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Michigan State University

Impact Project

Chapter 1: "What"

The final product of this project is a student workbook that includes all of the needed curriculum for one semester of an Agricultural (Ag) Biology course. The title of the project is "Ag Biology Student Workbook: First Semester". The curriculum in the workbook correlates with our current Biology textbook at Montague High School, (Miller & Levine, 2017). The goal of this project was to create a hard copy workbook for each chapter in our first semester of the course. Included in each chapter is the cover page, table of contents, and needed curriculum which includes: book notes, additional notes, activity worksheets, labs, project outlines, and quiz/test review guides. The purpose of creating this product is to meet the needs of students and teachers in an Ag Biology classroom by having a set curriculum with all necessary materials provided. Each chapter focuses on including materials to meet both the required Science Standards for the state of Michigan and the required Agriculture Education Standards for our program.

Chapter 2: "Why"

A teacher's role in communicating to students the science and Agriculture, Food and Natural Resources (AFNR) curriculum is becoming imperative to a students development. It is within that teacher's role to prepare their students and provide them with the materials needed to be successful in that content area. In a study performed, it was found that teachers want to teach the AFNR and science standards in their classes, but do not feel prepared or sufficient in teaching them (McKim et al., 2018). This workbook was created with the intentions of having a prepared curriculum for teachers to use, especially early on in their Ag Biology teaching. It is crucial that teachers and students have materials that will help them be successful within a science classroom.

Throughout the years there was a significant shift in Agriculture Education to include the Science Technology Engineering and Math (STEM) concepts. As we continue to further Ag Education, "the relationship between agriculture and content normally considered *academic*, including those falling under the STEM umbrella, are becoming more defined, highlighted and often, celebrated" (Swafford, 2019, 11). A tool to compile all AFNR Performance Indicators, Disciplinary Core Ideas and NGSS Performance Expectations was developed and researched to help educators prepare their curriculum in classes (Barrick et al., 2018). This tool proved to be useful when it came to ensuring that the documents I was putting into this workbook checked all of the boxes.

With the importance of providing students with the opportunity to learn a curriculum that balances both sets of standards, it is imperative that experiential learning is a part of the process. Experiential learning has the opportunity to provide several outcomes "including helping

students realize themselves, helping teachers become reflexive teachers, identifying learning styles of students, and development of key teacher's skills" (Sharlanova, 2004, 39). Within an Ag Biology course, and using our workbooks, students will be given the opportunity to experience hands-on projects like raising broiler chickens and learn about the biology of animal science, as well as extract DNA from a strawberry while learning about the structure and functions of DNA. "As you build STEM lessons, using experiential learning theory can help you differentiate instruction and meet the needs of each student" (Smith, 2018, 18). Building this workbook was a great way to get experience in creating lessons and chapters that included all of the content needed to meet the standards, but to also ensure that students had the opportunity to participate in hands-on learning experiences through experiential learning.

Chapter 3: "How"

When it came to developing this product the first thing that took place was creating a list of all of the types of things I wanted to include in these workbooks. Once that list was developed I laid out a template Cover Page and Table of Contents to follow when building all of the chapter packets. I then took the time to create a folder system in Google Drive of all of the materials I had saved and used from the previous year in Ag Biology. While I was compiling all of these documents into each chapter folder I made sure to make any necessary changes I had made notes of last year. I also re-created or added new documents to each chapter as needed. Once all documents were added to the folders I then began to insert them into their respective chapter packet document. With the Table of Contents template already created it was easy to paste in the documents in the correct order. After all of the documents had been added, or page savers for documents that were pdfs, I went back and wrote in all of the page numbers into the Table of Contents. The process of inserting the documents and filling out the page numbers was repeated for all of the chapters within the first semester. Once the packets were built, it was time to go back and do all of the formatting and detail edits as well as insert the pdf documents. As I made formatting changes to each packet I cross checked that the page numbers were correct before moving onto the next chapter and working to finish the project.

Chapter 4: "Results"

Chapter 1 Workbook begins below.
Chapter 2 Workbook begins below.
Chapter 7 Workbook begins below.

Chapter 5: "So What"

The intention of creating this workbook was to make building a curriculum for an Ag Biology class easier as a new teacher. One of the biggest things I struggled with this past year was wanting to make sure what I was teaching was actually meaningful and meeting the required standards for this course. Developing this project allowed me to make sure what I was building would do just that. I wanted to make this workbook something that is usable for this upcoming year, but would also be something that is easily adaptable to the future as the course changes and

develops over time. I recognize that as I settle more into teaching Ag Biology I will cover material in a different way than I do right now and this product makes it easy to swap or add new materials I wish to start teaching. For students, the workbook will be something they receive chapter by chapter and will be expected to keep track of them using a binder system. I have not tested it yet, but I would recommend setting a specific grading system ahead of time, binder checks every Friday for example.

Although the workbook is built around the textbook we currently have at Montague High School, the product can definitely be adapted to other textbooks and programs. I think this product could end up being very useful for other AFNR teachers who also teach an Ag Biology course. Some extensions I am already considering for the product are a couple of additional resources that will be very useful for teachers. An example of this would be to include a document that lists out all of the segments and standards that each chapter covers. The reason I hesitated to add this in now is because I know there are some changes coming to the Ag Education standards and I also wanted to give the workbook a year in use in case something major changes with the design of it. The other extension that will definitely be occurring this fall is the addition of a chapter workbook for our Leadership Contest Assignment unit. I did not create this workbook yet because I am not entirely sure what the assignment looks like yet. It will also be different for each student depending on which contest they choose. My goal when I do create this extension is to create a series of workbooks with the included materials for each individual contest as needed. The biggest possible extension would be if the workbook is successful in the upcoming year, I would also consider creating workbooks for the other classes I teach.

Overall I feel as though the development of this product has gone very smoothly. I think the biggest struggle I faced was when I started to realize that there were several pdf documents I couldn't just paste into the Google Document. I had to create page savers and then insert those pdf documents when I went to print the workbook for the first time. Even with this little snag however, the product came out looking great. I am looking forward to using these workbooks in the upcoming year and to see how much stress and time it saves from developing the curriculum as we go throughout the year. I am also excited to see how students react to the workbooks and organization of the course in a different way.

References:

Barrick, R. K., Heinert, S. B., Myers, B. E., Thoron, A. C., & Stofer, K. (2018, May). Integrating Disciplinary Core Ideas, the Agriculture, Food and Natural Resources Career Pathways and Next Generation Science Standards. *Career and Technical Education Research*, *43*(1), 41-56. 10.5328/cter43.1.41

McKim, A. J., Pauley, C. M., Velez, J. J., & Sorensen, T. J. (2018). Interdisciplinary Learning Opportunities in Agriculture, Food, Natural Resources, and Science: The Role of the Teacher. *Journal of Agriculture Education*, *59*(2), 179-196. https://doi.org/10.5032/jae.2018.02179

Miller, K. R., & Levine, J. S. (2017). *Miller & Levine Biology*. Pearson.

Sharlanova, V. (2004). Experiential Learning. *Trakia Journal of Sciences*, *2*(4), 36-39. http://www.uni-sz.bg/tsj/volume2_4/experiential%20learning.pdf

Smith, K. (2018, March/April). Experiencing STEM: Using Experiential Learning to Help Students Understand STEM Concepts. *The Agricultural Education Magazine*, *90*(5), 17-19. https://www.naae.org/profdevelopment/magazine/archive_issues/Volume90/2018%2003%20--%20Mar%20Apr.pdf

Swafford, M. (2019, May/June). STEM and Agricultural Education: Manure, Lowell Catlett and Three Circles. *The Agricultural Education Magazine*, *91*(6), 10-12. https://www.naae.org/profdevelopment/magazine/archive_issues/Volume91/2019%2005%20--%20May%20June.pdf

In addition to materials from our textbook provided by Miller and Levine Biology I would also like to acknowledge the following sources for various materials in these workbooks: Amoeba Sisters, Cornell Veterinary Science Curriculum, Doodle Notes, Middle School Survival Guide, and Smart School Systems.

Ag Biology

Semester 1

Chapter 1 Workbook:
The Science of Biology

Name: _____ Date: _____

Class Period: _____ Teacher: _____

Table of Contents

Chapter 1: The Science of Biology

Ag Biology Syllabus

Course Teachers:
Ms. Kaminski: kaminskim@mapsk12.org
Ms. Schwass: schwassm@mapsk12.org

Course Description:
Biology is the study of living organisms and their relationship with the environment. We will explore a variety of topics including cell biology and the diversity of life using agriculture as a lens through which to focus our study. Students enrolled in AFNRE Biology will be expected to grow as scientists while they learn about the world around them.

Text:
Biology. Miller, Levine; Prentice Hall Pearson Education, Inc., © 2017. ISBN: 978-1-32-320585-3

Required Materials:
The following should be brought to class daily:
3 Ring Binder (you will be receiving unit packets and need a binder to organize them into)
Writing Utensil (Science is a process - I strongly encourage pencil over pen)

Percentage Distribution:
30% First Quarter Content
30% Second Quarter Content
20% Final Exam
10% FFA Contest Skills
10% Broiler Project

Grading Scale: Montague High School's grading scale

A: 93+	B: 83-86	C: 73-76	D: 63-66
A-: 90-92	B-: 80-82	C-: 70-72	D-: 60-62
B+: 87-89	C+: 77-79	D+: 67-69	F: 59 and below

Grading Policy:
Everything is graded on a straight points system. If a test is 100 points, and a quiz the next week is 20 points, then they are recorded in the gradebook as such. The "weight" in an assignment comes in the form of the points that it's graded out of. Tests will be big, daily assignments will be small. And everything in between will be based on size and importance. Your performance throughout the semester as a whole is 80% of the final grade. The Final Exam is the other 20%.

If you miss an assignment, you have a week to make it up. If you turn it in late, there will be a 30% point reduction. IT IS YOUR JOB TO TRACK DOWN WHAT YOU MISSED. Simply stop in before you are going to miss extended class time, ask what you'll need to make up, or, when you get back after missing time, see your teacher for the work. Control. Your. Grade.

Incomplete or Late Assignments:
Incomplete assignments will not be accepted. They will be marked incomplete, and scored accordingly, and returned to the student. The student may complete the assignment and resubmit for full credit until the end of each unit. If you miss an assignment, you have a week to make it up. If you turn it in late, there will be a 30% point reduction.

Tentative Course Outline:
This list includes a general idea of the sections and units that will be covered throughout this course. The order and content is subject to change.

Semester One (Sept- Jan):
-The Science of Biology
-Cell Structure and Function
-Poultry Production
-Career Exploration and Leadership Skills

Semester Two (Jan - June):
-Photosynthesis and Cellular Respiration
-Genetics
-Cellular Growth & Division
-DNA/RNA & Protein Synthesis

MMC Standards Covered
This course covers all Michigan High School Life Science Standards (HS-LS)

- Structure and Function
- Matter and Energy in Organisms
- Inheritance and Variation of Traits

CTE Segments Covered

- 2 - Animal Anatomy and Physiology
- 3 - Animal Genetics and Reproduction
- 4 - Domestic Animal Production
- 5 - Animal Health and Nutrition
- 8 - Plant Culture and Propagation

Classroom Expectations: Same as the school. This classroom is a place of learning. People can't learn if they feel threatened. It's a scientific fact. Look at the research. Thus, the classroom is a safe place where we ALL need to get stuff done.

- **Respect your peers.** Chances are, you'll be working in a group with every single person in this class at some point or another. Your grade could depend on that relationship that you build with each and every person. Play the odds, and be respectful to everyone. Don't take that gamble….
- **Respect your equipment.** A lot of the equipment in the classroom is very cool, and thus, very expensive. If you want to continue to use the cool, expensive equipment, then treat it well so it lasts.
- **Respect Yourself.** Every single person in this class has an intelligence. It might not perpetuate itself in the form of studying or public speaking, but it's there. Believe in it, and use your own skills to help yourself. If you believe it and show it, then others will see it and believe it too.

FFA Membership:
All students enrolled in this course will be FFA members and will be expected to participate in activities related to FFA inside the classroom. There will be optional opportunities for additional participation outside of the classroom. We will utilize agriculture experiences when possible to highlight biological concepts. You will never be required to complete any FFA related activities outside of the classroom but are encouraged to participate in them.

Michigan FFA Career Development Events - Leadership Contests: Students are required to participate in a career development event (CDE) at the local level on issues related to current topics dealing with science and the environment. Students will have the opportunity to compete at the district, regional, state, and national level CDE events, attend field trips to facilitate instruction and participate in leadership conferences as applicable.

Students will have the option of Leadership contests that are offered by the Michigan FFA Association. These contests include: Parliamentary Procedure, Demonstration, Public Speaking, and Extemporaneous Public Speaking. Parliamentary Procedure and Demonstration contests are designed to promote skill sets in leadership that cater to teamwork and public speaking respectively. The Public Speaking contest will specifically give the participant the opportunity to choose a topic within the realm of agriculture, ecology, and natural resources, thus supplementing our studies in Ag Biology.

Michigan FFA Career Development Events - Spring Skills Contests: Students are required to participate in a career development event (CDE) at the local level in areas defined by the Michigan FFA Association relevant to the course content. Students who achieve a degree of competency worthy of representing Montague FFA in competition will be able to travel to Michigan State University to compete in the Spring Skills event.

Students may choose from any contest available, and will be expected to prepare for the contest as part of a final examination. Example contests include: agricultural communications, agricultural sales, agronomy, environmental skills, floriculture, forestry, land conservation, marketing, nursery/landscape, and meat evaluation. Students are not required to compete at the state level, but will be required to present their progress in a chosen contest within the class as a test grade.

AB- Syllabus and Handbook Scavenger Hunt

1. Should your cellphone be in the classroom? Where should it be kept?

2. What two steps are taken if a student is caught cheating?

3. What are the three R's and why are they important?

4. How many times can you sign out of class to use a pass?

5. Who are the two teachers for this class? How can you contact them? Who is your lead teacher?

6. Your performance throughout the semester is worth what percentage of your overall grade?

7. Your final exam in January will be worth what percentage of your overall grade?

8. How long will you have to complete a missing assignment? Where can you find missing work?

9. What percentage will be taken off of late assignments?

10. Who controls your grade?

Student Signature: _____

Dear Parents/Guardians,

Throughout the year, agricultural education students will attend local field trips. This permission slip gives your student permission to walk to local businesses like Tri County Feed (which all of the sections of Ag Biology will do), ride with Ms. Feuerstein, Ms. Kaminski, Mrs. Lemmen or Ms. Schwass to local businesses in and around the White Lake Area including but not limited to the following:

1. Bush's Orchard to glean apples
2. Lebanon Lutheran Church to drop off gleaned apples,
3. Marsh Dairy Farm to drop off Christmas Trees to be recycled
4. Montague Post Office to pick up chicks
5. Tri County Feed Montague Location for a tour
6. RRO Elementary for Harvest Day
7. MACC for I Spy Trails in October and April

Often times we may receive a call about someone needing our help with something and in the past have needed to make runs to the following businesses to assist with completing a project:

1. Weesies Brothers Garden Center and Landscaping
2. Montague Foods
3. Mac's Meats

Your student will not participate in all of these activities and events but in the event of needing an available student to assist at the last minute, we are securing permission for these types of trips.

I, _____, give permission to my student,

_____, to travel with agricultural education and FFA staff for various class and FFA projects in the White Lake Area.

Parent/Guardian Signature: _____

Student Signature: _____

You can call 231-894-2661 with any questions you may have.

Thank you for your support of agriculture education and FFA at Montague High School.

Ms. Feuerstein, Ms. Kaminski, Mrs. Lemmen and Ms. Schwass

1.1 What Is Science?

Lesson Objectives

- State the goals of science.
- Describe the steps used in scientific methodology.

Lesson Summary

What Science Is and Is Not **Science** is an organized way of gathering and analyzing evidence about the natural world. The goals of science are to provide natural explanations for events in the natural world and to use those explanations to make useful predictions. Science is different from other human works in the following ways:

- Science deals only with the natural world.
- Scientists collect and organize information about the natural world in an orderly way.
- Scientists propose explanations that are based on evidence, not belief.
- They test those explanations with more evidence.

Scientific Methodology: The Heart of Science Methodology for scientific investigation involves:

- Making an **observation**. Observation involves the act of noticing and describing events or processes in a careful, orderly way. Scientists use their observations to make inferences. An **inference** is a logical interpretation based on what scientists already know.
- Suggesting hypotheses. A **hypothesis** is a scientific explanation for a set of observations that can be tested in ways that support or reject it.
- Testing the hypothesis. Testing a hypothesis often involves designing an experiment. Whenever possible, a hypothesis should be tested by a **controlled experiment**—an experiment in which only one variable (the **independent variable**, or manipulated variable) is changed. The variable that can change in response to the independent variable is called the **dependent variable**, or responding variable. The **control group** is exposed to the same conditions as the experimental group except for one independent variable.
- Collecting, recording, and analyzing **data**, or information gathered during the experiment.
- Drawing conclusions based on data.

What Science Is and Is Not

1. What is science?

_____

_____

2.What are the goals of science?

_____

_____

Scientific Methodology: The Heart of Science

Questions 3–10 refer to spontaneous generation, the idea that life can arise from nonliving matter. Spontaneous generation was accepted by many in the scientific community up until the mid-nineteenth century. A series of simple experiments tested the validity of this idea.

3. Evidence used to support spontaneous generation was the observation that foods over time become covered in maggots or fungal and bacterial growth. The inference behind spontaneous generation is that there is no "parent" organism. Write this inference as a hypothesis using an if–then sentence that suggests a way of testing it.

_____

_____

4. In 1668, Francesco Redi proposed a different hypothesis to explain the specific example of maggots that appear on spoiled food. He had observed that maggots appear on meat a few days after flies have been seen on the food. He inferred that the flies had left behind eggs too small to see. Redi's experiment is shown below. What conclusion can you draw from Redi's experiment?

_____

_____

5. In the late 1700s, LazzaroSpallanzani designed a different experiment to show that life did not arise spontaneously from food. He inferred that some foods spoil because of growing populations of microorganisms. Fill in the information requested below.

Independent variable:

_____

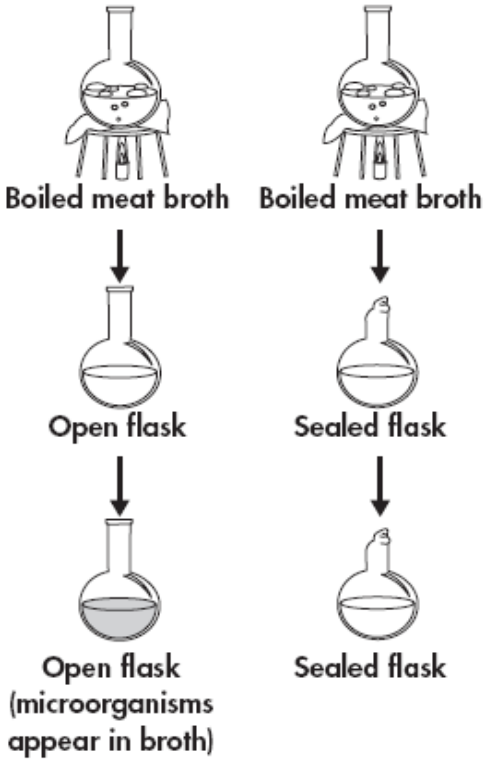
Dependent variable:

_____

Controlled variables (identify three):

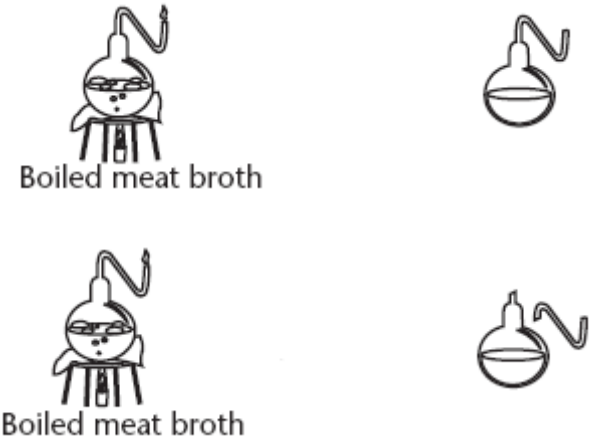
_____

_____



6. Critics of Spallanzini said that he showed only that organisms cannot live without air. In 1859 Louis Pasteur designed an experiment to address that criticism, an experiment that reproduced Spallanzani's results.

Draw in the third and final steps in the experiment. Use an arrow to show the path of travel of the microorganisms. Shade the broth in the flask(s) in which microorganisms grew.



7. How did Pasteur solve Spallanzani's problem of limiting exposure to air?

_____

_____

8. What purpose did boiling the meat broth serve in both the Spallanzani and Pasteur experiments?

_____

_____

9. How do the Redi, Spallanzani, and Pasteur experiments disprove the hypothesis you wrote in Question 3?

_____

_____

10. Today, we use a process of heating liquids to prevent spoiling by bacteria and other microorganisms, pioneered by one of the three scientists mentioned above. What is that process called and for what food it is used?

_____

1.2 Science in Context

Lesson Objectives

- Explain how scientific attitudes generate new ideas.
- Describe the importance of peer review.
- Explain what a scientific theory is.
- Explain the relationship between science and society.

Lesson Summary

Exploration and Discovery: Where Ideas Come From Scientific methodology is closely linked to exploration and discovery. Good scientists share scientific attitudes, or habits of mind, that lead them to exploration and discovery. New ideas are generated by curiosity, skepticism, open-mindedness, and creativity.

- Ideas for exploration can arise from practical problems.
- Discoveries in one field of science can lead to new technologies; the new technologies give rise to new questions for exploration.

Communicating Results: Reviewing and Sharing Ideas Communication and sharing of ideas are vital to modern science. Scientists share their findings with the scientific community by publishing articles that undergo peer review. In peer review, scientific papers are reviewed by anonymous, independent experts. Publishing peer-reviewed articles scientific journals allows scientists to

- share ideas.
- test and evaluate each other's work.

Once research has been published, it enters the dynamic marketplace of scientific ideas. New ideas fit into scientific understanding by leading to new hypotheses that must be independently confirmed by controlled experiments.

Scientific Theories In science, the word **theory** applies to a well-tested explanation that unifies a broad range of observations and hypotheses and that enables scientists to make accurate predictions about new situations.

- No theory is considered absolute truth.
- Science is always changing; as new evidence is uncovered, a theory may be reviewed or replaced by a more useful explanation.

Science and Society Using science involves understanding its context in society and its limitations. Understanding science

- helps people make decisions that also involve cultural customs, values, and ethical standards.
- can help people predict the consequences of their actions and plan the future.

Scientists strive to be objective, but when science is applied in society, it can be affected by **bias**, a point of view that is personal rather than scientific

Exploration and Discovery: Where Ideas Come From

1. Describe how new ideas are generated.

_____

2. How are science and technology related?

_____

_____

3. It took hundreds of years of discussion and the experiments of Louis Pasteur in the nineteenth century for the larger scientific community to accept that spontaneous generation of life was not a valid scientific concept. Referring to the diagram, describe how modern methods of communication have changed the scientific process.

_____

_____

_____

_____

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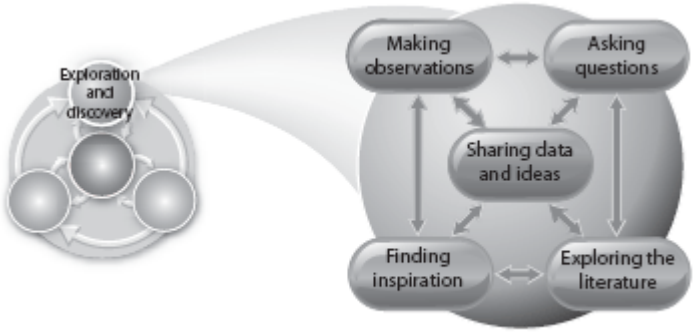


Adapted from *Understanding Science*, UC Berkeley, Museum of Paleontology

Communicating Results: Reviewing and Sharing Ideas

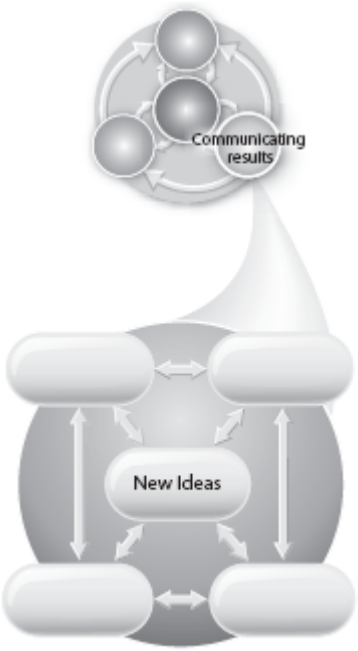
4. Use lesson concepts to complete the diagram to show the outcome of communication among scientists. Why are "New Ideas" placed at the center of the diagram?

_____

_____

5. Of the four types of communication you added, identify the one that is critical to ensuring communication among the scientific community.

_____



Adapted from *Understanding Science*, UC Berkeley, Museum of Paleontology

Scientific Theories

6. A typical dictionary will have different definitions for the word *theory*. It will include a definition that describes how scientists use the term, but it will also define *theory* as speculation, or an assumption, or a belief. Are these common definitions of *theory* synonyms (words similar in meaning) or antonyms (words opposite in meaning) to the definition of a scientific theory? Explain your thinking.

_____

_____

_____

_____

For Questions 7–11, identify whether each statement is a hypothesis or a theory. For a hypothesis, write an "H" on the line. For a theory, write a "T."

_____ **7.** The rate that grass grows is related to the amount of light it receives.

_____ **8.** All life is related and descended from a common ancestor.

_____ **9.** The universe began about 15 billion years ago.

_____ **10.** New tennis balls bounce higher than old tennis balls.

_____ **11.** Caffeine raises blood pressure.

Science and Society

12. How can bias affect the application of science in society? What role does a good understanding of science play in this phenomenon?

_____

_____

_____

_____

1.3 Studying Life

Lesson Objectives

- List the characteristics of living things.
- Identify the central themes of biology.
- Explain how life can be studied at different levels.
- Discuss the importance of a universal system of measurement.

Lesson Summary

Characteristics of Living Things

Biology is the study of life. Living things share these characteristics: They are made of cells and have a universal genetic code; they obtain and use materials and energy to grow and develop; they reproduce; they respond to signals in their environment (**stimuli**) and maintain a stable internal environment; they change over time.

Big Ideas in Biology

The study of biology revolves around several interlocking ideas:

- **Cellular basis of life**. Living things are made of cells.
- **Information and heredity.** Living things are based on a universal genetic code written in a molecule called **DNA**.
- **Matter and energy**. Life requires matter that provides raw material, nutrients, and energy. The combination of chemical reactions through which an organism builds up or breaks down materials is called **metabolism**.
- **Growth, development, and reproduction**. All living things reproduce. In **sexual reproduction**, cells from two parents unite to form the first cell of a new organism. In **asexual reproduction**, a single organism produces offspring identical to itself. Organisms grow and develop as they mature.
- **Homeostasis.** Living things maintain a relatively stable internal environment.
- **Evolution.** Taken as a group, living things evolve, linked to a common origin.
- **Structure and function.** Each major group of organisms has evolved structures that make particular functions possible.
- **Unity and diversity of life.** All living things are fundamentally similar at the molecular level.
- **Interdependence in nature.** All forms of life on Earth are connected into a **biosphere**—a living planet.
- **Science as a way of knowing.** Science is not a list of facts but "a way of knowing."

Fields of Biology

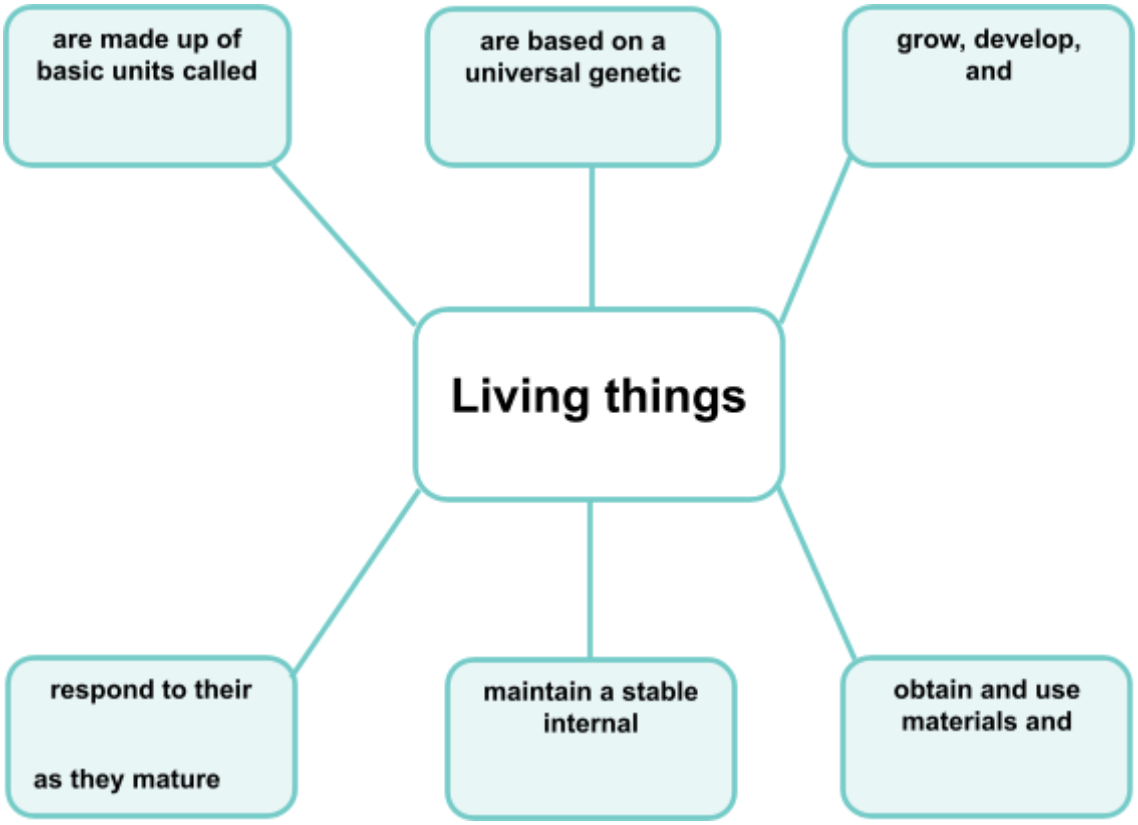
Biology includes many overlapping fields that use different tools to study life. These include biotechnology, global ecology, and molecular biology.

Performing Biological Investigations

Most scientists use the metric system as a way to share quantitative data. They are trained in safe laboratory procedures. To remain safe when you are doing investigations, the most important rule is to follow your teacher's instructions.

Characteristics of Living Things

1. Complete the graphic organizer to show the characteristics living things share.



2. The genetic molecule common to all living things is _____.

3. The internal process of _____ enables living things to survive changing conditions.

4. Living things are capable of responding to different types of _____.

5. Living things have a long history of _____ change.

6. The continuation of life depends of both _____ and _____.

7. The combination of chemical reactions that make up an organism's _____ help to organize raw materials into living matter.

Big Ideas in Biology

8. Complete the table of Big Ideas in Biology. The first row is filled in for you.

Big Idea	Description
Cellular basis of life	Living things are made of cells.
Information and heredity	
	Life requires matter that provides raw materials, nutrients, and energy.
Growth, development, and reproduction	
	Living things maintain a relatively stable internal environment.
Evolution	
	Each major group of organisms has evolved structures that make particular functions possible.
	All living things are fundamentally similar at the molecular level.
	All forms of life on Earth are connected into a biosphere—a living planet.
Science as a way of knowing	

9. Pick two of the big ideas from the chart and describe how the ideas interlock.

Fields of Biology

10. Biology is made up of many overlapping fields, each of which uses different tools to gather information about living things. Fill out the table below with information about two fields of biology—one that appeals to you, and one that does not. Include a description of each field and the tools scientists in the field use, as well as your impressions of each.

Field of Biology	Description of Field	Why It Does or Does Not Appeal to Me

Performing Biological Investigations

11. Describe the system of measurement most scientists use when collecting data and doing experiments.

12. Why do scientists need a common system of measurement?

13. What is the most important safety rule for you to follow in the laboratory?

Amoeba Sisters | Video Recap

NAME: _____

Amoeba Sisters Video Recap: General *Lab Safety*

The illustrations below involve one or more general lab safety concepts. For each illustration, write in any applicable lab safety concepts that could relate with that illustration.

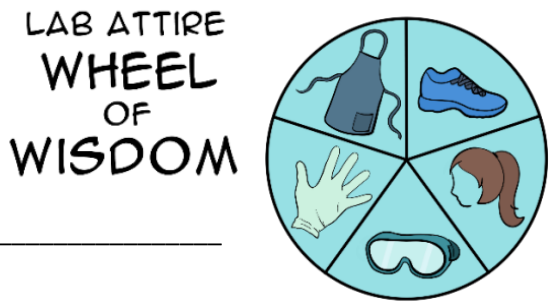
1. _____

_____

_____

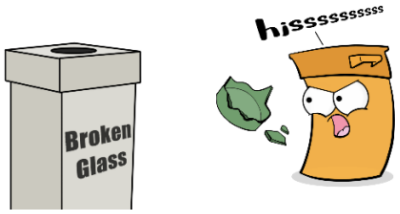
_____

_____



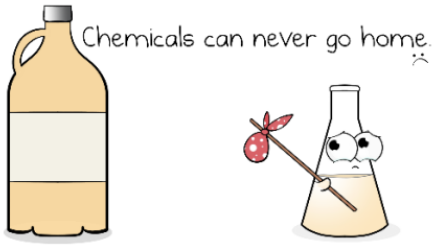
2. _____

_____



3. _____

_____



4. _____

_____

5. _____

_____

Heating it Up

In your own words, list safety guidelines that you would follow to be safe when heating this test tube.

6. _____

_____

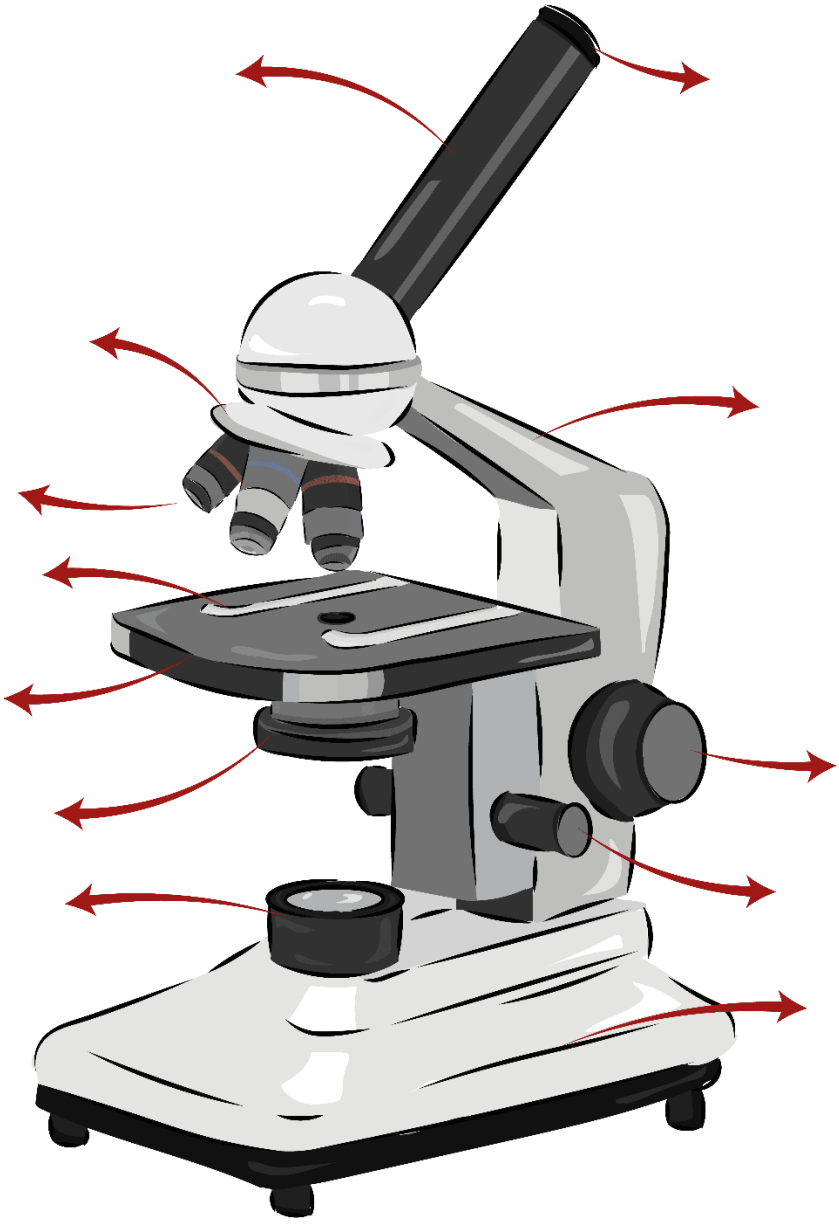
Locate the Safety Equipment in your Lab Room!

For the following items, write where they are found in *your* lab room. Depending on your course and the types of labs that you perform, some may not be applicable. If any are not applicable to your lab room, write N/A under location. <u>If there are other types of lab items or safety equipment that your instructor mentioned, you can add them to the bottom of this chart.</u>

Item/Equipment	What is it for?	Location?
Eyewash	7.	8.
Safety Shower	9.	10.
Aprons	11.	12.
Goggles	13.	14.
Fume Hood	15.	16.
Fire Extinguisher	17.	18.
Fire Blanket	19.	20.
Fire Exit Route Map	21.	22.
Container for Broken Glass	23.	24.
Biohazard Bag	25.	26.
Chemical Waste Disposal	27.	28.
Broom and Dustpan	29.	30.
First Aid Kit	31.	32.
MSDS/SDS	33.	34.
Phone	35.	36.

Name _____ Class Period _____ Date _____

Parts of a Microscope Worksheet



SmartSchoolSystems.com

SMARTSCHOOL systems

How to Conduct Credible Research

Task: Choose any topic that interests you and follow along with the guided notes on how to conduct research.

Clarify

What information are you looking for? Consider keywords, questions, synonyms, alternative phrases, etc.

1. Choose a topic (koalas, basketball, Mount Everest, etc). Write as many questions as you can think of relating to the topic.

2. Make a mindmap of the topic. Include what you already know about it, along with questions that you have, any and all information that can help you learn more about the topic.

Search

What are the best words you can type into the search engine to get the highest quality results?

1. Open Google in two tabs. In one search, type one or two keywords (Amazon Rainforest). In the other search, type in multiple relevant keywords (endangered animals Amazon Rainforest). Compare the results.

2. Explore how Google uses autocomplete to suggest searches quickly. Try it out using your topic. What are some of the suggestions Google gives you?

Delve

What search results should you click on and explore further?

1. Brainstorm a list of popular domains. Are any of these domains more reliable than others? Why might this be so?

2. Type a question relating to your topic into Google and look for the “People also ask” and “Searches related to…” sections. How could these be useful? When should you use them or ignore them? Is the information under these sections always the best?

Evaluate

Once you click on a link and land on a site, how do you know if it offers the information you need?

1. Using your selected topic, find a short article. Practice skim reading and notice what stands out to you.

2. Find two articles from different publications. Or find a news article and an opinion piece on the same topic. Make a Venn Diagram comparing similarities and differences. Do you find that there are any contradicting statements?

Cite

How can you write information in your own words (paraphrase or summarize), use direct quotes, and cite sources?

1. We have all heard that plagiarism is bad, but what exactly is plagiarism?

2. Two ways to avoid plagiarism include paraphrasing and summarizing. Give an example of both of these with a topic of your choice.

Staying Organized

Once you locate and distinguish the information you need, how do you keep track of it?

1. How can you keep the valuable information you find online organized as you go through the research process?

2. If you do not already know how to do a split screen on your chromebook, research it right now! It is a great resource to use when taking notes. Draw a star under this question once you have read it and tried it out on your chromebook!

Name: _____

Ice Cream Experimental Design Lab

Background Information Brainstorming:

1. Take a couple of minutes to find ONE background fact about ice cream. (think about things related to how it was first made, what types of ingredients, flavors, etc.) Write your fact down in the space below.

_____

_____

_____

_____

2. We will now take the next few minutes to talk with your groupmates and come up with your top 3 background facts to share with the class.

3. Once all groups have their top 3 picked we will create a master list of facts for the whole class. Use the space below to write down the facts in the master list so you can use them in your lab report later.

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

Introduction:

We are going to be making ice cream using salt and baggies. It will be up to you and your group to make a couple of decisions about how you want to set up your experiment, but first let's talk a little bit about how this process works. Ice must absorb energy in order to melt, changing the phase of water from a solid to a liquid. When you use ice to cool the ingredients for ice cream, the energy is absorbed from the ingredients and from the outside environment (like your hands, if you are holding the baggie of ice). **When you add salt to the ice, it lowers the freezing point of the ice, so even more energy must be absorbed from the environment in order for the ice to melt**. **This makes the ice colder** than it was before, which is how your ice cream freezes. Although you will be making ice cream in a group of 4-5, **each individual will be responsible for writing their own lab report to turn in**. We will talk more about this throughout the next few sections of this document.

Setting Up:

In this experiment you and your group will be designing your own lab procedure to test. Your group will select ONE of the following variables to focus on in your experiment. Once you have selected your variable you will need to come up with an Experimental Question and Hypothesis.

Type of milk:
-2% milk
-Whole milk (control)
-Chocolate milk
-Vanilla Almond milk
-Chocolate Almond milk

Mixing method:
-Gently knead
-Shake violently (control)
-Flip over and over
-Leave on table and push back and forth on sides
-Toss back and forth between group members (this option is a privilege, if you can't handle it, it will be removed from the list)

Experimental Question:

_____

_____

_____

_____

Hypothesis:

_____

_____

_____

_____

Our next task is to figure out what we will need in order to complete our experiments. Use the space below to write down the types of equipment and ingredients your group thinks you need. Think about items we have already talked about in this lab design.

Equipment:

_____

_____

_____

_____

_____

_____

_____

_____

Ingredients:

_____

_____

_____

_____

_____

_____

_____

_____

You and your group now need to determine what your procedural steps are going to be. A very basic outline of the lab steps will be provided on the screen at the front of the room. It will be up to your group to take those steps and expand on them to make them more detailed. Remember that a good lab procedure is written well enough that another group that has no prior knowledge of the lab could come in, perform it and get the same results that your group gets. In other words, DO NOT just write what is on the screen and say that's good enough. I will be checking your steps for more detail and specifics. Use the space below to write your steps.

Procedure:

Throughout your experiment you will also need to be collecting some sort of data in order to actually answer your question and test your hypothesis. Every group will have to be collecting data on the time it takes to create your ice cream, which we know will be Quantitative data. Your group also needs to come up with a few other points of Qualitative data that you can collect. Use the table below as an example of how you can set up your data collection in your lab report.

Data Collection:

Time	Qualitative Data

Data Analysis:

In this section of your report you will need to provide an evaluation of your data. Describe what you saw throughout the experiment and compare it to what happened in the control group. This should be a 3-5 sentence paragraph in your final lab report.

Conclusion:

In this section of your report you will need to provide a summary of your entire experiment. Start with reintroducing the experiment and explaining your question and hypothesis. Then move into discussing how your group performed the experiment. Finally, summarize your results and state whether your hypothesis was supported or not. This is also the point where, if you had any, you would make comments about any complications your group came across throughout the experiment and how they may have changed your results. If you did have a complication, also describe how it could be resolved in the future of the experiment. End with a closing statement about the experiment in general and how it went for you and your group.

Lesson Review Questions

Lesson 1.1: What is Science?

1. _____
2. _____
3. _____
4. _____
5. _____

Lesson 1.2: Science in Context

1. _____
2. _____
3. _____
4. _____
5. _____

Lesson 1.3: Studying Life

1. _____
2. _____
3. _____
4. _____
5. _____

Ag Biology

Semester 1

Chapter 2 Workbook: Broilers & Biomolecules

Name: _____ Date: _____

Class Period: _____ Teacher: _____

Table of Contents

Chapter 2: Broilers & Biomolecules

27.1 Feeding and Digestion

Lesson Objectives

- Describe the different ways animals get food.
- Explain how digestion occurs in different animals.
- Describe how mouthparts are adapted for an animal's diet.

Lesson Summary

Obtaining Food Animals obtain food in different ways.

- Most filter feeders catch algae and small animals by using modified gills or other structures as nets that filter food items out of water.
- Detritivores feed on detritus, or decaying bits of plant and animal material. Detritivores often obtain extra nutrients from the bacteria, algae, and other microorganisms that grow on and around the detritus.
- Carnivores eat other animals.
- Herbivores eat plants or parts of plants in terrestrial and aquatic habitats.
- Many animals rely upon symbiosis for their nutritional needs. Parasites live within or on a host organism, where they feed on tissues or on blood and other body fluids. In mutualistic relationships, both participants benefit.

Processing Food Some invertebrates break down food primarily by intracellular digestion, but many animals use extracellular digestion to break down food.

- In **intracellular digestion**, food is digested inside specialized cells that pass nutrients to other cells by diffusion.
- In **extracellular digestion**, food is broken down outside cells in a digestive system and then absorbed.
  - Some invertebrates, such as cnidarians, have a **gastrovascular cavity** with a single opening through which they both ingest food and expel wastes.
  - Many invertebrates and all vertebrates, such as birds, digest food in a tube called a **digestive tract**, which has two openings: a mouth and an anus. Food travels in one direction through the digestive tract.

Specializations for Different Diets The mouthparts and digestive systems of animals have evolved many adaptations to the physical and chemical characteristics of different foods.

- Carnivores typically have sharp mouthparts or other structures that can capture food, hold it, and "slice and dice" it into small pieces.
- Herbivores typically have mouthparts adapted to rasping or grinding.
- Some animals have specialized digestive organs that help them break down certain foods. For example, cattle have a pouch like extension of their stomach called a **rumen**, in which symbiotic bacteria digest cellulose.

Obtaining Food

1. Complete the table about types of feeders.

Types of Feeders	
Type of Feeder	**Description**
Filter feeder	
	feeds on decaying bits of plant and animal material
Carnivore	
	eats plants or parts of plants
Parasitic symbionts	
Mutualistic symbionts	

2. Explain the difference between a parasite and a host.

_____

_____

3. Give an example of a mutualistic relationship involving a nutritional symbiont.

_____

_____

_____

Processing Food

4. How is the digestion of food different in simple animals compared with more complex animals?

_____

_____

_____

_____

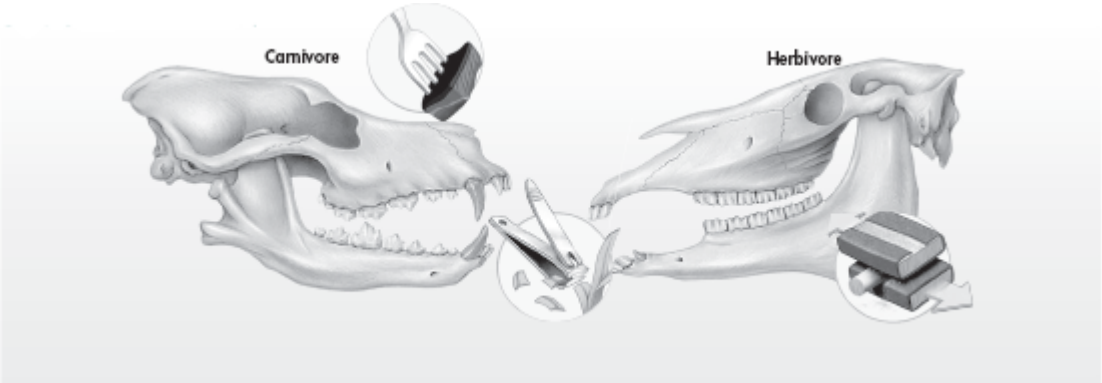
5. How is a one-way digestive track like a “disassembly line”?

_____

_____

Specializations for Different Diets

6.



The visual analogy compares different types of teeth with common tools. Complete the table about the different kinds of teeth found in mammals and the tools they are like.

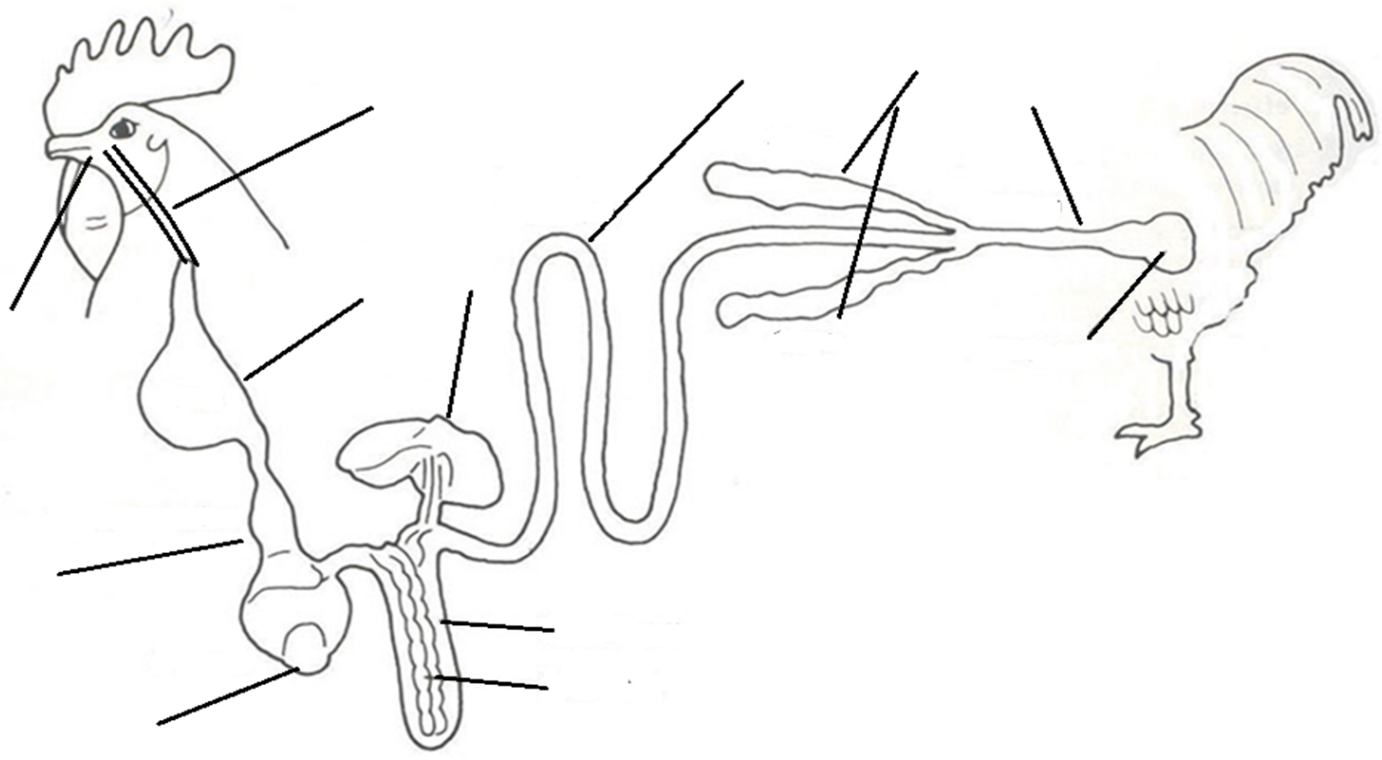
Teeth Adaptations in Mammals		
Type of Teeth	**Description**	**Tool Analogy**
Canines		
	chisel-like teeth used for cutting, gnawing, and grooming	
Molars		

7. Explain whether organisms with a gastrovascular cavity or organisms with a digestive tract obtain and process nutrients more efficiently.

Avian Digestion Notes

Directions: Label the diagram below with the following terms:

- Esophagus
- Ceca
- Vent
- Cloaca
- Small intestine
- Proventriculus
- Liver
- Crop
- Large Intestine
- Gizzard



27.2 Respiration

Lesson Objectives

- Describe the characteristics of respiratory structures that all animals share.
- Explain how aquatic animals breathe.
- Identify the respiratory structures that enable land animals to breathe.

Lesson Summary

Gas Exchange Animals have evolved respiratory structures that promote the movement of oxygen and carbon dioxide in the required directions by passive diffusion.

- Gases diffuse most efficiently across a thin, moist membrane.
- Respiratory structures maintain a difference in concentrations of oxygen and carbon dioxide on either side of the respiratory membrane, promoting diffusion.

Respiratory Surfaces of Aquatic Animals Many aquatic invertebrates and most aquatic chordates, other than reptiles and mammals, exchange gases through gills.

- **Gills** are feathery structures that expose a large surface area of thin, selectively permeable membrane to water.
- Aquatic reptiles and aquatic mammals, such as whales, breathe with **lungs**, organs that exchange oxygen and carbon dioxide, and must hold their breath underwater.

Respiratory Surfaces of Terrestrial Animals Terrestrial animals must keep their respiratory membranes moist in dry environments.

- Respiratory structures in terrestrial invertebrates include skin, mantle cavities, book lungs, and tracheal tubes.
- All terrestrial vertebrates breathe with lungs.
  - In mammalian lungs, **alveoli** provide a large surface for gas exchange.
  - In birds, a unique system of tubes and air sacs enables one-way airflow.

Gas Exchange

For Questions 1–5, write True if the statement is true. If the statement is false, change the underlined word or words to make the statement true.

_____ **1.** In respiratory systems, gas exchange occurs through <u>active</u> diffusion.

_____ **2.** Substances diffuse from an area of <u>higher concentration</u> to an area of lower concentration.

_____ **3.** Gases diffuse most efficiently across thin, <u>dry</u> surfaces.

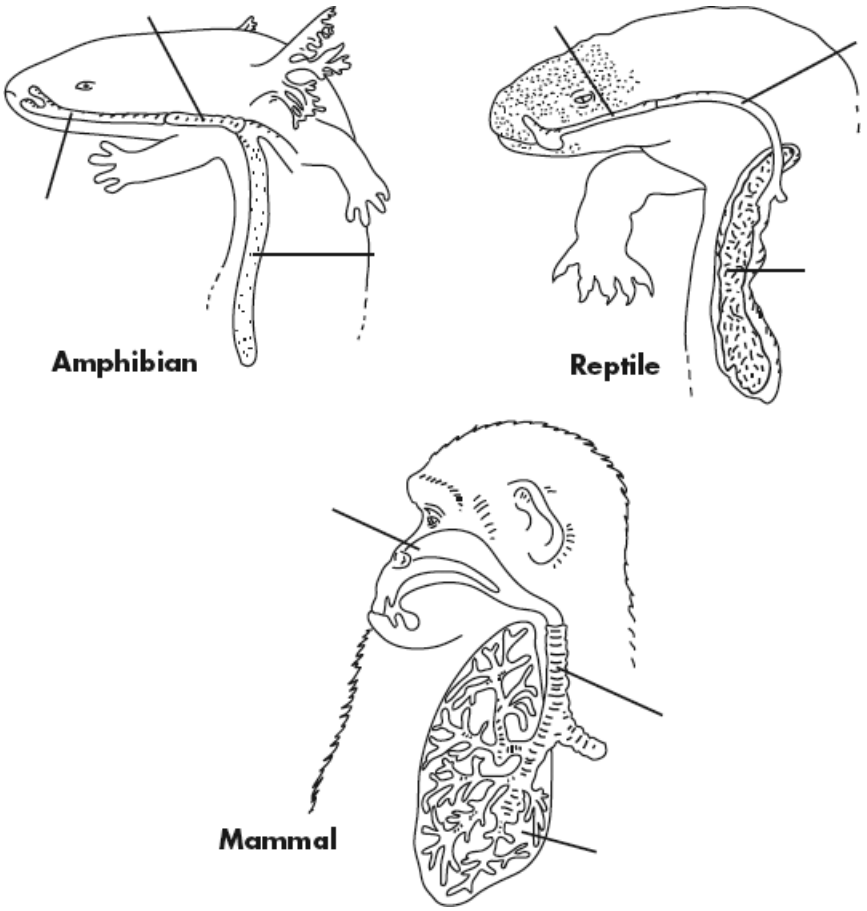
_____ **4.** Respiratory structures have a <u>selectively permeable</u> membrane.

_____ **5.** Respiratory structures maintain a difference in the relative concentrations of oxygen and <u>nitrogen</u> on either side of the membrane.

6. Respiratory organs have large surface areas. How is this an advantage to an animal?

7. Respiratory surfaces are moist. How does this enable respiration to take place?

8. Label the nostrils, mouth, and throat; trachea; and lungs of the animals below.



9. Describe the basic process of breathing among land vertebrates.

10. Why are the lungs of birds more efficient than those of most other animals?

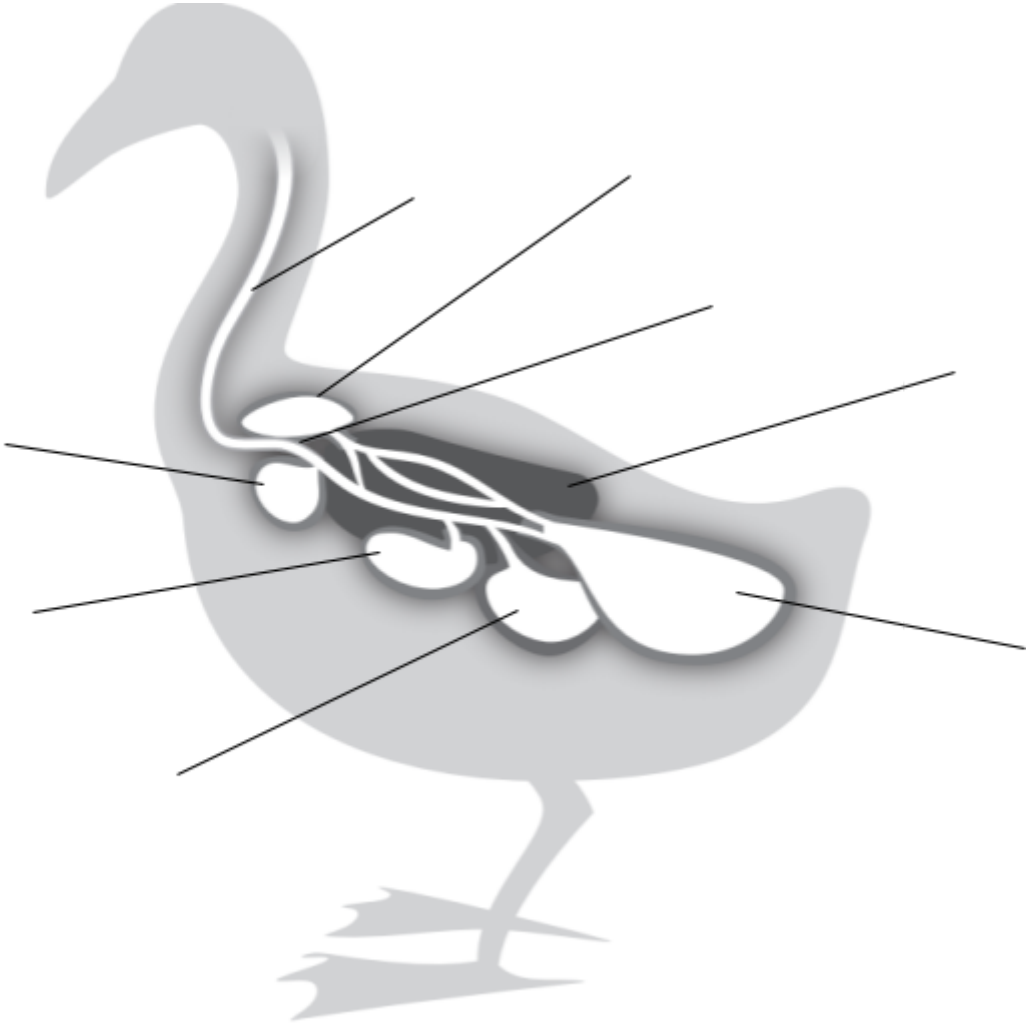
11. Compare the structure and function of fish gills with the structure and function of bird lungs.

Avian Respiration Notes

Directions: Label and color the parts of the respiratory system of the bird as described below:

Avian Respiratory System:

- ☐ Lungs - Red
- ☐ Syrinx - Purple
- ☐ Cervical air sac - Brown
- ☐ Anterior thoracic air sac - Yellow
- ☐ Trachea - Pink
- ☐ Interclavicular air sac - Green
- ☐ Abdominal air sac - Orange
- ☐ Posterior thoracic air sac - Blue



2.3 Carbon Compounds

Lesson Objectives

- Describe the unique qualities of carbon.
- Describe the structures and functions of each of the four groups of macromolecules.

Lesson Summary

The Chemistry of Carbon Organic chemistry is the study of compounds with bonds between carbon atoms. Carbon atoms have four valence electrons, allowing them to form strong covalent bonds with many other elements, including hydrogen, oxygen, phosphorus, sulfur, and nitrogen. Living organisms are made up of molecules made of carbon and these other elements.

- One carbon atom can bond to another to form chains and rings.
- Carbon can form millions of different large and complex structures.

Macromolecules Many of the carbon molecules in living things are so large they are called macromolecules. Macromolecules form by polymerization, in which smaller units called **monomers** join together to form **polymers.** Biochemists sort the macromolecules in living things into groups based on their chemical composition.

- **Carbohydrates** (starches and sugars) are composed of carbon, hydrogen, and oxygen. Carbohydrates are the main energy source for living things. Plants and some animals also use carbohydrates for structural purposes. Molecules with one sugar monomer are **monosaccharides.** A disaccharide is made of two monosaccharides.
- **Lipids** (fats, oils, and waxes) are made mostly of carbon and hydrogen atoms. Lipids can be used to store energy and form parts of biological membranes and waterproof coverings. Steroids manufactured by the body are lipids as well.
- **Nucleic acids** contain hydrogen, oxygen, nitrogen, carbon, and phosphorus. They are polymers of **nucleotides.** A nucleotide has three parts: a 5-carbon sugar, a phosphate ($–PO_4$) group, and a nitrogenous base. Nucleic acids store and transmit hereditary (genetic) information. There are two kinds of nucleic acids: DNA (deoxyribonucleic acid) and RNA (ribonucleic acid).
- **Proteins** are made up of nitrogen, carbon, hydrogen, and oxygen. Proteins are polymers of **amino acids.** An amino acid molecule has an amino group ($–NH_2$) on one end and a carboxyl group (–COOH) on the other end. Proteins control the rate of reactions, regulate cell processes, form cellular structures, carry substances into or out of cells, and help fight disease.
  - More than 20 different amino acids are found in nature. Any amino acid can bond with any other.
  - Covalent bonds called peptide bonds link amino acids together to form a polypeptide.
  - Amino acids are assembled into polypeptide chains according to instructions coded in DNA.

The Chemistry of Carbon

1. How many valence electrons does each carbon atom have?

_____

2. What gives carbon the ability to form chains that are almost unlimited in length?

_____

Macromolecules

For Questions 3–5, complete each statement by writing the correct word or words.

3. Many of the molecules in living cells are so large they are called _____.

4. _____is the process that forms large organic molecules.

5. When two or more _____ join together, a polymer forms.

6. Create a table in which you compare the components and functions of the following macromolecules: carbohydrates, lipids, nucleic acids, and proteins**.**

	Carbohydrates	Lipids	Nucleic Acids	Proteins
Components				
Functions				

7. How did organic compounds get their name? How is the word related to its meaning?

_____

_____

_____

Biomolecules Edpuzzle Notes

1. Which foods are heavy in Carbohydrates?

2. The main function of Carbohydrates is to provide _____.

3. Which are examples of foods high in Lipids?

4. What is the primary function of Lipids?

5. The principal components of the Cell Membrane are Lipids: True or False?

6. Examples of foods high in Proteins are _____ and _____.

7. What are some functions of Proteins?

8. What do Nucleic Acids include?

9. You eat DNA of other organisms: True or False?

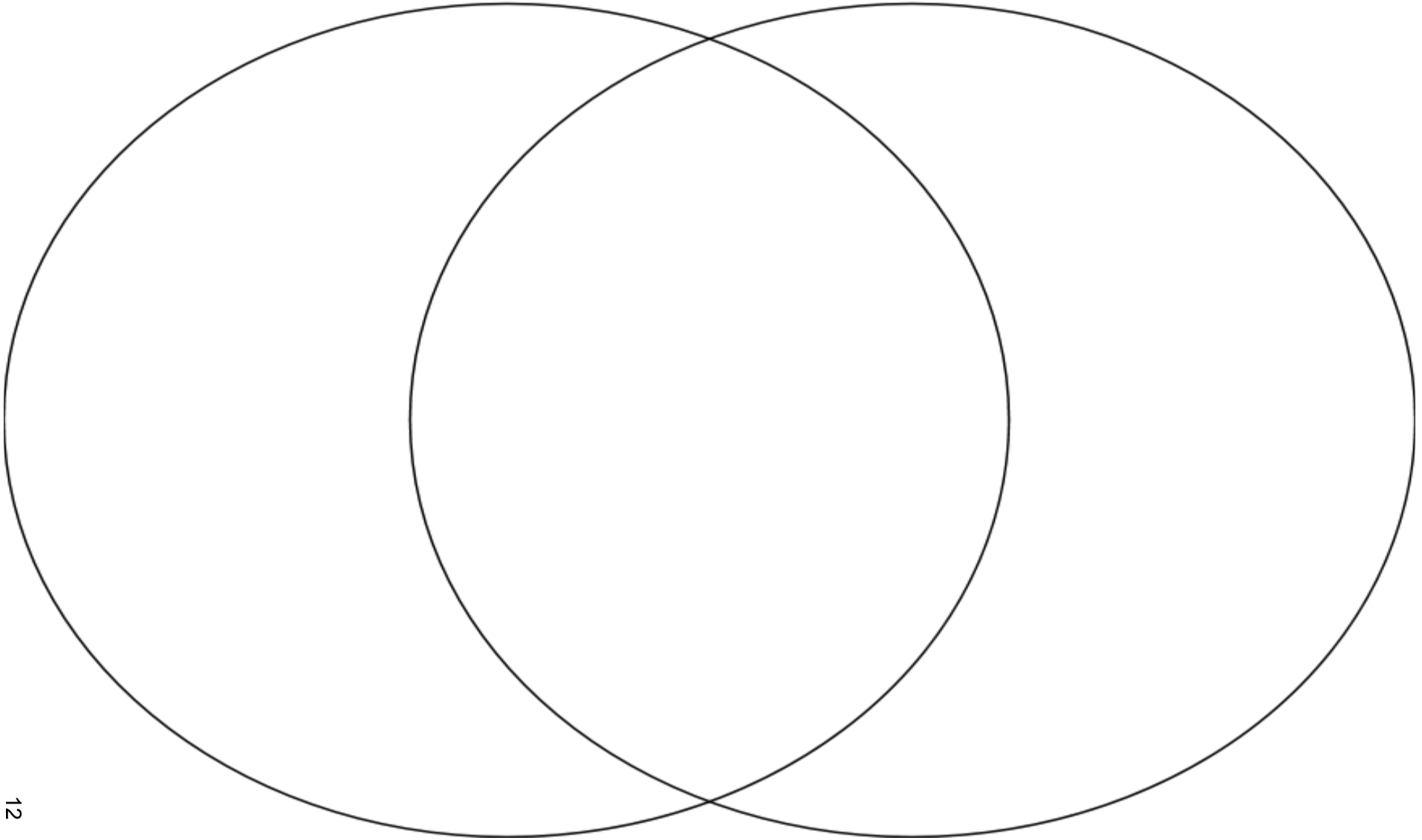
10. What three elements are in ALL biomolecules?

11. What biomolecules are made up of only CHO?

12. Which biomolecule is made up of CHONP?

13. Every biomolecule featured in this video contains what element?

Food & Feed Label Comparison



Name:

Components of a Feed Tag

Learning Objectives

1. Students will identify and evaluate a feed ration based on its feed tag.
2. Students will apply prior knowledge of nutrition to make informed decisions on small animal nutrition issues.

Definitions

- Crude Fiber: The cellulosic material obtained as a residue of chemical analysis of vegetative substances. Primarily composed of lignin.

- Crude Protein: A mixture of true protein and non-protein nitrogen in a feedstuff. It is an indicator of the capacity of the feed to meet an animal's protein needs.

- Dry Matter Basis: The amount of dry matter in a feed. Used to compare nutrient composition in rations by eliminating moisture content in feeds.

- Fat: One of the six main classes of nutrients. Needed for overall animal health.

- Fiber: One of the six main classes of nutrients. Found in plant cell walls.

- Guaranteed Analysis: The amount of a nutrient that is guaranteed to be in a feed. Feeds may contain more than the guaranteed analysis (minimum guaranteed) or less than the guaranteed analysis (maximum guaranteed).

- Moisture: Water in a feed. Must be removed mathematically in order to compare different feeds.

- Protein: One of the six main classes of nutrients. Composed of amino acids and used as structural components such as muscle, hair and other tissues.

- Total Digestible Nutrient: The energy value of a feedstuff.

Step 1:
Pick out a feed tag from the given supplies. Try finding one that you might use in your 'real life' outside of the classroom.

Step 2:
Locate the "Guaranteed Analysis" table on the feed tag. Record the guaranteed analysis of your own feed in the following table and answer the questions that follow.

Nutrient	Amount (units)
Ex: Crude Protein	*42.0%*

Answer the following questions:

1. **What does "Guaranteed Analysis" mean in terms of specific amounts of nutrients in a feed?**

2. **Why might some nutrients have a minimum guaranteed analysis while other nutrients have a maximum guaranteed analysis?**

Step 3:
Determine the composition of the feed on a dry matter basis.

Why would we want to know the composition of the feed on a dry matter basis rather than by including moisture?

To do this, first subtract the percentage of moisture from 100 (total percentage)
100% - 5% Moisture = _____% Dry Matter

Next, convert the protein, fat and fiber percentages to a dry matter basis.
To do this, divide the percentages of protein, fat and fiber by the percentage of dry matter (previous calculation)

_____% Protein / _____% Dry Matter = _____ % Protein on a Dry Matter Basis

_____% Fat / _____% Dry Matter = _____% Fat on a Dry Matter Basis

_____% Fiber / _____% Dry Matter = _____% Fiber on a Dry Matter Basis

Answer the following questions:

1. **Why is the percentage of protein, fat and fiber different on a dry matter basis than what is shown on the feed tag?**

2. **How could the guaranteed analysis potentially mislead consumers who don't convert the composition of the feed to a dry matter basis?**

Step 4:
Identify major ingredients in your feed.
All feeds are made of component ingredients. In any labeling of animal feed or human food, the ingredients are listed by total weight in the feed. The ingredient that makes up most of the feed's weight is listed first in the list.

Does the order of the ingredients on the label matter? Why or why not?

List the top five ingredients by weight in your feed:

1. _____
2. _____
3. _____
4. _____
5. _____

Answer the following questions:

1. **Why is it important to know what ingredients are in a feed ration?**

Pen Name Competition

We need to name our pen of chickens for the Broiler Contest. We will be competing against schools all across the state and we want to be able to stand out instead of just being “Montague Ag Bio 6”. Now that being said, we need to be creative, but school appropriate with the names we come up with. “The Chicken Nuggets” has been used a million times, we need to come up with something better than that. We will follow the directions below to figure out our class name!

1. First, spend 5 minutes individually coming up with a list of ideas for names.

---

2. Now that you are in your groups, you and the other members need to:
    a. Decide on a name
    b. Come up with a motto/slogan
    c. Come up with some sort of design for their rough draft poster. You can use the space below to create your rough idea of your poster design

Keep in mind that this is a competition between groups, we will be voting on the winning poster after you pitch them to the whole class

THIS IS A PAGE SAVER FOR THE CHORE LIST GROUPS AND AGENDA

THIS DOCUMENT WILL NEED TO BE ADDED ONCE WE HAVE THE GROUPS FORMULATED DURING THE SEMESTER.
IT WILL BE A ONE PAGE DOCUMENT

Adding a Project:

Log into AET
Click on “Journal”
Click on “Project/Experience Manager”
Click “Add New”
Name the project: Broiler Project
Select “School Based”
Select “Foundational”
Primary Experience Category: “Animal Systems”
Primary Subcategory: “Poultry”
Hit save, your screen should exit back out and you should see a red bar across the screen

Click on the pencil icon
Fill in each tab with the information below:

Description:
-My interest and motivation for this project is to learn about biological systems through raising broiler chickens.
-My project will start on Wednesday, September 28th and end on November 2-4.
-My project goals are (1) raise healthy birds, (2) learn how to properly care for an animal, and (3) practice recordkeeping.
-My project will be evaluated/supervised by (Your teacher's name).
-In terms of project safety, important areas of safety include washing hands before and after handling birds, checking heat lamp temperature before handling, and properly disposing of waste (chicken bedding).

Time Investment:
-I will spend 5 hours per week in classroom and hands-on activities.
-My project time varies from month to month, but common activities are feeding and watering, changing bedding, recordkeeping, and supplemental classroom activities.

Financial Investment:
-I will have no financial investment into this project.

Learning Objectives:
Hit the green plus sign that says “Add/Explore Skill Areas”
Add the following skills:
AS.02.01, AS.02.02, AS.03.01, AS.03.02
Hit “Save & Back to SAE Plan” at the top of the screen
For each skill area you will need to write a one sentence summary of how you will demonstrate this in the box provided. Below are some examples of what you can write.

AS.02.01: Every day we will check on the birds to ensure that they are well fed, watered and healthy.
AS.02.02: We will be recording all of the products that our birds consume and be cautious about biosecurity measures including washing our hands.
AS.03.01: We will be starting the birds off with a 27% protein feed for a growth boost while they're young, then moving down to a 20% protein feed to avoid health issues.
AS.03.02: Every day we will determine the health of our birds and how much feed we should give them. We will be sure to record this in our reports.

For Reflections:

-Go under "Time in your AET Projects/Experiences"
-Select Broiler Project
-Select 5 mins for the time (this is the approximate time it takes to write the reflection)

Tri County Feed Reflection:
Set date to 9/27 (date of field trip)
Skill Area: AS.03.01
Description:
What did you already know about animal feed before going on this field trip?

What was the most shocking or interesting thing you learned at Tri County?

Do you think our food is created in a similar way/environment? Why or why not?

Chick Day Reflection:
Set date to 9/28 (date of chick day)
Skill Area: AS.02.01
Description:
What was something you didn't realize about chicks when it comes to handling them?

Why do you think it is important to take extra caution to wash your hands before and after holding them?

Why did we have to dip their beaks into water when we went out to the barn?

What was your favorite part about the chicks?

What is one question you have related to the Broiler Project?

Week 2 Update:
Use today's date (10/12)
Skill Area: AS.02.01
Description:
Feed Program

1. Where did the feed come from? (Elevator, feed store, home grown, etc.)
2. What brand of feed was used?
3. What is the percent of protein, fat and fiber of all feeds used?
4. Briefly describe any supplements, vitamins, minerals or any water supplements used and why any changes might have been made to your feed program.

Week 2 Update:
Use today's date (10/12)
Skill Area: AS.02.01
Description:
Ventilation, Temperature, and Litter Condition

1. Describe the type of ventilation system that was used?
2. What was the beginning temperature in the pen and was it adjusted as the birds grew? If so, how?
3. What type of litter was used and how was the litter managed?

Week 2 Update:
Use today's date (10/12)
Skill Area: AS.02.01
Description:
House & Equipment Description

1. Describe the house (coop) and how was the equipment set-up in it? Please remember to attach a diagram with the beginning and ending coop set-up along with dimensions.
2. What heat source did you have?
3. What size or type of feeders did you use? How many were used?
4. What size or type of waterers did you use? How many were used?

Week 3 Update:
Use today's date (10/20)
Skill Area: AS.02.01
Description:
General Management Description

1. What steps were taken to clean and prepare the house and equipment prior to the chick's arrival?
2. Were the feeders and waterers adjusted as the birds grew? If so, how were they adjusted?
3. How were sick birds identified and managed?

Final Reflection:
Use today's date (11/7)
Skill Area: CRP.01.01
Description:

1. Knowing what you know now about the broiler contest, what would you adjust if you were to do this again in the future?
2. What was the most surprising thing that you learned when it came to feed and water consumption?
3. What trends did you notice throughout the project with feed and water consumption?
4. What's your prediction for our class's results? (Hint: maybe chat with the people who went to the contest and had the opportunity to see other people's birds)
5. In this farm to table project, what do you think the benefit is of knowing exactly where your food comes from?
6. Would you be interested in trying to raise birds at home? Explain why or why not.

Making Models of Macromolecules

Introduction

A small number of elements make up most of the mass of your body. Two of these elements are oxygen and hydrogen, which are the elements in water. Add carbon to hydrogen and oxygen and you have the three elements in carbohydrates. Add nitrogen and sulfur, and you have the five elements in amino acids.

Each carbon atom can form four bonds with other atoms. This property allows carbon to form the long chains or rings that are the backbone of all large biological molecules. Most of these large molecules are polymers, which are built up from smaller units called monomers.

In this lab, you will make models of three carbohydrates—glucose, maltose, and starch. Then, you will make models of two amino acid molecules. Finally, you will join the amino acid molecules together to model a peptide bond and a polypeptide chain.

Pre-Lab Questions

1. Review What do the lines in a structural formula represent? What does it mean when there are two lines between atoms in a structural formula?

_____

_____

2. Use Models In your molecular model set, what do the balls or beads represent? What do the sticks or tubes represent?

_____

_____

_____

3. Infer Why do you need models to visualize the structure of molecules?

_____

_____

_____

Procedure

In most molecular model kits the "atoms" are color coded as follows: black for carbon, blue for nitrogen, red for oxygen, and white for hydrogen.

Part A: Models of Carbohydrates

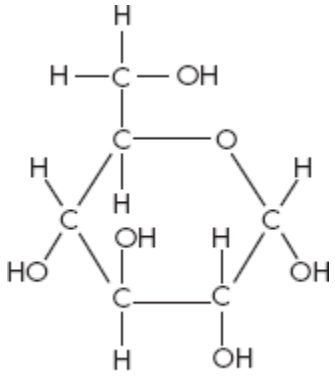
Most organisms rely on carbohydrates for their main source of energy. Carbohydrates include simple sugars and their polymers.

1. Glucose is a simple sugar, or monosaccharide, which means that it is a sugar with only one ring. Use the structural formula in Figure 1 to make a model of glucose. Start by joining the atoms in the ring. Then, attach the rest of the carbon and oxygen atoms.

2. Complete the model by adding a hydrogen atom to every unfilled bonding site. Check your work

against the formula in Figure 1.

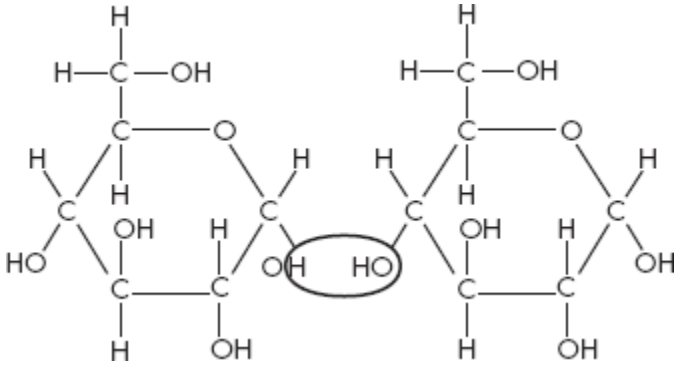
Figure 1 A simple sugar



Glucose

3. Work with another group to make a model of a disaccharide, or two-ring sugar. Place your glucose models side by side as shown in Figure 2 on the next page. Remove the atoms that are circled in the formula. Use the atoms you remove to form a water molecule. A reaction in which water is removed from the reacting molecules is a *dehydration* reaction.

Figure 2 Glucose molecules side by side

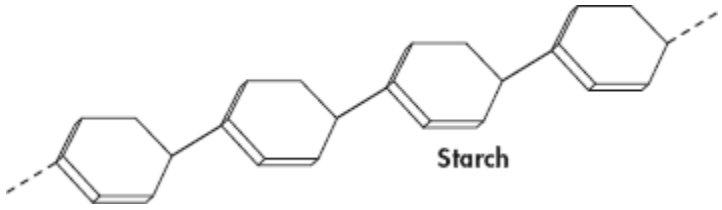


4. Join the glucose molecules by forming a bond between the oxygen atom on the left and the carbon atom on the right. You have made a model of the disaccharide maltose. Draw the structural formula for maltose in the space below.

Structural Formula for Maltose

5. You will need to work with another pair of groups to make the model of starch shown in Figure 3. Combine your maltose molecules in the same way you combined the glucose molecules in Steps 3 and 4.

Figure 3 Structural formula for starch



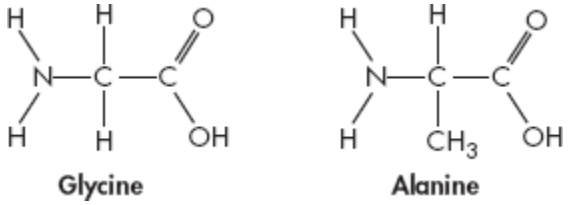
Part B: Models of Proteins

Proteins control the rate of reactions in cells. They are also the building blocks for many cellular structures. Proteins consist of long chains of amino acids folded into complex shapes. All amino acids have an amino group ($-NH_2$) and a carboxyl group (-COOH). What distinguishes one amino acid from another are the R-groups, or side chains.

6. Using the formula in Figure 4, construct a molecule of the simplest amino acid, glycine.

7. Make a second glycine molecule. Remove one of the hydrogen atoms from the carbon that is bonded to the nitrogen. Replace the hydrogen atom with a carbon atom that has three hydrogen atoms bonded to it. Check your work against the formula for alanine in Figure 4.

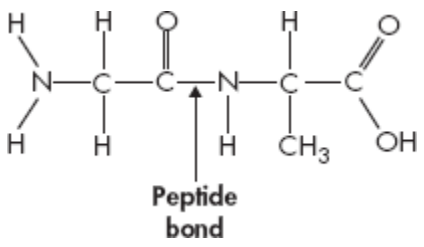
Figure 4 Structural formulas for two amino acids



8. Place the amino acid models side by side with the glycine model to the left of the alanine model. Remove the OH from glycine's carboxyl group and one hydrogen atom from alanine's amino group. Connect the carbon on glycine to the nitrogen on alanine to form a peptide bond. Check your work against Figure 5.

9. Work with another group to make a model of a polypeptide. Apply the instructions from Step 8 for forming a peptide bond.

Figure 5 Peptide bond between glycine and alanine



Analyze and Conclude

1. Draw Conclusions How many bonds can carbon, nitrogen, oxygen, and hydrogen atoms form?

2. Compare and Contrast What can you learn from your models that you cannot learn by looking at structural formulas?

3. Evaluate What could you do to your models of starch and of a polypeptide chain in a protein to make them more accurate?

4. Infer There are thousands of proteins in a human cell, but only about 20 different amino acids. Explain how so few building blocks can be used to make so many different proteins.

5. Infer When starch is digested, the bonds between the monomers in the starch molecule are broken. The breakdown of starch is an example of a hydrolysis reaction. What is a hydrolysis reaction? *Hint:* What atoms are needed to complete each broken bond between monomers?

Macromolecules Meal Project

We have been studying and talking about Carbohydrates, Lipids, Proteins and Nucleic Acids in class. We have completed labs looking at the structures of each of them and how they interact with our bodies. Our next step to end this unit on macromolecules is to create a project where we will demonstrate our use of each molecule through food items over a three day period. Follow the instructions below to complete this project.

1. Define each type of macromolecule:
   Carbohydrates: _____

   _____

   Lipids: _____

   _____

   Proteins: _____

   _____

   Nucleic Acids: _____

   _____

2. Each type of macromolecule structural formula needs to be on your poster, be sure to familiarize yourself with the structures.
   Carbohydrates (One Glucose)
   Lipids (One Unsaturated Fat)
   Proteins (One Alanine)
   Nucleic Acids (One Nucleotide: Phosphate Group, Sugar, Nitrogenous Base)

3. Choose a restaurant (it can be a fast food restaurant or a sit down restaurant)

4. Find their menu and select 4 FULL meals from it

   Meal 1: _____

   Meal 2: _____

   Meal 3: _____

   Meal 4: _____

5. Determine where each macromolecule is found within the meal

Meal 1:

Carbohydrates: _____

Lipids: _____

Proteins: _____

Nucleic Acids: _____

Meal 2:

Carbohydrates: _____

Lipids: _____

Proteins: _____

Nucleic Acids: _____

Meal 3:

Carbohydrates: _____

Lipids: _____

Proteins: _____

Nucleic Acids: _____

Meal 4:

Carbohydrates: _____

Lipids: _____

Proteins: _____

Nucleic Acids: _____

6. For each Carbohydrate macromolecule, describe if you think this would be a good source of “Carbo Loading” before an athletic event.

7. For each Lipid macromolecule, describe whether it is Unsaturated, Saturated or Trans Fat.

8. For each Protein macromolecule, describe what kind of function you think it is doing for your body (ex. Regulating cell processes, building muscle, etc.).

9. For each Nucleic Acid macromolecule, describe the process of how this source of Nucleic Acid came from its “living” state to your plate.

10. Using all of the information you found on this sheet, create a poster that is creative, colorful and neat.

Grading Rubric:

Description	Points Possible	Points Earned
- Have all four macromolecules - Defining all four macromolecules	4 4	
- Have structure for all four - Have accurate structure for each	4 4	
- Restaurant - Have four different meals - Have four FULL meals	2 4 4	
- Connection to “Carbo Loading” for each Carbohydrate macromolecule	4	
- Correct form of lipid identified for each Lipid molecule	4	
- Explanation of function for each Protein macromolecule	4	
- Description for each Nucleic Acid from its “living” state to your plate	4	
- Use of creativity, color, and overall neatness of the poster	8	
Total Grade	50	

Lesson Review Questions

Lesson 27.1: Feeding and Digestion

1. _____
2. _____
3. _____
4. _____
5. _____

Lesson 27.2: Respiration

1. _____
2. _____
3. _____
4. _____
5. _____

Lesson 2.3: Carbon Compounds

1. _____
2. _____
3. _____
4. _____
5. _____

Ag Biology

Semester 1

Chapter 7 Workbook:
Cell Structure & Function

Name: _____ Date: _____

Class Period: _____ Teacher: _____

Table of Contents

Chapter 7: Cell Structure & Function

7.1 Life Is Cellular

Lesson Objectives

- State the cell theory.
- Describe how the different types of microscopes work.
- Distinguish between prokaryotes and eukaryotes.

Lesson Summary

The Discovery of the Cell The invention of the microscope in the 1600s enabled researchers to see cells for the first time.

- Robert Hooke named the empty chambers he observed in cork "cells."
- Anton van Leeuwenhoek was the first to observe living microorganisms.
- **Cells** are the basic units of life.
- Discoveries by German scientists Schleiden, Schwann, and Virchow led to the development of the **cell theory,** which states:
  - All living things are made of cells.
  - Cells are the basic units of structure and function in living things.
  - New cells are produced from existing cells.

Exploring the Cell Scientists use light microscopes and electron microscopes to explore the structure of cells.

- Compound light microscopes have lenses that focus light. They magnify objects by up to 1000 times. Chemical stains and fluorescent dyes make cell structures easier to see.
- Electron microscopes use beams of electrons focused by magnetic fields. They offer much higher resolution than light microscopes. There are two main types of electron microscopes—transmission and scanning. Scientists use computers to add color to electron micrographs, which are photos of objects seen through a microscope.

Prokaryotes and Eukaryotes Cells come in an amazing variety of shapes and sizes, but all cells contain DNA. Also, all cells are surrounded by a thin flexible barrier called a **cell membrane.** There are two basic categories of cells based on whether they contain a nucleus. The **nucleus** (plural: nuclei) is a large membrane-enclosed structure that contains DNA.

- **Eukaryotes** are cells that enclose their DNA in nuclei.
- **Prokaryotes** are cells that do not enclose their DNA in nuclei.

The Discovery of the Cell

For Questions 1–6, complete each statement by writing the correct word or words.

1. The invention of the _____ made the discovery of cells possible.

2. Robert Hooke used the name _____ to refer to the tiny empty chambers he saw when he observed magnified cork

3. German botanist Matthias Schleiden concluded that _____ are made of cells.

4. German biologist Theodor Schwann concluded that _____ are made of cells.

5. Rudolph Virchow concluded that new cells are produced from _____.

6. The _____ combines the conclusions made by Schleiden, Schwann, and Virchow.

Exploring the Cell

For Questions 7–9, write True if the statement is true. If the statement is false, change the underlined word or words to make the statement true.

_____ **7.** The size of the image formed by a light microscope is <u>unlimited</u> because light that passes through matter is diffracted.

_____ **8.** Fluorescent dyes help scientists see the movement of <u>compounds and structures</u> in living cells.

_____ **9.** <u>Transmission</u> electron microscopes form a 3-D image of the surface of a specimen.

10. In the second row of the table, draw diagrams to show how a sample of three yeast cells would look in the types of micrographs indicated in the top row of the table. Then, in the third row, describe how each image would be formed.

A Comparison of Detail in Basic Types of Micrographs		
Light Micrograph (LM 500x)	**Transmission Electron Micrograph** (TEM 4375x)	**Scanning Electron Micrograph** (SEM 3750x)
A light microscope image is formed by _____ _____ _____ .	A transmission electron microscope image is formed by _____ _____ _____.	A scanning electron microscope image is formed by a _____ _____ _____.

11. To study cells with a light microscope, different types of stains are usually available. Why is it generally more useful to stain eukaryotic cells than prokaryotic cells?

Prokaryotes and Eukaryotes

12. Complete the table about the two categories of cells.

Two Categories of Cells			
Category	**Definition**	**Size range**	**Examples**
Prokaryotic cells			
Eukaryotic cells			

13. Which category of cells—prokaryotic or eukaryotic—is your body composed of?

7.2 Cell Structure

Lesson Objectives

- Describe the structure and function of the cell nucleus.
- Describe the role of vacuoles, lysosomes, and the cytoskeleton.
- Identify the role of ribosomes, endoplasmic reticulum, and Golgi apparatus in making proteins.
- Describe the function of the chloroplasts and mitochondria in the cell.
- Describe the function of the cell membrane.

BUILD Vocabulary

A. The chart below and on the next page shows key words from the lesson with their definitions. Complete the chart by writing a strategy to help you remember the meaning of each term. One has been done for you.

Term	Definition
Cell wall	
Centriole	
Chloroplast	
Cytoplasm	
Cytoskeleton	
Endoplasmic reticulum	
Golgi apparatus	

Continued on next page

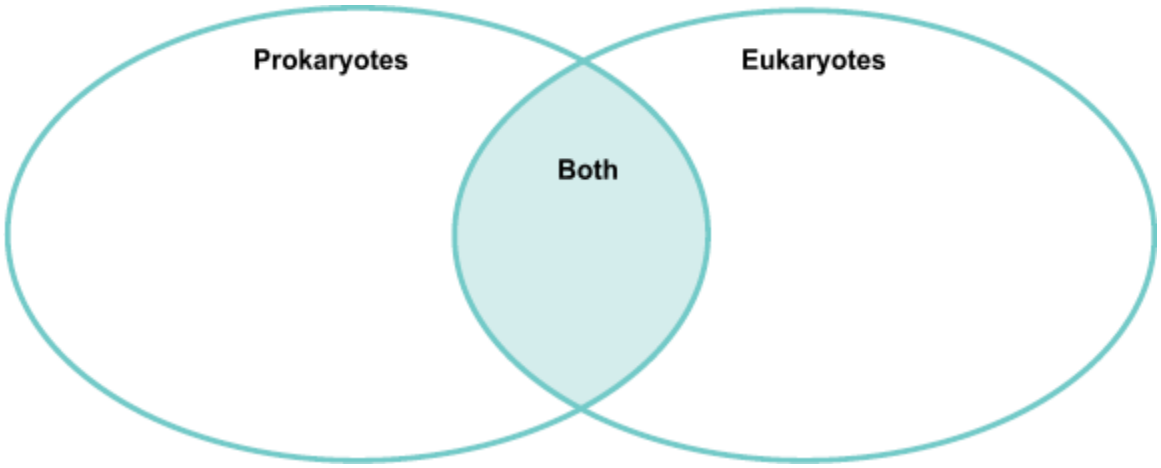
Term	Definition
Lysosome	
Mitochondrion	
Organelle	
Ribosome	
Vacuole	

BUILD Understanding

Venn Diagram A Venn diagram is made up of overlapping circles. It is a useful tool for comparing two or even three topics.

Use terms from the box to complete the Venn diagram.

cell membrane	**cytoskeleton**	**mitochondria**
cell wall	**DNA in cytoplasm**	**nucleus containing DNA**
centriole	**endoplasmic reticulum**	**ribosome**
chloroplast	**Golgi apparatus**	**vacuole**
cytoplasm	**lysosome**	



Cell Organization

An organelle is a specialized cell structure. Each organelle functions in a different way. All of the organelles help the cell carry out life processes.

Use the terms in the box to write the name of the organelle underneath its picture.

endoplasmic reticulum	Golgi apparatus	mitochondrion	nucleus

Organelle	Function
 _____	Controls most cell processes and stores genetic material
 _____	Where lipid parts of the cell membrane and proteins for export are assembled and stored
 _____	Modifies, sorts, and packages materials from the endoplasmic reticulum
 _____	Converts the energy stored in food into a more usable form

BUILD Connections

The Cell As a Living Factory An analogy takes two things that seem to be different and shows how they can be similar.

1. If the cell were a factory, what part would serve as the main office? _____
2. Which cell part would provide electricity? _____
3. With a partner, discuss how the actions of the forklifts are related to actions in cells._____

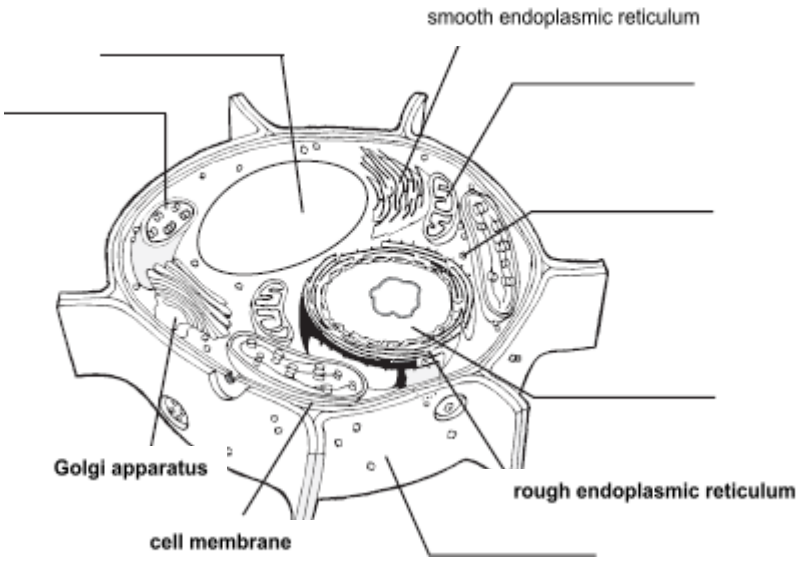
Cell Organization

Follow the directions.

1. Use the words below to label the plant cell. Some structures have been labeled for you.

cell wall	**mitochondrion**	**ribosome**
chloroplast	**nucleus**	**vacuole**

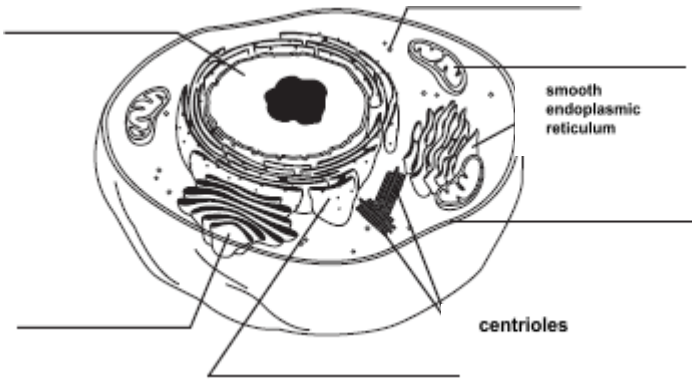
Plant Cell



2. Use the words below to label the animal cell. Some structures have been labeled for you.

cell membrane	**mitochondrion**	**rough endoplasmic reticulum**
Golgi apparatus	**nucleus**	**ribosome**

Animal Cell



Use the diagrams to answer the questions.

3. Which structure is found in a plant cell but not in an animal cell? Circle the correct answer.

chloroplast cell membrane ribosome

4. What is the main function of vacuoles?

_____

7.3 Cell Transport

Lesson Objectives

- Describe passive transport.
- Describe active transport.

Lesson Summary

Passive Transport The movement of materials across the cell membrane without using cellular energy is called passive transport.

- **Diffusion** is the process by which particles move from an area of high concentration to an area of lower concentration.
- **Facilitated diffusion** is the process by which molecules that cannot directly diffuse across the membrane pass through special protein channels.
- **Osmosis** is the facilitated diffusion of water through a selectively permeable membrane.
  - **Aquaporins** are water channel proteins that allow water to pass through cell membranes.
  - Two adjacent solutions are **isotonic** if they have the same concentrations of solute.
  - **Hypertonic** solutions have a higher concentration of solute compared to another solution.
  - **Hypotonic** solutions have a lower concentration of solute compared to another solution.
- **Osmotic pressure** is the force caused by the net movement of water by osmosis.

Active Transport The movement of materials against a concentration difference is called active transport. Active transport requires energy.

- Transport proteins that act like pumps use energy to move small molecules and ions across cell membranes.
- The bulk transport of large molecules and clumps of materials into and out of cells occurs by movements of the cell membrane, which require energy.

Passive Transport

For Questions 1–4, write the letter of the correct answer on the line at the left.

_____ **1.** Which of the following must be true for diffusion to occur?

A. Molecules or particles must have different sizes.

B. Special protein channels must always be available.

C. There must be areas of different concentrations.

D. Energy must be available.

_____ **2.** Which term refers to the condition that exists when *no* net change in concentration results from diffusion?

A. concentration **C.** osmosis

B. equilibrium **D.** randomness

_____ **3.** Air has a higher concentration of oxygen molecules than does the cytoplasm of your lung cells. Where in your lungs will there be a net increase of oxygen?

A. in the air breathed in **C.** outside of the lung cells

B. in the air breathed out **D.** inside of the lung cells

_____ **4.** Which of the following statements tells how facilitated diffusion differs from simple diffusion?

A. Particles move through cell membranes without the use of energy by cells.

B. Particles tend to move from high concentration to lower concentration.

C. Particles move within channel proteins that pass through cell membranes.

D. Particles tend to move more slowly than they would be expected to move.

For Questions 5–7, match the situation with the result. Write the letter of the correct answer on the line at the left.

Situation	Result
_____ **5.** Cells are in an isotonic solution.	**A.** The cells lose water.
_____ **6.** Cells are in a hypertonic solution.	**B.** The cells gain water.
_____ **7.** Cells are in a hypotonic solution.	**C.** The cells stay the same.

8. In the table below, describe how each type of cell will look after being placed in a hypertonic solution.

Appearance of Cells in a Hypertonic Solution	
Animal Cells	**Plant Cells**

Active Transport

9. What is the function of active transport in moving small molecules and ions across cell membranes? Give an example.

10. How does ATP (energy) enable transport proteins to move ions across a cell membrane?

11. What are the proteins used in active transport called?_____

12. Complete the table to summarize the types of bulk transport.

Types of Bulk Transport	
Type	**Description**
Endocytosis	
Phagocytosis	
Exocytosis	

13. Most sports drinks are isotonic in relation to human body fluids. Explain why athletes should drink solutions that are isotonic to body fluids when they exercise rather than ones that are hypotonic to body fluids (contain a greater proportion of water in comparison to the fluids in and around human body cells).

Introduction to Cells Edpuzzle Notes

1. What ARE the three parts of the Cell Theory?
    a.
    b.
    c.

2. What are two examples of Prokaryotes?

3. Plants, Animals, Fungi and Protists are all examples of what?

4. Which cell organelle makes Eukaryotes DIFFERENT from Prokaryotes?

5. Prokaryotes have membrane-bound organelles: True or False?

6. What does semi-permeable mean?

7. What does the Cell Membrane do? Which cells have a Cell Membrane?

8. What does the Cytoplasm do?

9. What do Ribosomes make? Which cells have Ribosomes?

10. What is found inside of the Nucleus? Which cells have a Nucleus?

11. What is the job of the ER? Which type of cells have an ER?

12. What does the Golgi Apparatus do? Which cells have Golgi Bodies?

13. What does the Mitochondria do? Which cells have Mitochondria?

14. What do Chloroplasts do? Which cells have Chloroplasts?

15. What is a Vacuole used for? Which cell type has MANY SMALL Vacuoles? Which cell type has ONE LARGE Vacuole?

16. What is a Cell Wall used for? Which cells have a Cell Wall?

Eukaryotic vs. Prokaryotic Edpuzzle Notes

1. All living things are made of _____?

2. Prokaryotes are _____ celled organisms.

3. _____ can be either a single celled or multicellular organism.

4. Which type of cell(s) have DNA?

5. Why is the plasma membrane important?

6. Animal cells do not have _____.

7. Who's more complex?

8. If looking at a prokaryotic cell under the microscope, you will NOT find a nucleus: True or False?

9. Eukaryotic cells DO have a nucleus: True or False?

10. _____ are examples of a prokaryotic cell.

11. Which of the following is FALSE?

Osmosis Edpuzzle Notes

1. Osmosis is the movement of _____ across a membrane.

2. Which answer choice describes how molecules move in passive transport?

3. What are two examples of solutes?

4. Solutes dissolve in solvents (true or false)

5. What does semipermeable mean?

6. What way do water molecules move during osmosis?

7. Hypertonic means…

8. Hypotonic means…

9. Water always moves to the side with the higher solute concentration (true or false)

10. Would red blood cells or pure water have a higher solute concentration?

11. What type of solution would move at equilibrium in and out of cells?

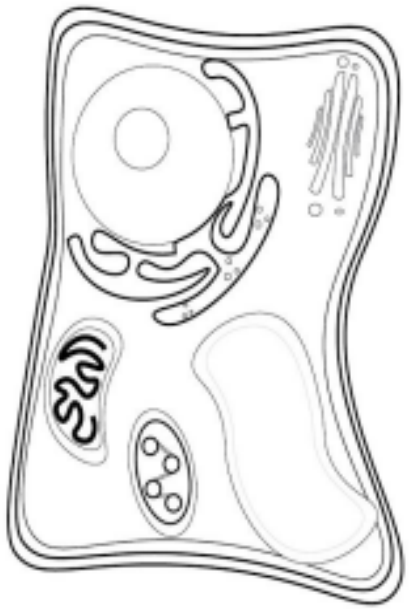
12. What would happen to a fish adapted for saltwater in freshwater?

13. What organism has an adaptation that allows them to live in fresh or saltwater?

14. What caused the plants on the road and the slug to die?

Plant Cell with Organelles!

The Cell!



Golgi Body

Mitochondria

Cell Wall

Structure

Vacuole

Chloroplast

Nucleus

Endoplasmic Reticulum

Animal Cell with Organelles!

The Cell!

Golgi Body

Mitochondria

Cytoplasm

Plasma Membrane

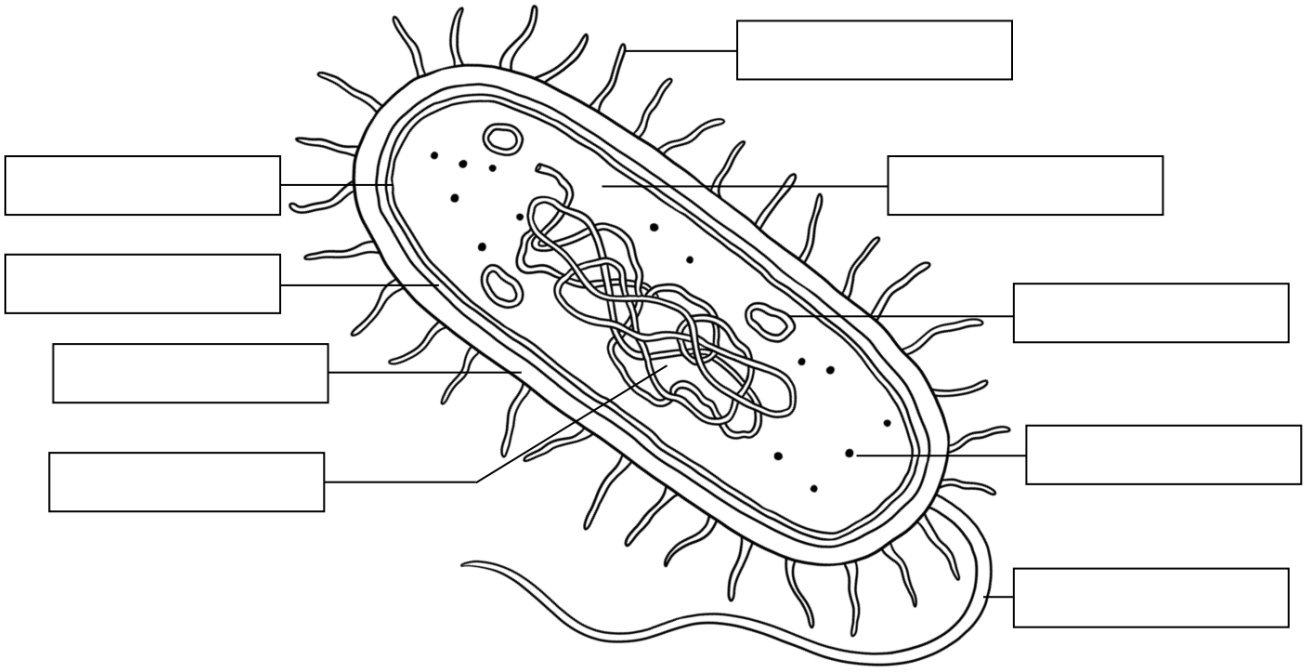
Centriole

Nucleus

Endoplasmic Reticulum

Prokaryotic Cells

Prokaryotes are microscopic single-celled organisms. Prokaryotic cells don't have a distinct nucleus with a membrane. **Correctly label the following prokaryotic cell structures.**



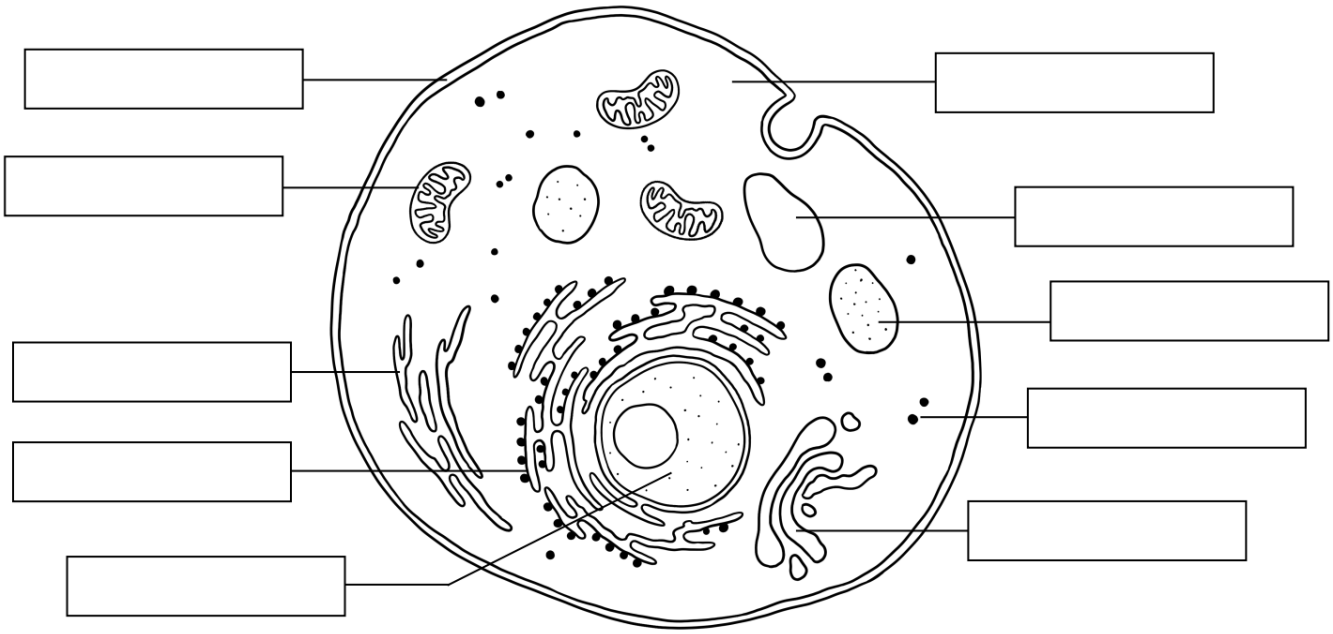
Cell Membrane	**Cell Wall**	**Capsule**	**Pili**	**Plasmid**
Flagella	**Nucleoid Region**		**Ribosomes**	**Cytoplasm**

Briefly explain the function of each labeled structure.

Cell Membrane	
Cell Wall	
Capsule	
Pili	
Plasmid	
Flagella	
Nucleoid Region	
Ribosomes	
Cytoplasm	

Eukaryotic Cells

Eukaryotes are organisms that can be both unicellular and multicellular. The genetic material is DNA which is contained within a distinct nucleus. **Correctly label the following eukaryotic cell structures.**



Nucleus	**Rough Endoplasmic Reticulum**		**Ribosomes**
Mitochondria	**Lysosome**	**Vacuole**	**Cytoplasm**
Cell Membrane	**Smooth Endoplasmic Reticulum**		**Golgi Apparatus**

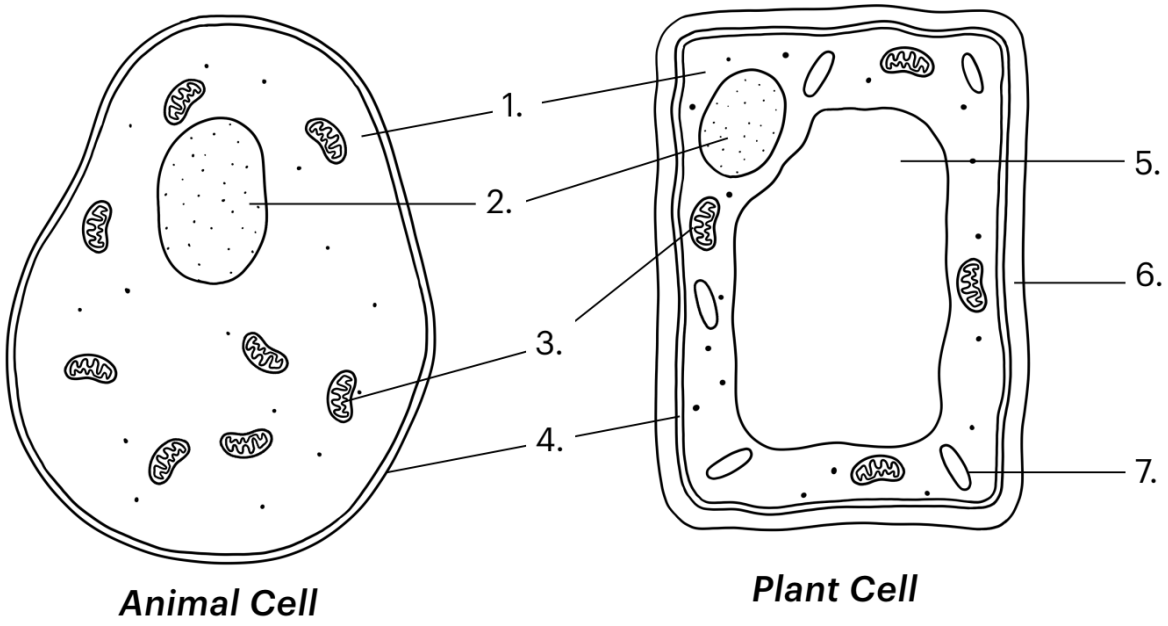
Briefly explain the function of each labeled structure.

Nucleus	
Rough ER	
Smooth ER	
Ribosomes	
Mitochondria	
Lysosomes	
Vacuole	
Cell Membrane	
Cytoplasm	
Golgi Apparatus	

Eukaryotic Cells

Plant and Animal cells are both eukaryotic cells. While they contain many of the same organelles, there are significant differences between them.

Write the number of the correct corresponding structure in the table below. Then, distinguish between prokaryotic and eukaryotic cells by writing either a tick or cross in the boxes.



Organelle	Number of Structure	Eukaryotic Cells		Prokaryotic Cells
		Animal Cell	Plant Cell	
Cell membrane				
Cytoplasm				
Nucleus				
Mitochondria				
Vacuole				
Cell wall				
Chloroplasts				
DNA free in cytoplasm				

Name: _____ Date __/__/__

Recognizing Cellular Organelles

Read the description of the operation below. After reading the description, recognize which function of the farm would be a representative of each organelle.

Shelfield Farms is a row crop operation located in west central Illinois. A fence surrounds all of the ground that John Shelfield owns. In the middle of the farm is John's house. John is the principal operator of the farm and is solely responsible for deciding which direction the business should go in. By John's house is a fuel tank containing diesel fuel that he uses to power his tractors. Because of the fences, John has to open gates to get any of his equipment in a field. In John's garage is a Biodiesel Processor where he converts corn residue left in his fields into biodiesel so he can run in his tractors. John is also in cooperation with his neighbor Billy, a pig farmer. John allows Billy to dump all of the hog manure and various waste produced in his confinements into a lagoon on John's property. John then uses this byproduct to fertilize his ground every year. Every fall, John has his combine harvester out to harvest corn and soