade, I often just circle the class and do a spot check grade for completion before drawing names and going over as a class. For instance, in this unit, I would not collect and grade:
    - Practice: Organelle Identification *(you could spot check for **15 pts** before going over)*
    - Practice: Labeling the Cell
    - Practice: Cell Analogy *(I would spot check for **10 pts** that they completed part 2)*
    - Task Cards: Organelles *(you could spot check for **20 pts** before going over)*
    - Practice: Types of Cellular Transport
    - Practice: Putting it All Together
    - Practice: Cell Cycle
    - Activity: Mitosis Flipbooks *(I would spot check for **20 pts** that they did it correctly)*
    - Stations: A Closer Look at Cancer *(I would spot check for **30 pts** that they did each station)*
  - In general, an activity that lasts only half of a 50-minute class period would usually only be worth about 25 pts. An activity that lasts a full class period or two is usually worth about 50 pts, and an activity that takes more than two class periods to complete would be worth 100 pts. For instance, in this unit I would collect and grade for accuracy:
    - Inquiry Investigation: Feedback Mechanisms for **100 pts**
    - Lab: Exploring Osmosis for **100 pts**
    - Research Activity: A Look into Bioethics for **100 pts**

© It's Not Rocket Science®

# Teacher Notes:

**Minor Grades** = 40% of the student's overall grade

- **Daily Quizzes/Bell Ringers** = **5 pts per day**, usually totaling **25 pts for the week** (if there is one every day)
  - This is something I have fallen in love with doing, but not every teacher does which is why I do not include my daily quizzes/bell ringers with this product (if you would like to purchase for this unit, you can find them in my store. They are $5 per unit or cheaper as a bundle.)
  - I call my bell ringers "Prime Times" because I believe that the first 5 minutes of class is the most important time of the day. I love that my students are in a routine and come in ready to work as soon as they get to my room because they know they will have a Prime Time.
  - If you would like to know more about how I implement these, again, check them out in my store! The gist is that students have 3-5 questions a day on the board when they come in. They use the same sheet of paper each day to write their answers on. I give them 5 minutes at the start of class to answer the questions, then they pass them over and I collect them and grade each day. They count for 5 pts a day. At the end of the week I add up the points based on how many we did and give them a score for the week.
  - **I grade these for accuracy but I allow students to use their notes.** This way I ensure students are writing good notes, keeping up when they are absent, and getting the basics of what we covered the day before. I also like it because I go over the answers as soon as I collect them so I know if the majority of students are getting what we did the day before so I can address issues before we move on to new material. It is my favorite way to check in with each student **DAILY** to know where they are with the material!!

- **Homework** = **Concept Study Guides** = **10 pts each**
  - Biology can be so much memorization, so the most important use of a student's time at home *(in my opinion)* is to be **studying**. However, most students don't know how to study! This is why I have students create their own study guides to practice this skill. Here is how I do this:
    - I divide each unit into 3-6 concepts (Note: This unit has 3 concepts.) Students make a study guide for each concept and turn them in at different points throughout the unit to be graded for 10 pts each. I return them **within a day** so they can have them to study for their unit tests.
    - For their study guide they must **answer all objectives** and **define all vocabulary** on the first page of the packet. They do not have to write anything for the *italicized objectives*, as those represent skills that would be hard to show mastery of on paper, however they do need to be able to do ALL of the objectives on the assessment.
  - All summative assessments provided in this product and future products are aligned with the objectives and vocabulary outlined on the front page(s) of each packet, making this an effective resource to base their study guides off of.
  - I do allow them some freedom in this. Some students like to type these, some hand write them. I also encourage students to make them as **visual** as possible. *They shouldn't write their study guides in paragraph form.* I encourage them to make Venn diagrams, tables, and other charts to make their study guides visually appealing – and something they would actually like to study from. I do not show them examples of how to do this, because I want them to find their own method that works best for them!
    - For instance, a lot of students make flashcards, flipcharts, or use Quizlet (an online flashcard making tool) for the vocabulary portion. This is great, but I do make them turn these in with their study guide so I can check them. For Quizlet, students just print them out and staple to the back of their objectives.
    - To provide guidance for students as they make their first study guide, see the **How to Write a GREAT Study Guide** document in the **Implementation** folder.
  - I find these especially useful because so much of this course builds upon itself, and I want to encourage my students to really learn material for the long-term, and not just cram it in the night before a test. Because of this, all of my unit tests are cumulative. If students make good study guides, they will be incredibly useful resources for them to reference throughout the year as they review for future tests. It will also be a valuable skill for them to have if they move on to higher education.

© It's Not Rocket Science®

# Teacher Notes:

## Materials:

- Hole-punched copies of packet for each student to put in their binders *(or distributed digital paperless packets to students via Google Drive™ or Microsoft OneDrive™)*
- Ability to project and use PowerPoints during lecture
- Access to technology for activities where students will need to conduct research
- Printed (and I prefer laminated so that they hold up each year – you won't regret it!!) copies of the following (can be found in the **Activities** folder):
  - Station Cards: Organelles
    - 1 set = 19 cards.
  - Task Cards: Organelles
    - 1 set = 20 cards.
      - *I'd print 1-2 sets (depending on class size) and spread them out around the room*
  - Stations: Cancer
    - 1 set = 6 stations
      - *If you have a larger class, make 3-4 copies of each station so students can stay spread out.*
- Materials the students request as they design their Inquiry Investigation: Feedback Mechanisms:
  - If doing the sample investigation in the packet answer key, students will only need stopwatches
- Materials needed for the Lab: Exploring Osmosis:
  - Gummy bears (2 per group)
  - Clear plastic cups (2 per group)
  - Plastic forks or spoons (2 per group)
  - Wax paper or aluminum foil
  - Distilled water
  - Tap water
  - Salt
  - Digital scale for measuring mass
- General art supplies like computer paper, scissors, and coloring utensils like markers or colored pencils for the Activity: Mitosis Flipbooks
- Copies of quizzes and tests *(I print class sets of tests that students can't write on so I can reuse them year after year to save copies. Students only get the 2-page answer sheet.)*
- (optional) Headphones *(I have students bring their own in when needed, but always like to have **a few extra** just in case)*

© It's Not Rocket Science®

# Teacher Notes:

## Implementation:

Over the next few pages I will be providing commentary for how to implement this unit, based on the **unit plans** included in the **Implementation** folder. Be sure to have a copy of the unit plan open or printed out as you read through this so it makes the most sense. For this unit, I use a lot of the same resources for both my CP (on grade level) and Honors students, and just have lower expectations for the assessments for my lower level classes. For general implementation, I give CP students a lot more support and guidance as I teach them, and the honors students are expected to work more independently. If there are any other differences between implementation for both levels, I will include those in the notes. Also, check out the **NGSS Alignment** document in this folder for tips on how to teach through this unit using NGSS phenomena.

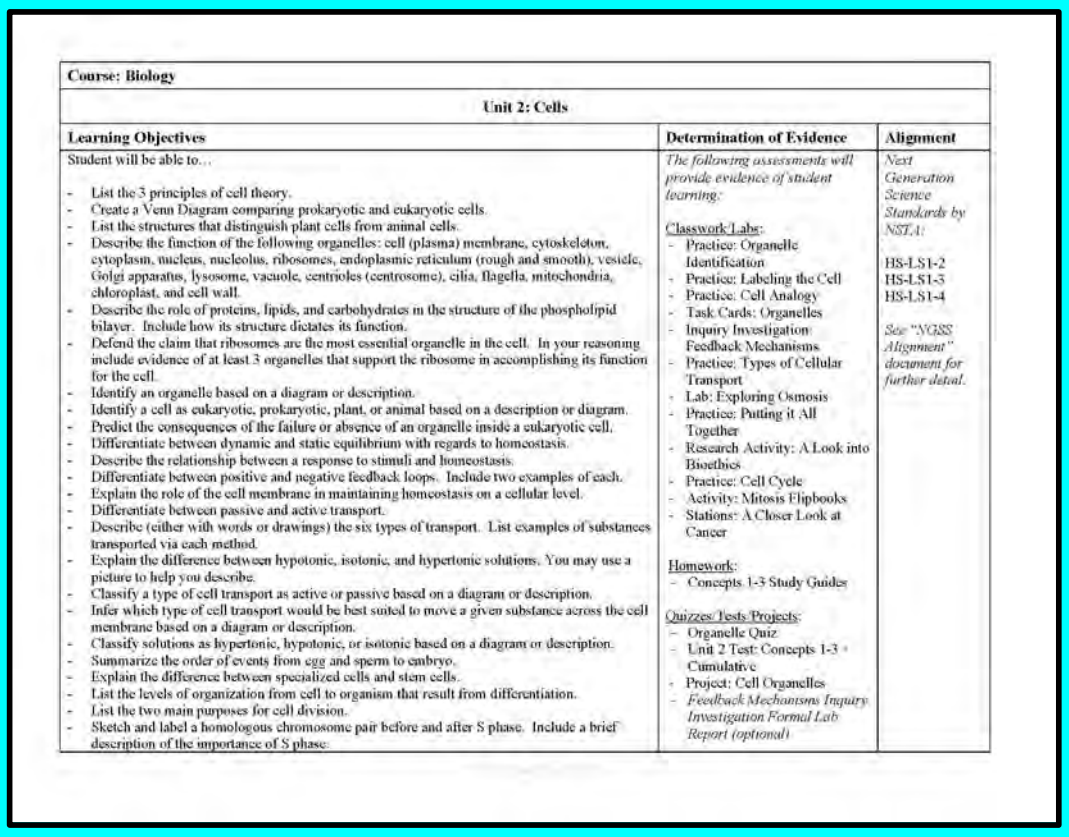
Please use the unit plans and these notes as a ***guideline*** for your class. Teaching and plans have to be flexible and be able to be adjusted based on students' needs. This unit is written to take 21 days, but you can cut out some of the activities, have them do some of the practice at home, or use the YouTube lecture videos (links on ***page 18***) to do a flipped classroom style if you need to squeeze it into a shorter period of time. Editable versions of unit plans are provided for that exact reason!

***Note***: *All implementation notes are based off a 50-minute class period. A 90-minute block unit plan is provided in the* ***Implementation*** *folder for reference.*

- Day 1: Before class begins, set up the Organelle Station Cards from the **Activities** folder all around the classroom. I print these full page, in color, and laminate them so they last every year. Start class by lecturing through Concept 1 Notes, slides 1-8 only. When you get to the organelles, send students off, either in pairs or solo, to move around to each organelle station to take notes on p.3-6 in their packets. This cuts lecture down significantly and gets students out of their seats!! If time, start going over the organelles (on slides 9-27) after.
  - Side note: I LOVE using popsicle sticks to go over things as a class when calling on students. At the beginning of the year, I write each student's name on a stick and I keep a plastic bag (or cup) of sticks for each class. I try to make sure I use this bag to call on every student at least once a class period. I also use this any time I need to make pairs or lab groups so that students know it is completely random!! I would draw popsicle sticks when going over the organelles.
- Day 2: Finish Concept 1 Notes. Have students pair up with a neighbor to complete the summary charts provided on p.7. Then go over as a class. Have students complete p.8 Practice: Organelle Identification for homework or in class, if there is time.
- Day 3: I would spot check p.8 during my bell ringer and give students a 15 pt grade for completing it before going over afterwards. Then have students complete the labeling the cell practice on p.9 and Cell Analogy practice on p.10. It's up to you if you want them to color p.9 – I usually don't to save time. For the Cell Analogy I usually do the first 1 or 2 with my CP students to help them get the idea. Then have them finish on their own. I would draw names and go over the analogy and then have students write their own. As they are writing go around and help students get inspired. I usually try to get them to think of a place or thing they love and make their analogy around that. Love Harry Potter? Make a cell analogy to Hogwarts. Love playing football? Make a cell analogy to a football stadium. Anything can work! After, I usually take a few volunteers to share if we have class configuration for their analogy to each organelle. Then I may collect them, read and give students a 10 minor grade for them.

PREVIEW
More Teacher Notes in actual product

© Mrs. Cell's Class®

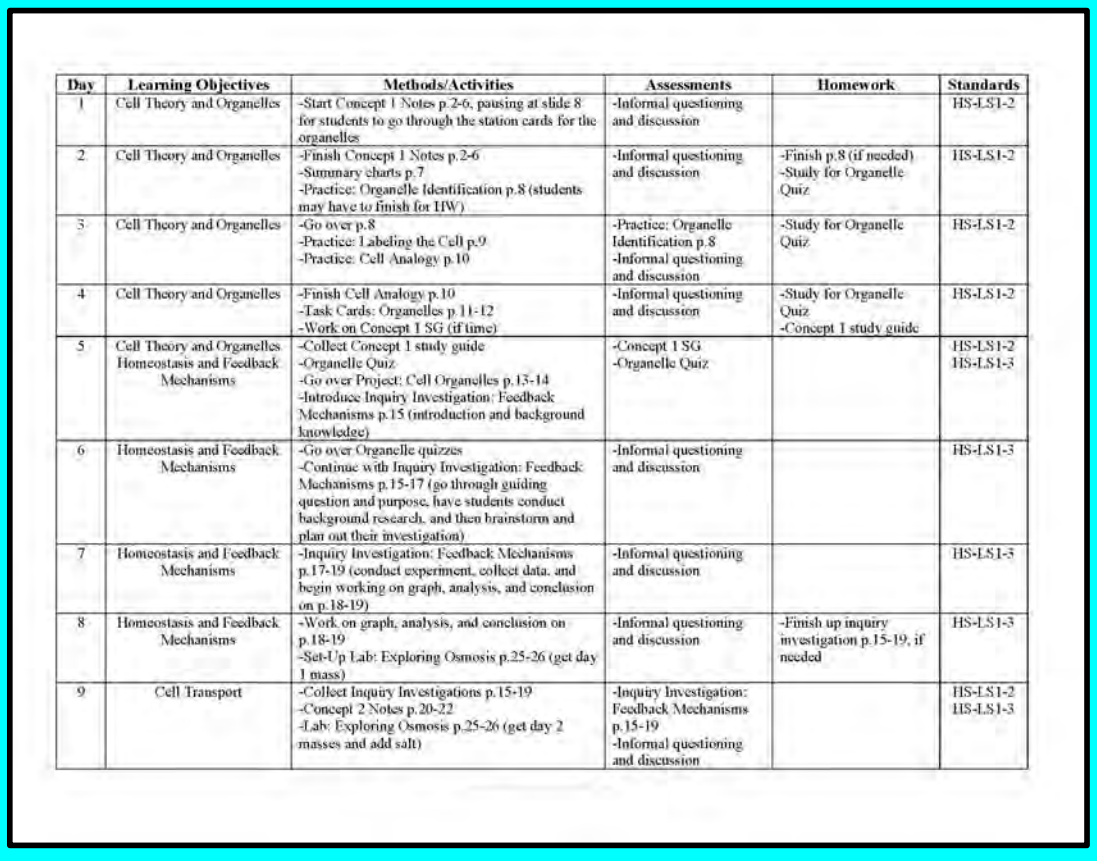


| Course: Biology | | |
|---|---|---|
| Unit 2: Cells | | |
| **Learning Objectives** | **Determination of Evidence** | **Alignment** |
| Student will be able to…<br><br>- List the 3 principles of cell theory.<br>- Create a Venn Diagram comparing prokaryotic and eukaryotic cells.<br>- List the structures that distinguish plant cells from animal cells.<br>- Describe the function of the following organelles: cell (plasma) membrane, cytoskeleton, cytoplasm, nucleus, nucleolus, ribosomes, endoplasmic reticulum (rough and smooth), vesicle, Golgi apparatus, lysosome, vacuole, centrioles (centrosome), cilia, flagella, mitochondria, chloroplast, and cell wall.<br>- Describe the role of proteins, lipids, and carbohydrates in the structure of the phospholipid bilayer. Include how its structure dictates its function.<br>- Defend the claim that ribosomes are the most essential organelle in the cell. In your reasoning include evidence of at least 3 organelles that support the ribosome in accomplishing its function for the cell.<br>- Identify an organelle based on a diagram or description.<br>- Identify a cell as eukaryotic, prokaryotic, plant, or animal based on a description or diagram.<br>- Predict the consequences of the failure or absence of an organelle inside a eukaryotic cell.<br>- Differentiate between dynamic and static equilibrium with regards to homeostasis.<br>- Describe the relationship between a response to stimuli and homeostasis.<br>- Differentiate between positive and negative feedback loops. Include two examples of each.<br>- Explain the role of the cell membrane in maintaining homeostasis on a cellular level.<br>- Differentiate between passive and active transport.<br>- Describe (either with words or drawings) the six types of transport. List examples of substances transported via each method.<br>- Explain the difference between hypotonic, isotonic, and hypertonic solutions. You may use a picture to help you describe.<br>- Classify a type of cell transport as active or passive based on a diagram or description.<br>- Infer which type of cell transport would be best suited to move a given substance across the cell membrane based on a diagram or description.<br>- Classify solutions as hypertonic, hypotonic, or isotonic based on a diagram or description.<br>- Summarize the order of events from egg and sperm to embryo.<br>- Explain the difference between specialized cells and stem cells.<br>- List the levels of organization from cell to organism that result from differentiation.<br>- List the two main purposes for cell division.<br>- Sketch and label a homologous chromosome pair before and after S phase. Include a brief description of the importance of S phase. | *The following assessments will provide evidence of student learning:*<br><br>Classwork/Labs:<br>- Practice: Organelle Identification<br>- Practice: Labeling the Cell<br>- Practice: Cell Analogy<br>- Task Cards: Organelles<br>- Inquiry Investigation: Feedback Mechanisms<br>- Practice: Types of Cellular Transport<br>- Lab: Exploring Osmosis<br>- Practice: Putting it All Together<br>- Research Activity: A Look into Bioethics<br>- Practice: Cell Cycle<br>- Activity: Mitosis Flipbooks<br>- Stations: A Closer Look at Cancer<br><br>Homework:<br>- Concepts 1-3 Study Guides<br><br>Quizzes/Tests/Projects:<br>- Organelle Quiz<br>- Unit 2 Test: Concepts 1-3 + Cumulative<br>- Project: Cell Organelles<br>- *Feedback Mechanisms Inquiry Investigation Formal Lab Report (optional)* | *Next Generation Science Standards by NSTA:*<br><br>HS-LS1-2<br>HS-LS1-3<br>HS-LS1-4<br><br>*See "NGSS Alignment" document for further detail.* |

# **Unit Plans** (+ EDITABLE VERSIONS)

for both CP and Honors

Includes **50-MINUTE** and **90-MINUTE** pacing



| Day | Learning Objectives | Methods/Activities | Assessments | Homework | Standards |
|---|---|---|---|---|---|
| 1 | Cell Theory and Organelles | -Start Concept 1 Notes p.2-6, pausing at slide 8 for students to go through the station cards for the organelles | -Informal questioning and discussion | | HS-LS1-2 |
| 2 | Cell Theory and Organelles | -Finish Concept 1 Notes p.2-6<br>-Summary charts p.7<br>-Practice: Organelle Identification p.8 (students may have to finish for HW) | -Informal questioning and discussion | -Finish p.8 (if needed)<br>-Study for Organelle Quiz | HS-LS1-2 |
| 3 | Cell Theory and Organelles | -Go over p.8<br>-Practice: Labeling the Cell p.9<br>-Practice: Cell Analogy p.10 | -Practice: Organelle Identification p.8<br>-Informal questioning and discussion | -Study for Organelle Quiz | HS-LS1-2 |
| 4 | Cell Theory and Organelles | -Finish Cell Analogy p.10<br>-Task Cards: Organelles p.11-12<br>-Work on Concept 1 SG (if time) | -Informal questioning and discussion | -Study for Organelle Quiz<br>-Concept 1 study guide | HS-LS1-2 |
| 5 | Cell Theory and Organelles<br>Homeostasis and Feedback Mechanisms | -Collect Concept 1 study guide<br>-Organelle Quiz<br>-Go over Project: Cell Organelles p.13-14<br>-Introduce Inquiry Investigation: Feedback Mechanisms p.15 (introduction and background knowledge) | -Concept 1 SG<br>-Organelle Quiz | | HS-LS1-2<br>HS-LS1-3 |
| 6 | Homeostasis and Feedback Mechanisms | -Go over Organelle quizzes<br>-Continue with Inquiry Investigation: Feedback Mechanisms p.15-17 (go through guiding question and purpose, have students conduct background research, and then brainstorm and plan out their investigation) | -Informal questioning and discussion | | HS-LS1-3 |
| 7 | Homeostasis and Feedback Mechanisms | -Inquiry Investigation: Feedback Mechanisms p.17-19 (conduct experiment, collect data, and begin working on graph, analysis, and conclusion on p.18-19) | -Informal questioning and discussion | | HS-LS1-3 |
| 8 | Homeostasis and Feedback Mechanisms | -Work on graph, analysis, and conclusion on p.18-19<br>-Set-Up Lab: Exploring Osmosis p.25-26 (get day 1 mass) | -Informal questioning and discussion | -Finish up inquiry investigation p.15-19, if needed | HS-LS1-3 |
| 9 | Cell Transport | -Collect Inquiry Investigations p.15-19<br>-Concept 2 Notes p.20-22<br>-Lab: Exploring Osmosis p.25-26 (get day 2 masses and add salt) | -Inquiry Investigation: Feedback Mechanisms p.15-19<br>-Informal questioning and discussion | | HS-LS1-2<br>HS-LS1-3 |

© It's Not Rocket Science

# **39-page CP Packet** with all student handouts for the entire unit

## Unit Topic: Cells

**Essential Question:** How do the components within a cell work together to maintain homeostasis from an organismal level all the way down to a cellular level?

**Concept 1:**
*Cell Theory and Organelles*

**Objectives**:

1. List the 3 principles of cell theory.
2. Create a Venn Diagram comparing prokaryotic and eukaryotic cells.
3. List the structures that distinguish plant cells from animal cells.
4. Describe the function of the following organelles: cell (plasma) membrane, cytoskeleton, cytoplasm, nucleus, nucleolus, ribosomes, endoplasmic reticulum (rough and smooth), Golgi apparatus, lysosome, vacuole, centrioles (centrosome), cilia, flagella, mitochondria, chloroplast, and cell wall.
5. Describe the role of proteins, lipids, and carbohydrates in the structure of the phospholipid bilayer. Include how its structure dictates its function.
6. Defend the claim that ribosomes are the most essential organelle in the cell. In your reasoning, include evidence of at least 3 organelles that support the ribosome in accomplishing its function for the cell.
7. *Identify an organelle based on a diagram or description.*
8. *Identify a cell as eukaryotic, prokaryotic, plant, or animal based on a description or diagram.*
9. *Predict the consequences of the failure or absence of an organelle inside a eukaryotic cell.*

**Vocabulary**:
Unicellular
Multicellular
Organelle

**Concept 2:**
*Cell Transport*

**Objectives**:

1. Differentiate between dynamic and static equilibrium with regards to homeostasis.
2. Describe the relationship between a response to stimuli and homeostasis.
3. Differentiate between positive and negative feedback loops. Include two examples of each.
4. Explain the role of the cell membrane in maintaining homeostasis on a cellular level.
5. Differentiate between passive and active transport.
6. Describe (either with words or drawings) the six types of transport. List examples of substances transported via each method.
7. Explain the difference between hypotonic, isotonic, and hypertonic solutions. You may use a picture to help you describe.
8. *Classify a type of cell transport as active or passive based on a diagram or description.*
9. *Infer which type of cell transport would be best suited to move a given substance across the cell membrane based on a diagram or description.*
10. *Classify solutions as hypertonic, hypotonic, or isotonic based on a diagram or description.*

**Vocabulary**:
Homeostasis
Solute
Solvent
Solution
Concentration

**Concept 3**:
*Cell Cycle and Cancer*

**Objectives**:

1. Summarize the order of events from egg and sperm to embryo.
2. Explain the difference between specialized cells and stem cells.
3. List the levels of organization from cell to organism that result from differentiation.
4. List the two main purposes for cell division.
5. Sketch and label a homologous chromosome pair before and after S phase. Include a brief description of the importance of S phase.
6. Describe ALL PHASES of the cell cycle, including the phases in interphase and mitosis, in order.
7. Differentiate between cytokinesis in plants and animal cells.
8. Summarize how cells know when they need to divide. Include examples of the difference between internal and external regulation.
9. Explain the key roles of checkpoints and apoptosis in the regulation of the cell cycle.
10. Define tumor and differentiate between the two types.
11. List several potential causes of cancer.
12. *Identify what stage of mitosis a cell is in based on a description or diagram.*
13. *Predict consequences of a failure during a given phase of the cell cycle.*

**Vocabulary**:
Differentiation
Stem cells
Cell cycle
Chromosome
Gene
Sister chromatids
Centromere
Telomere
Cancer
Metastasize
Carcinogens


© It's Not Rocket Science® 2020


The cover page of the packet splits the unit into 3 concepts: Cell Theory and Organelles, Cell Transport, and the Cell Cycle and Cancer. Each concept is broken down into objectives and vocabulary that students will use to create study guides from. An editable version of this cover page is included for you to customize for your class!

© It's Not Rocket Science

# **40-page Honors Packet** with all student handouts for the entire unit.

## Unit Topic: Cells Honors

**Essential Question:** How do the components within a cell work together to maintain homeostasis from an organismal level all the way down to a cellular level?

| **Concept 1:** *Cell Theory and Organelles* | **Concept 2:** *Cell Transport* | **Concept 3:** *Cell Cycle and Cancer* |
|---|---|---|
| **Objectives**:<br>1. List the 3 principles of cell theory.<br>2. Create a Venn Diagram comparing prokaryotic and eukaryotic cells.<br>3. List the structures that distinguish plant cells from animal cells.<br>4. Describe the function of the following organelles: cell (plasma) membrane, cytoskeleton, cytoplasm, nucleus, nucleolus, ribosomes, endoplasmic reticulum (rough and smooth), Golgi apparatus, lysosome, vacuole, centrioles (centrosome), cilia, flagella, mitochondria, chloroplast, and cell wall.<br>5. Describe the role of proteins, lipids, and carbohydrates in the structure of the phospholipid bilayer. Include how its structure dictates its function.<br>6. Defend the claim that ribosomes are the most essential organelle in the cell. In your reasoning, include evidence of at least 3 organelles that support the ribosome in accomplishing its function for the cell.<br>7. *Identify an organelle based on a diagram or description.*<br>8. *Identify a cell as eukaryotic, prokaryotic, plant, or animal based on a description or diagram.*<br>9. *Predict the consequences of the failure or absence of an organelle inside a eukaryotic cell.*<br><br>**Vocabulary**:<br>Unicellular<br>Multicellular<br>Organelle | **Objectives**:<br>1. Differentiate between dynamic and static equilibrium with regards to homeostasis.<br>2. Describe the relationship between a response to stimuli and homeostasis.<br>3. Differentiate between positive and negative feedback loops. Include two examples of each.<br>4. Explain the role of the cell membrane in maintaining homeostasis on a cellular level. Include which substances can and cannot pass through easily.<br>5. Differentiate between passive and active transport.<br>6. Describe (either with words or drawings) the six types of transport. List examples of substances transported via each method.<br>7. Explain the difference between hypotonic, isotonic, and hypertonic solutions. You may use a picture to help you describe.<br>8. *Classify a type of cell transport as active or passive based on a diagram or description.*<br>9. *Infer which type of cell transport would be best suited to move a given substance across the cell membrane based on a diagram or description.*<br>10. *Classify solutions as hypertonic, hypotonic, or isotonic based on a diagram or description.*<br><br>**Vocabulary**:<br>Homeostasis<br>Solute<br>Solvent<br>Solution<br>Concentration<br>Concentration gradient<br>Phagocytosis<br>Pinocytosis | **Objectives**:<br>1. Summarize the order of events from egg and sperm to embryo.<br>2. Explain the difference between specialized cells and stem cells.<br>3. List the levels of organization from cell to organism that result from differentiation.<br>4. List the two main purposes for cell division.<br>5. Sketch and label a homologous chromosome pair before and after S phase. Include a brief description of the importance of S phase.<br>6. Describe ALL PHASES of the cell cycle, including the phases in interphase and mitosis, in order.<br>7. Differentiate between cytokinesis in plants and animal cells.<br>8. Summarize how cells know when they need to divide. Include examples of the difference between internal and external regulation.<br>9. Explain the key roles of checkpoints and apoptosis in the regulation of the cell cycle.<br>10. Define tumor and differentiate between the two types.<br>11. List several potential causes of cancer.<br>12. *Identify what stage of mitosis a cell is in based on a description or diagram.*<br>13. *Predict consequences of a failure during a given phase of the cell cycle.*<br><br>**Vocabulary**:<br>Differentiation<br>Stem cells<br>Gastrula<br>Organogenesis<br>Cell cycle<br>Chromosome<br>Gene<br>Sister chromatids<br>Centromere<br>Telomere<br>Cancer<br>Metastasize<br>Carcinogens |

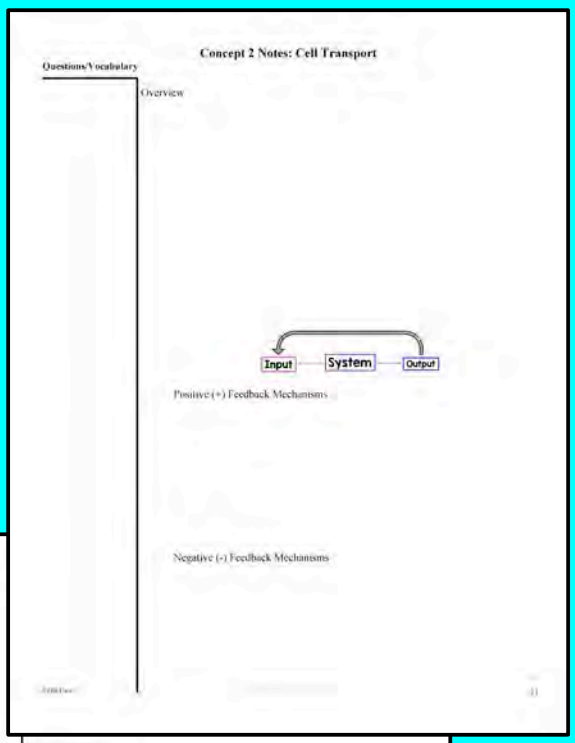

© It's Not Rocket Science® 2020


The cover page of the packet splits the unit into 3 concepts: Cell Theory and Organelles, Cell Transport, and the Cell Cycle and Cancer. Each concept is broken down into objectives and vocabulary that students will use to create study guides from. An editable version of this cover page is included for you to customize for your class!

© It's Not Rocket Science

Along with practice, activity overviews, and lab investigation handouts, the packets also include **Cornell note outlines** that go along with each PowerPoint.

*Sample* Concept 2 Notes: Cell Transport **Cornell Note outline**


Concept 2 Notes: Cell Transport

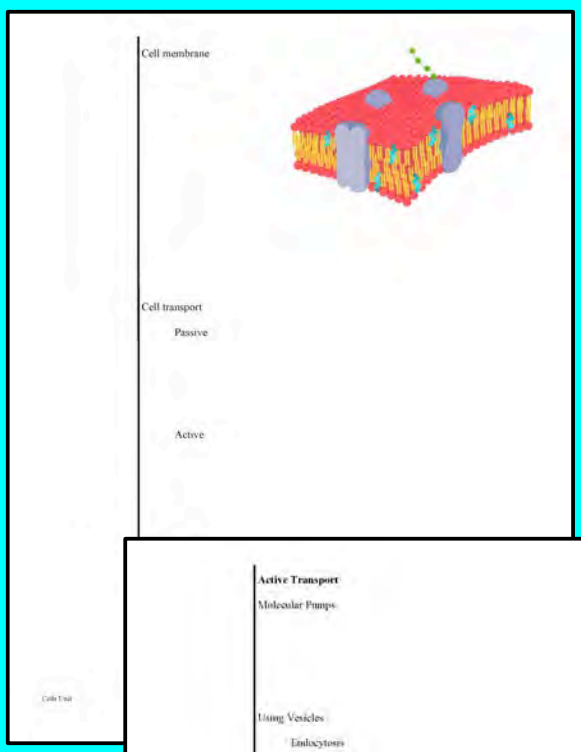
Questions/Vocabulary

Overview

Input System Output

Positive (+) Feedback Mechanisms

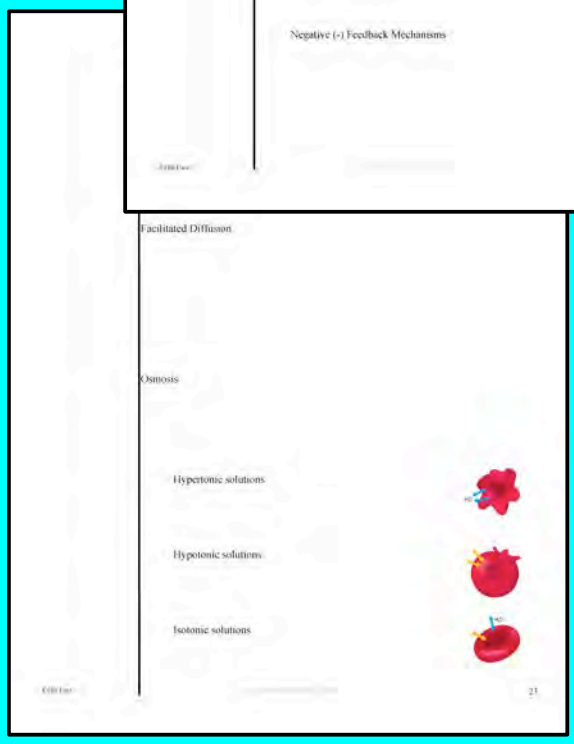
Negative (-) Feedback Mechanisms


Cell membrane

Cell transport

Passive

Active

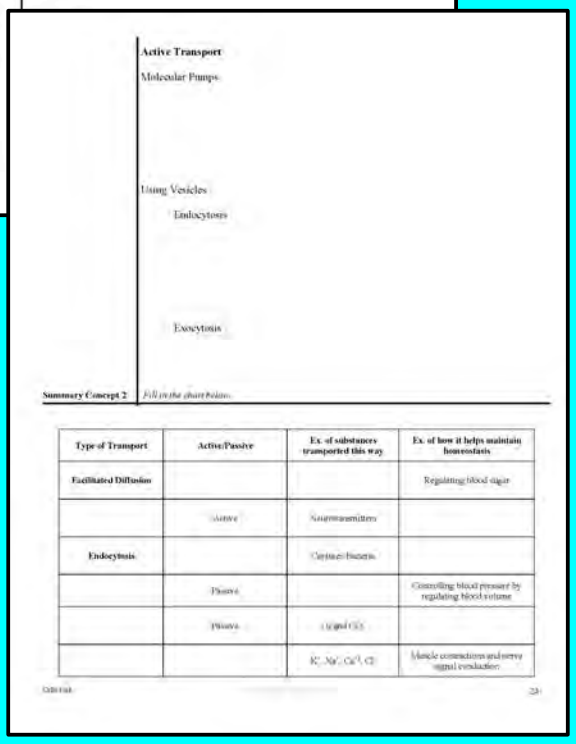

Facilitated Diffusion

Osmosis

Hypertonic solutions

Hypotonic solutions

Isotonic solutions


Active Transport

Molecular Pumps

Using Vesicles

Endocytosis

Exocytosis

Summary Concept 2

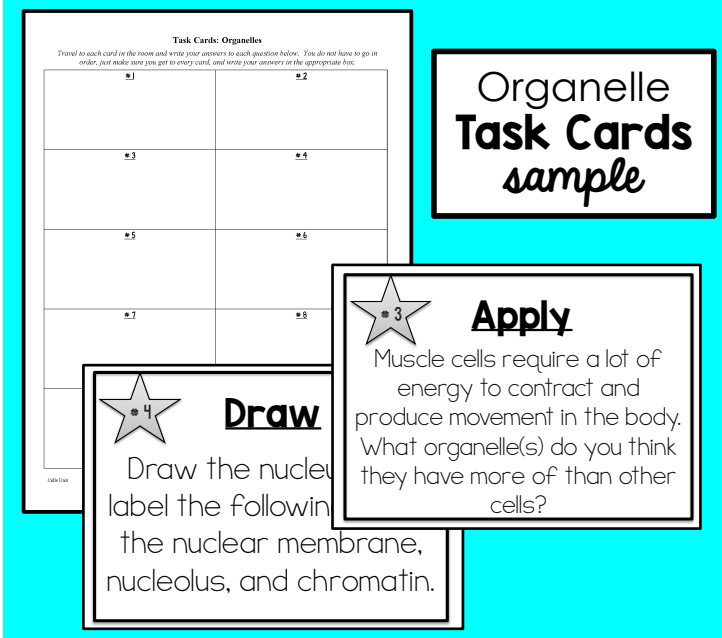
| Type of Transport | Active/Passive | Ex. of substances transported this way | Ex. of how it helps maintain homeostasis |
|---|---|---|---|
| Facilitated Diffusion | | | Regulating blood sugar |
| | Active | Neurotransmitters | |
| Endocytosis | | Certain Bacteria | |
| | Passive | | Controlling blood pressure by regulating blood volume |
| | Passive | | |
| | | | Muscle contractions and nerve signal conduction |

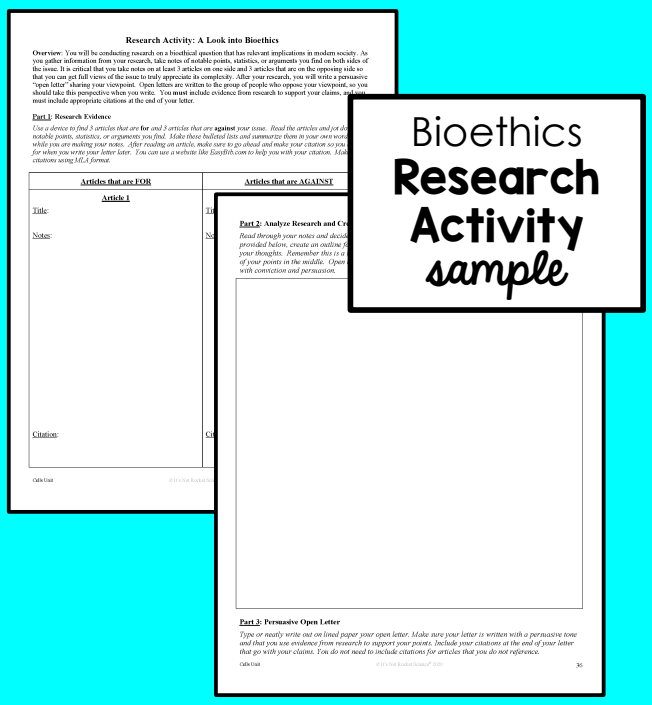
Cornell Notes leave a margin for students to highlight terms and write questions as they go back and study their notes. Cornell Notes also leave room at the end of notes for students to summarize what they learned. The CP summary sections have questions to help them summarize.

© It's Not Rocket Science

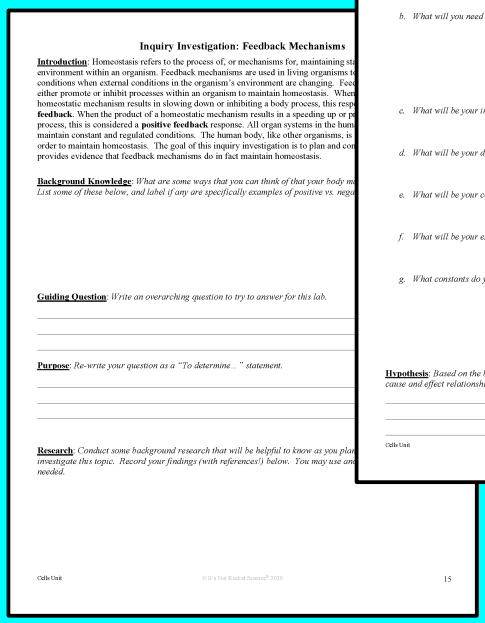
# Packet includes student handouts for:

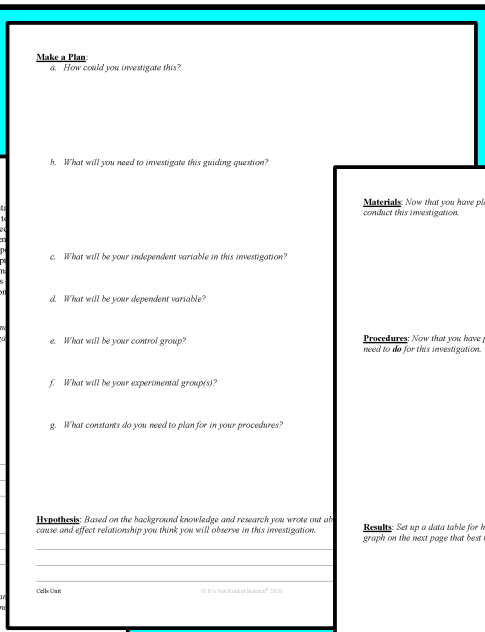
## **20** Cell Organelle **Task Cards**
## **Inquiry Investigation** on Feedback Mechanisms
## Bioethics **Research Activity**

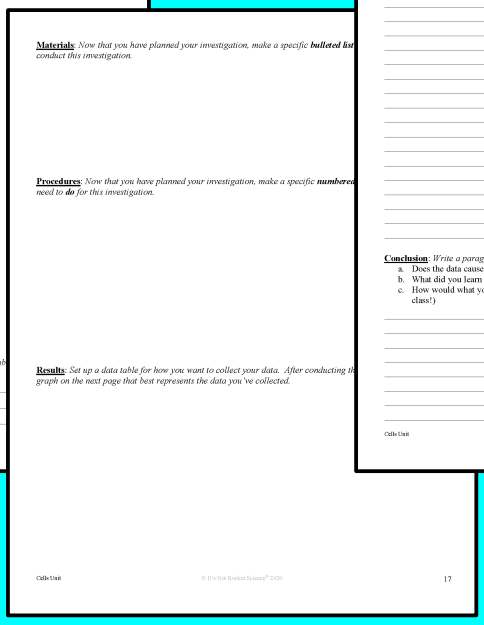


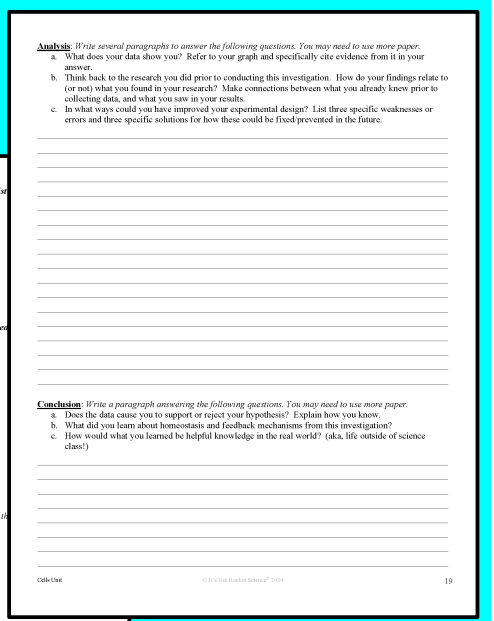




## Feedback Mechanisms **Inquiry Investigation** *sample*



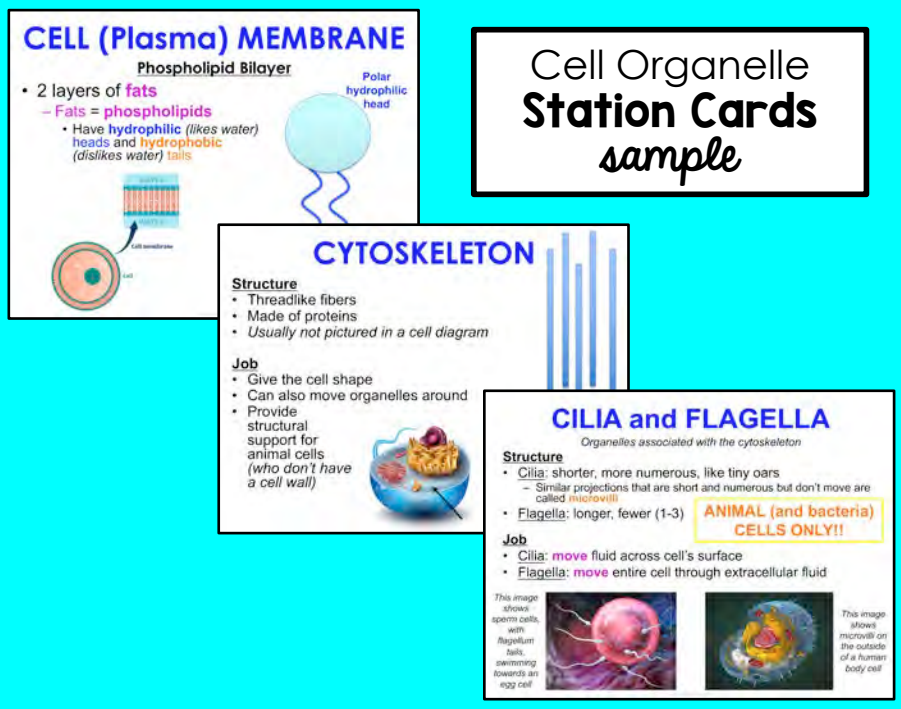



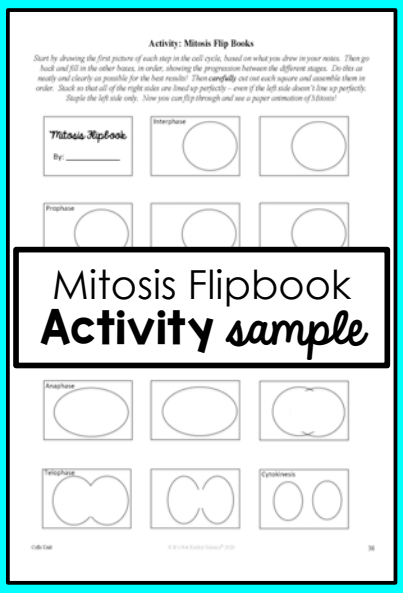

© It's Not Rocket Science

# Packet includes student handouts for:

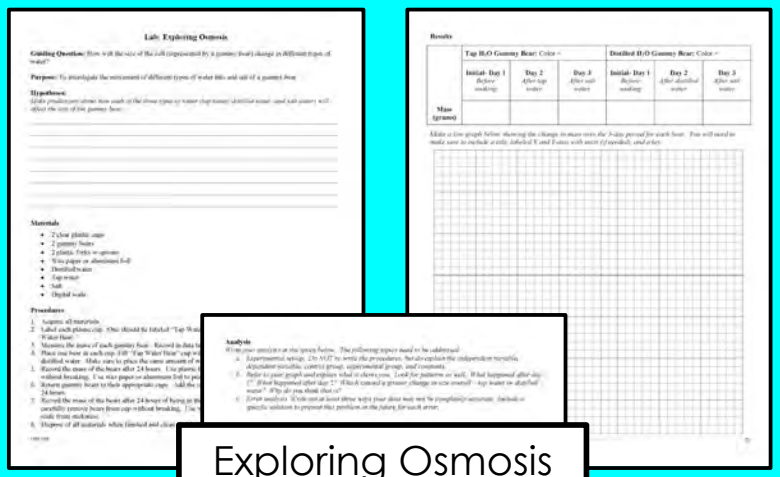
**19** Cell Organelle **Station Cards**
Exploring Osmosis **Lab**
Mitosis Flipbook **Activity**
**6** Cancer QR Code **Stations**



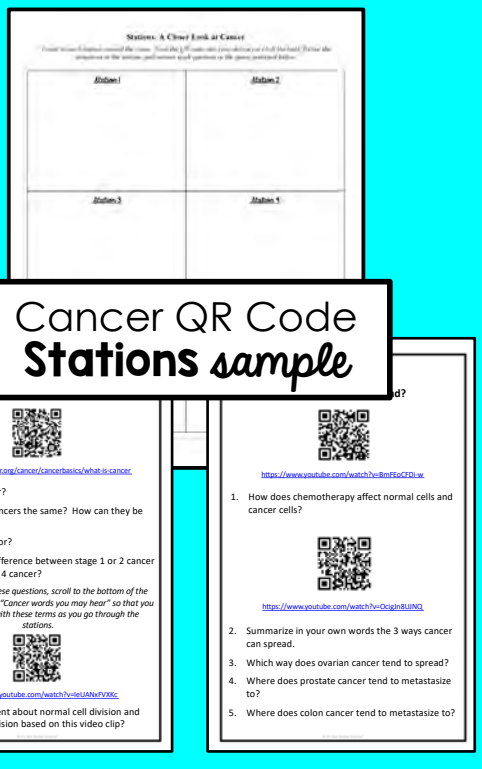

Cell Organelle
**Station Cards** *sample*




Mitosis Flipbook
**Activity** *sample*




Exploring Osmosis
**Lab** *sample*

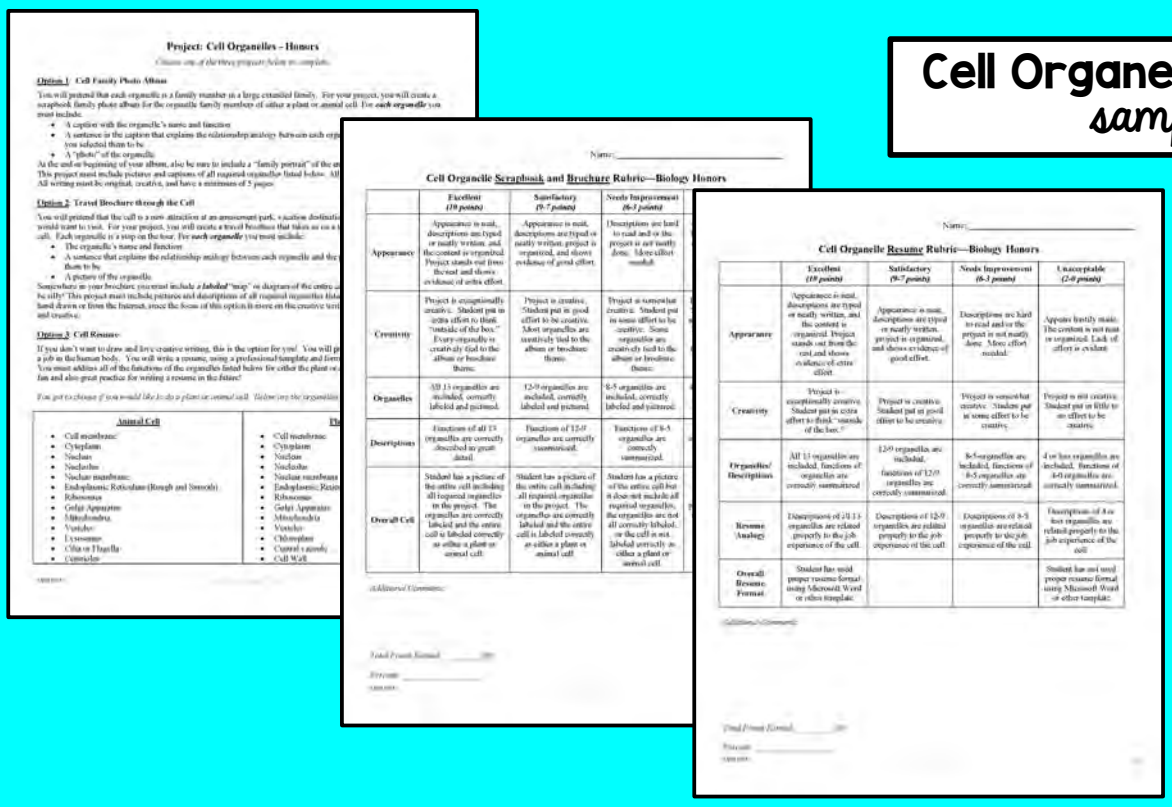



Cancer QR Code
**Stations** *sample*

© It's Not Rocket Science

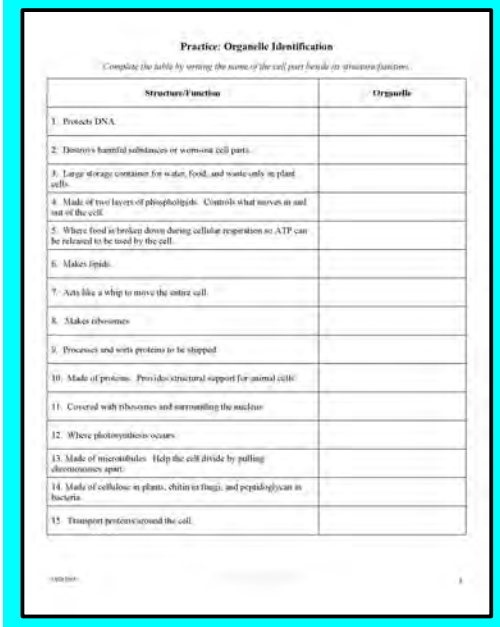
# Also included in this unit:

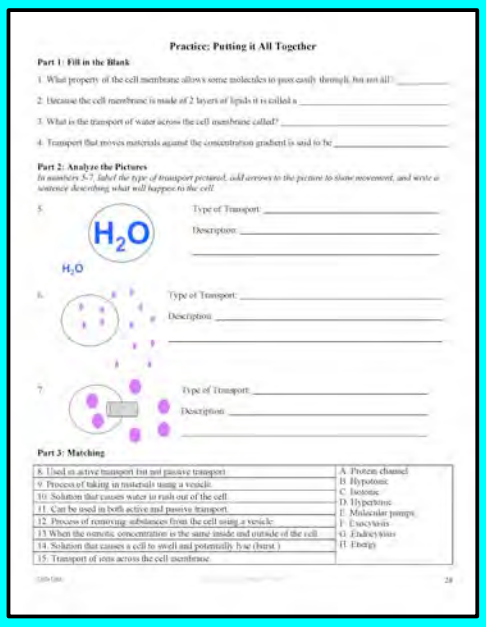
Cell Organelle **Project** description and rubrics
**Practice** for organelles, cell transport and the cell cycle

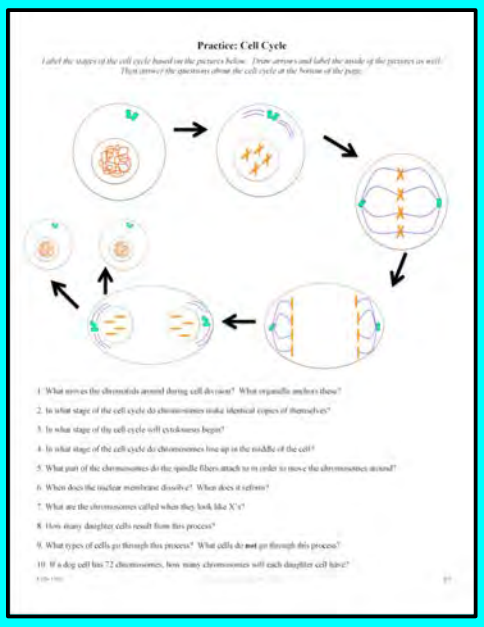



## Cell Organelle Project *sample*

## **Practice** *samples* - more included in student packet!

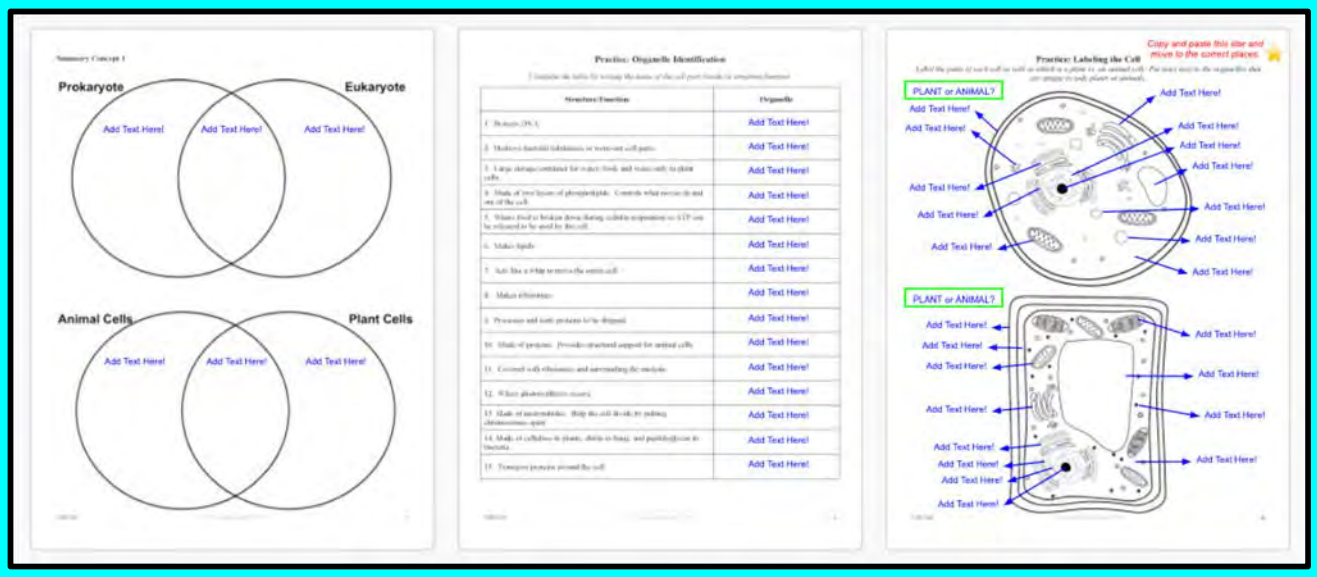


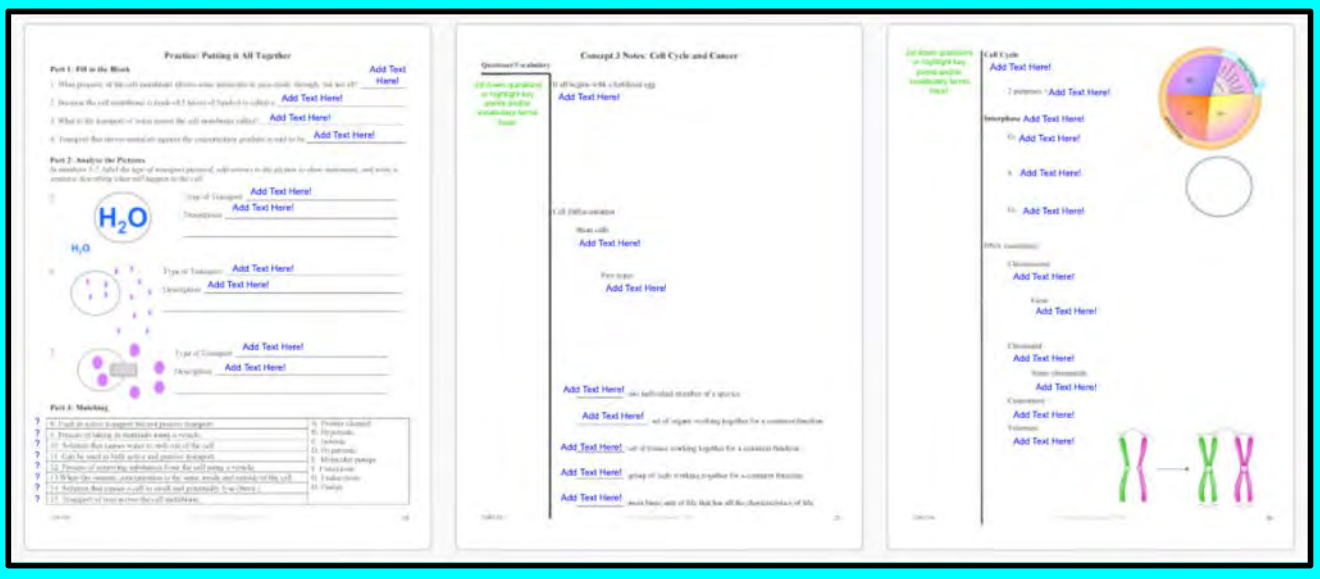




© It's Not Rocket Science

Includes access to **Paperless Digital** versions of the **student packets** that can be used in GOOGLE DRIVE or MICROSOFT ONEDRIVE



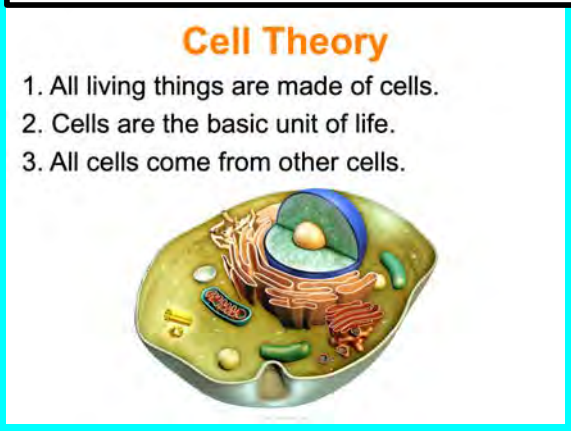

Perfect for teachers in 1:1 classrooms, looking to integrate more educational technology, or go PAPERLESS! Get all of the same content, organization, and ease of the paper packets, without all of the copies!

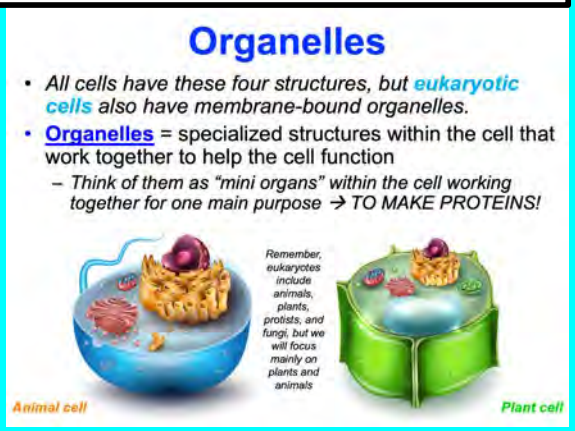
© It's Not Rocket Science

# 6 Powerpoints of Notes

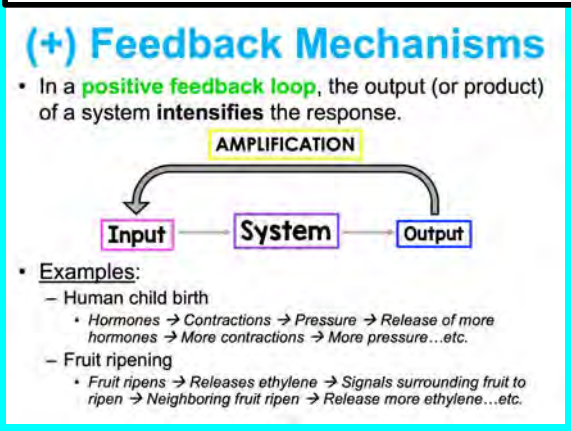
Covering **3** different concepts, CP and Honors version for each
**Over 150 slides**, all with *editable text*
**Fully animated** presentations in slide show mode

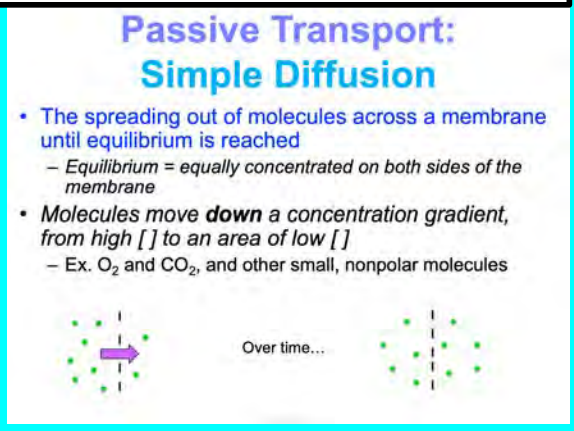
*Sample* slides from Concept 1 Notes: Cell Theory and Organelles



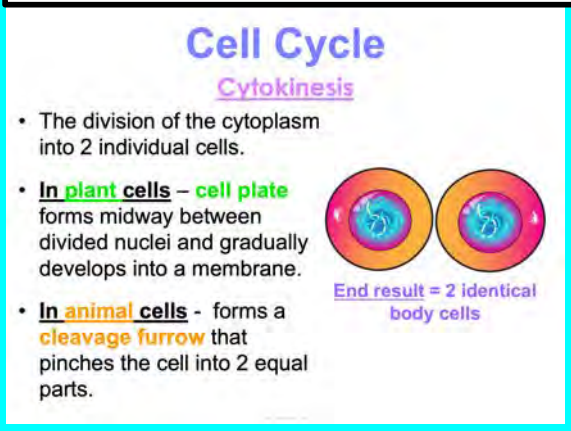



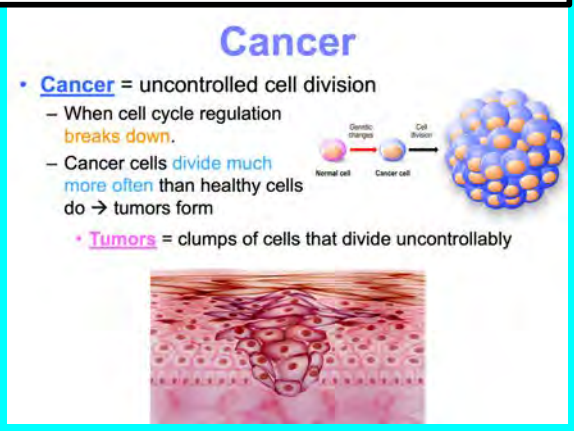

*Sample* slides from Concept 2 Notes: Cell Transport




*Sample* slides from Concept 3 Notes: Cell Cycle and Cancer




**PLUS** check out my **YouTube channel** for **lecture videos** that go with each set of notes!

© It's Not Rocket Science

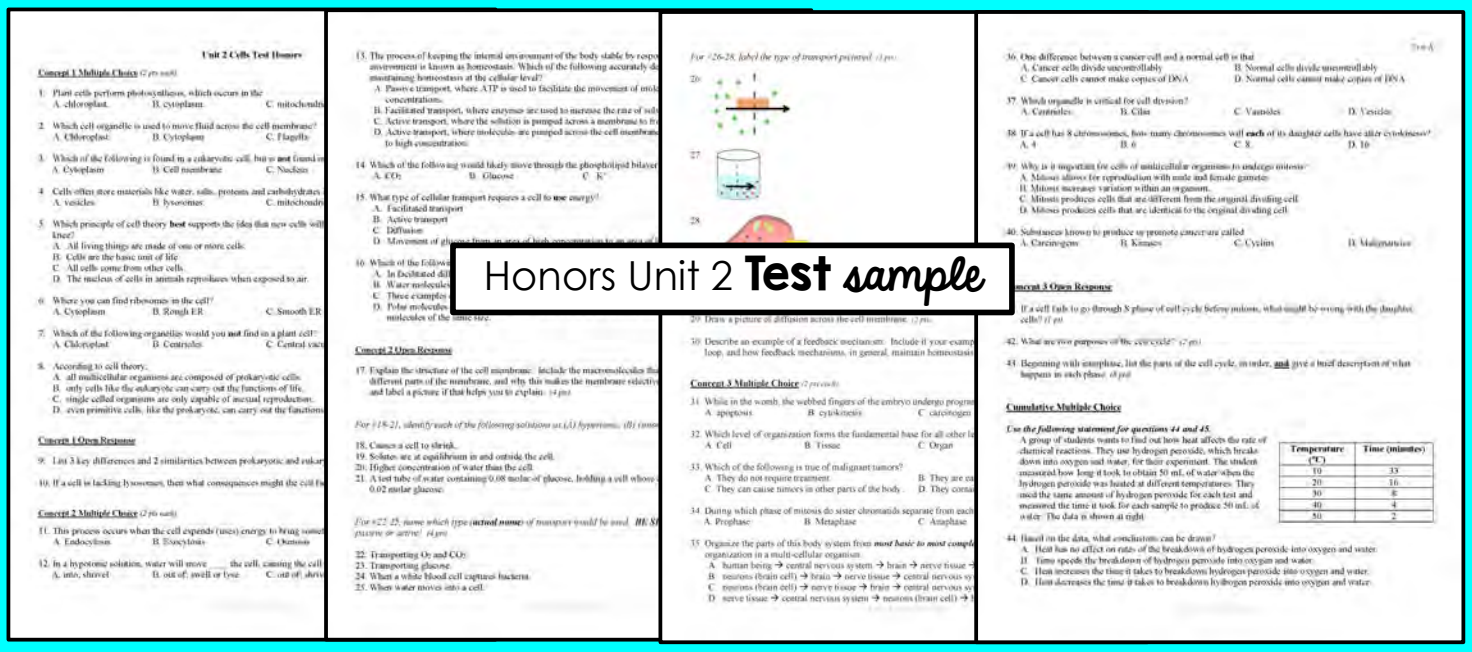
# Cell Organelle Quiz

## 4 Multiple Choice and Open Response **Tests**

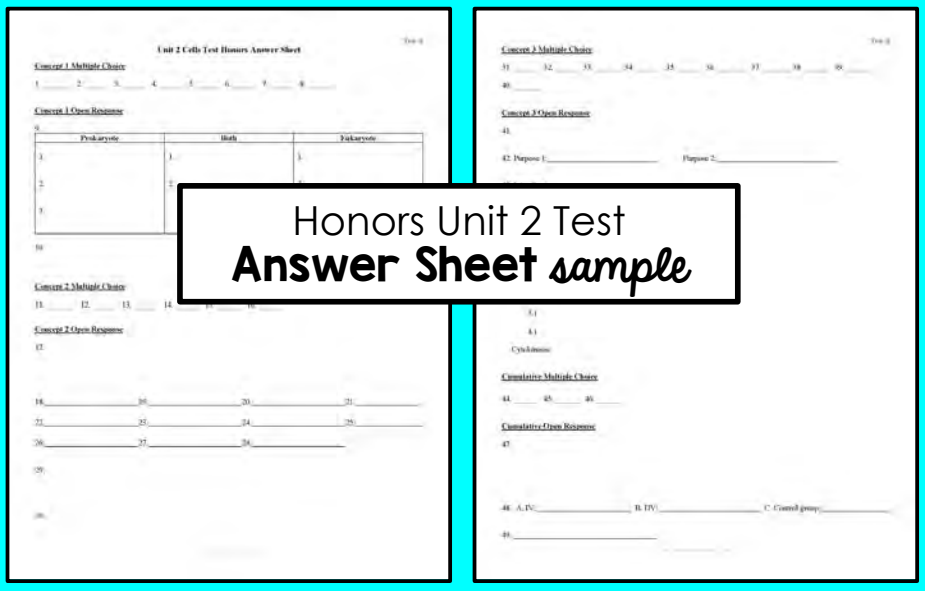
## **CP and Honors**

Versions A and B for both

*(MC rearranged to prevent cheating)*



Honors Unit 2 **Test** ***sample***



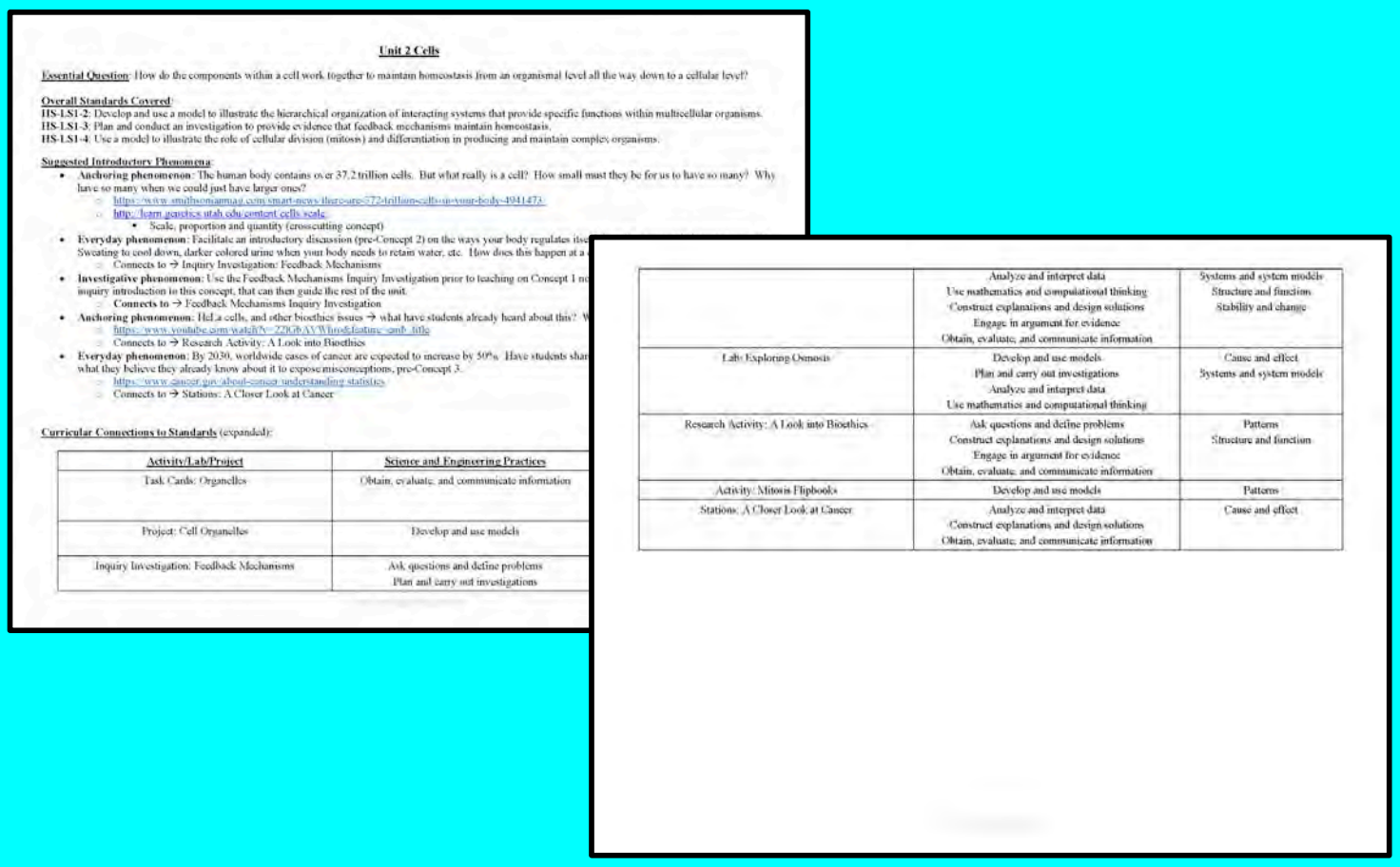
Honors Unit 2 Test
**Answer Sheet** ***sample***

Detailed **Answer Keys**

• **Editable Versions** of all assessments are included!

© It's Not Rocket Science

# NGSS Alignment Overview



**Unit 2 Cells**

**Essential Question**: How do the components within a cell work together to maintain homeostasis from an organismal level all the way down to a cellular level?

**Overall Standards Covered**:
**HS-LS1-2**: Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms.
**HS-LS1-3**: Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis.
**HS-LS1-4**: Use a model to illustrate the role of cellular division (mitosis) and differentiation in producing and maintain complex organisms.

**Suggested Introductory Phenomena**:

- **Anchoring phenomenon**: The human body contains over 37.2 trillion cells. But what really is a cell? How small must they be for us to have so many? Why have so many when we could just have larger ones?
  - https://www.smithsonianmag.com/smart-news/there-are-372-trillion-cells-in-your-body-4941473/
  - http://learn.genetics.utah.edu/content/cells/scale/
    - Scale, proportion and quantity (crosscutting concept)
- **Everyday phenomenon**: Facilitate an introductory discussion (pre-Concept 2) on the ways your body regulates its
  Sweating to cool down, darker colored urine when your body needs to retain water, etc. How does this happen at a
  - Connects to → Inquiry Investigation: Feedback Mechanisms
- **Investigative phenomenon**: Use the Feedback Mechanisms Inquiry Investigation prior to teaching on Concept 1 n
  inquiry introduction to this concept, that can then guide the rest of the unit.
  - **Connects to** → Feedback Mechanisms Inquiry Investigation
- **Anchoring phenomenon**: HeLa cells, and other bioethics issues → what have students already heard about this? W
  - https://www.youtube.com/watch?v=7ZfGbAYWnoc&feature=emb_title
  - Connects to → Research Activity: A Look into Bioethics
- **Everyday phenomenon**: By 2030, worldwide cases of cancer are expected to increase by 50%. Have students shar
  what they believe they already know about it to expose misconceptions, pre-Concept 3.
  - https://www.cancer.gov/about-cancer/understanding/statistics
  - Connects to → Stations: A Closer Look at Cancer

**Curricular Connections to Standards** (expanded):

| Activity/Lab/Project | Science and Engineering Practices |
|---|---|
| Task Cards: Organelles | Obtain, evaluate, and communicate information |
| Project: Cell Organelles | Develop and use models |
| Inquiry Investigation: Feedback Mechanisms | Ask questions and define problems<br>Plan and carry out investigations |

| | | |
|---|---|---|
| | Analyze and interpret data<br>Use mathematics and computational thinking<br>Construct explanations and design solutions<br>Engage in argument for evidence<br>Obtain, evaluate, and communicate information | Systems and system models<br>Structure and function<br>Stability and change |
| Lab: Exploring Osmosis | Develop and use models<br>Plan and carry out investigations<br>Analyze and interpret data<br>Use mathematics and computational thinking | Cause and effect<br>Systems and system models |
| Research Activity: A Look into Bioethics | Ask questions and define problems<br>Construct explanations and design solutions<br>Engage in argument for evidence<br>Obtain, evaluate, and communicate information | Patterns<br>Structure and function |
| Activity: Mitosis Flipbooks | Develop and use models | Patterns |
| Stations: A Closer Look at Cancer | Analyze and interpret data<br>Construct explanations and design solutions<br>Obtain, evaluate, and communicate information | Cause and effect |

This 2-page document is a helpful resource for teachers who are using the Next Generation Science Standards* while they teach an underclassmen Biology course. It organizes the various instructional methods to show alignment of the unit to high school life science DCIs, as well as the incorporation of science and engineering practices and crosscutting concepts.

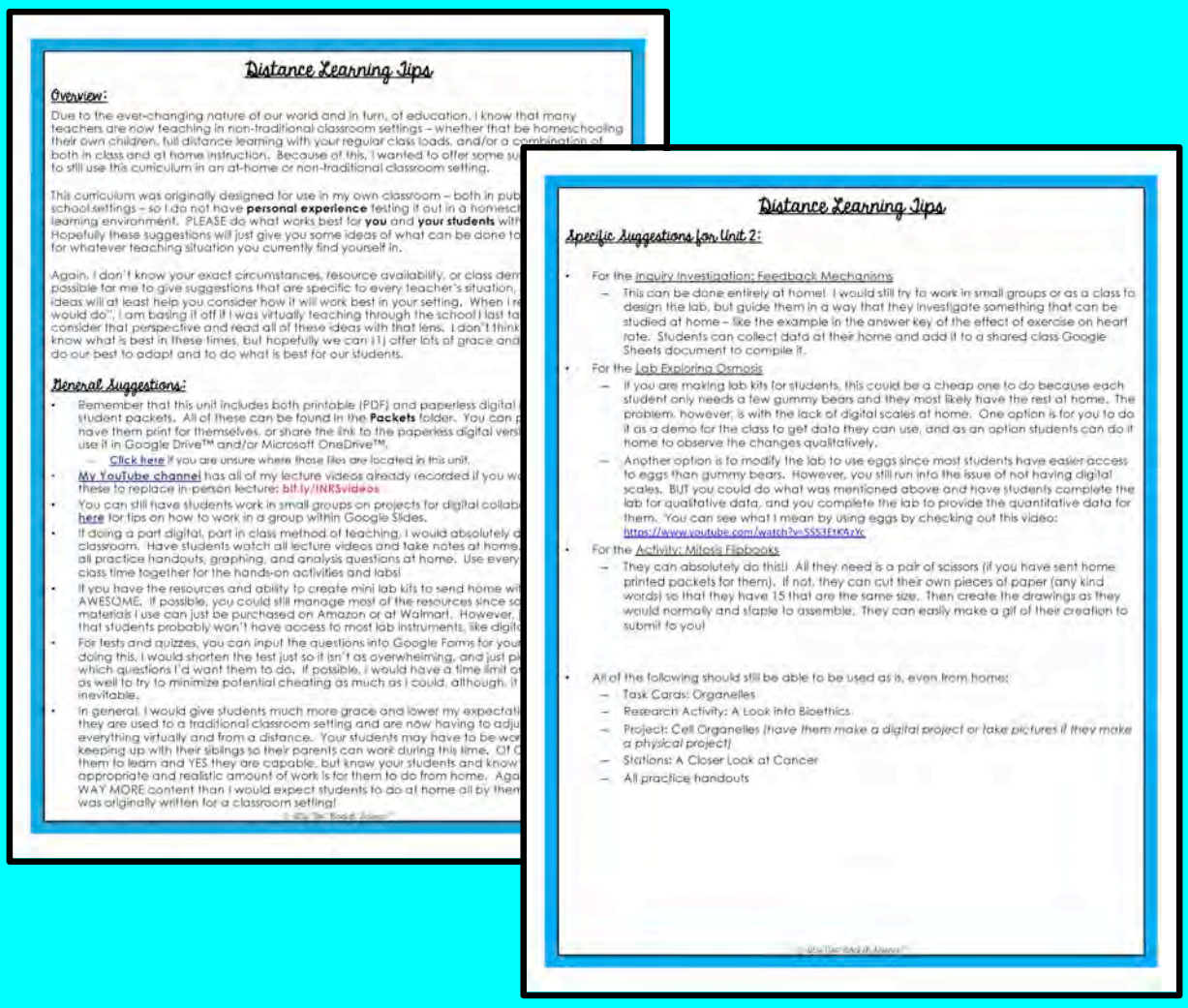
This document also includes a list of suggested phenomena teachers can use to develop storylines for their classes, based on their students' interests. Tips for transitioning to NGSS can be found on my blog **here**. Tips for using phenomena can be found **here**.

**Note: NGSS is a registered trademark of Achieve. Neither Achieve nor the lead states and partners that developed the Next Generation Science Standards were involved in the production of this product, and do not endorse it.*

© It's Not Rocket Science

# Distance Learning Tips

In light of current circumstances, I recently added a 2-page document with tips for teaching this class virtually. Although the unit wasn't specifically written to be taught in a distance learning or homeschool setting, many of the resources can still be used and/or adapted in some way to fit either of these two types of classrooms. The YouTube lecture videos and paperless digital version of the student packets are especially helpful for teachers who are transitioning between virtual and in-person teaching, as they help to maintain consistency and organization for the students.



Distance Learning Tips

Overview:

Due to the ever-changing nature of our world and in turn, of education, I know that many teachers are now teaching in non-traditional classroom settings – whether that be homeschooling their own children, full distance learning with your regular class loads, and/or a combination of both in class and at home instruction. Because of this, I wanted to offer some su... to still use this curriculum in an at-home or non-traditional classroom setting.

This curriculum was originally designed for use in my own classroom – both in pub... school settings – so I do not have **personal experience** testing it out in a homesc... learning environment. PLEASE do what works best for **you** and **your students** wit... Hopefully these suggestions will just give you some ideas of what can be done to... for whatever teaching situation you currently find yourself in.

Again, I don't know your exact circumstances, resource availability, or class dem... possible for me to give suggestions that are specific to every teacher's situation. ... ideas will at least help you consider how it will work best in your setting. When I r... would do", I am basing it off if I was virtually teaching through the school I last to... consider that perspective and read all of these ideas with that lens. I don't think... know what is best in these times, but hopefully we can (1) offer lots of grace and... do our best to adapt and to do what is best for our students.

General Suggestions:

- Remember that this unit includes both printable (PDF) and paperless digital... student packets. All of these can be found in the **Packets** folder. You can p... have them print for themselves, or share the link to the paperless digital vers... use it in Google Drive™ and/or Microsoft OneDrive™.
  - Click here if you are unsure where those files are located in this unit.
- My YouTube channel has all of my lecture videos already recorded if you w... these to replace in-person lecture: bit.ly/INKSvideos
- You can still have students work in small groups on projects for digital collab... here for tips on how to work in a group within Google Slides.
- If doing a part digital, part in class method of teaching, I would absolutely c... classroom. Have students watch all lecture videos and take notes at home, ... all practice handouts, graphing, and analysis questions at home. Use every... class time together for the hands-on activities and labs!
- If you have the resources and ability to create mini lab kits to send home wi... AWESOME. If possible, you could still manage most of the resources since s... materials I use can just be purchased on Amazon or at Walmart. However, ... that students probably won't have access to most lab instruments, like digit...
- For tests and quizzes, you can input the questions into Google Forms for you... doing this, I would shorten the test just so it isn't as overwhelming, and just pi... which questions I'd want them to do. If possible, I would have a time limit o... as well to try to minimize potential cheating as much as I could, although, i... inevitable.
- In general, I would give students much more grace and lower my expectati... they are used to a traditional classroom setting and are now having to adju... everything virtually and from a distance. Your students may have to be wo... keeping up with their siblings so their parents can work during this time. Of c... them to learn and YES they are capable, but know your students and know... appropriate and realistic amount of work is for them to do from home. Aga... WAY MORE content than I would expect students to do at home all by them... was originally written for a classroom setting!

Distance Learning Tips

Specific Suggestions for Unit 2:

- For the Inquiry Investigation: Feedback Mechanisms
  - This can be done entirely at home! I would still try to work in small groups or as a class to design the lab, but guide them in a way that they investigate something that can be studied at home – like the example in the answer key of the effect of exercise on heart rate. Students can collect data at their home and add it to a shared class Google Sheets document to compile it.
- For the Lab Exploring Osmosis
  - If you are making lab kits for students, this could be a cheap one to do because each student only needs a few gummy bears and they most likely have the rest at home. The problem, however, is with the lack of digital scales at home. One option is for you to do it as a demo for the class to get data they can use, and as an option students can do it home to observe the changes qualitatively.
  - Another option is to modify the lab to use eggs since most students have easier access to eggs than gummy bears. However, you still run into the issue of not having digital scales. BUT you could do what was mentioned above and have students complete the lab for qualitative data, and you complete the lab to provide the quantitative data for them. You can see what I mean by using eggs by checking out this video: https://www.youtube.com/watch?v=SSS3EtKAzYc
- For the Activity: Mitosis Flipbooks
  - They can absolutely do this! All they need is a pair of scissors (if you have sent home printed packets for them). If not, they can cut their own pieces of paper (any kind would) so that they have 15 that are the same size. Then create the drawings as they would normally and staple to assemble. They can easily make a gif of their creation to submit to you!
- All of the following should still be able to be used as is, even from home:
  - Task Cards: Organelles
  - Research Activity: A Look into Bioethics
  - Project: Cell Organelles *(have them make a digital project or take pictures if they make a physical project)*
  - Stations: A Closer Look at Cancer
  - All practice handouts

## Have questions?

Please do not hesitate to contact me with any questions **prior to purchasing**! Due to the nature of digital resources, this resource **cannot** be returned and refunded, so please ask before you buy! You can see the TpT refund policy here.

I respond to Q&A's as well as email at **itsnotrocketsciencestore@gmail.com**!

© It's Not Rocket Science

# THANK YOU!

I hope you find this resource to be useful to you in your classroom and that your students enjoy it as well!

# WANT TO SHARE YOUR THOUGHTS?

**If you enjoy this resource**, PLEASE leave feedback for me! I'd love to hear specifically what you enjoyed and how you used this in your classroom so that I can continue to create resources that are beneficial to you and your students. Your encouragement and feedback mean so much to me!

**If you have negative feedback**, I would love for you to email me first (itsnotrocketsciencestore@gmail.com) so that I can serve you best on an individual basis to guarantee your satisfaction with my products. I will consider any changes you suggest for the product or product description.

# WANT TO SAVE MONEY ON FUTURE PURCHASES?

*Earning TpT credit saves you money on future purchases! You can apply the credits you earn when you check out to a future purchase.*

• Log into your Teachers Pay Teachers account. Go to "My Purchases."
• Beside each purchase, you'll see a "Provide Feedback" button. Simply click it, and you will be taken to a page where you can give a quick rating and leave a short comment for the product. This is both helpful for you AND me! Win win!

# CREDITS FOR GRAPHICS AND FONTS

All clipart was either purchased with permission for commercial use from the artists above or created myself. All photographs are either my own, **are from public domain or purchased for commercial use.** This includes images taken by employees of various US Government agencies; images published prior to 1923; or images that have otherwise been released to public domain.

# LEGAL NOTICE

Thank you for protecting the hard work that went into this resource. By purchasing this resource, you are agreeing that the contents are **licensed to you for your classroom/personal use only as a SINGLE user.** In accordance with the Digital Millennium Copyright Act, I retain the copyright and reserve **all rights** to this product. With the ***license*** you purchased:

**You may:**
- Use this item for your own classroom, students, or for your own personal use.
- Buy additional licenses for others to use this product (at a discount) by visiting your TpT "My Purchases" page.
- Review this product to recommend others buy it in blog posts, at PD workshops, or other venues as long as credit is given to my store with a direct link to my store/product.

**You may NOT:**
- Upload this product to any unsecured website or server that other teachers could access for free.
- Give this product to others without the purchase of an additional license for them (this includes emailing, printing copies, or sharing through a website, cloud or other network.)
- Copy or modify any part of this document for others for free or for sale.

# WANT TO STAY CONNECTED AND IN THE LOOP?

• **Join my Email List by clicking HERE**: Join thousands of other teachers and be the first to receive It's Not Rocket Science® store updates, exclusive freebies, teaching tips, and more! This is the best way to keep up with what is going on at It's Not Rocket Science®.

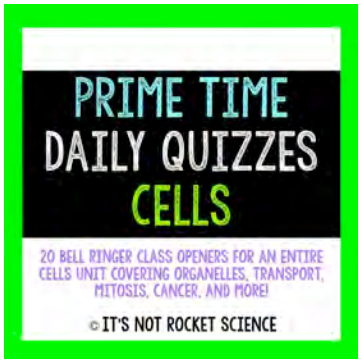
• **Follow me on Social Media**: Click the links to the right!

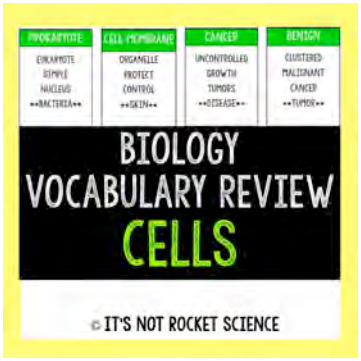
# Thank You!

Thank you for purchasing this product by **© It's Not Rocket Science®**! Be sure to read the Terms of Use on the previous page fully prior to using!

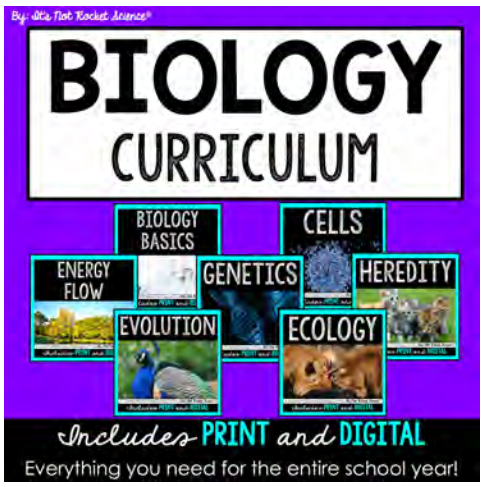
Want to see more from **© It's Not Rocket Science®**?
**Follow Me on TpT** or **Join my email list**! These are the best ways to be updated when new products and blog posts get posted!

## Supplemental Resources for this unit:




## 20% off Biology Curriculum Bundle:




## Or find other available Biology units below: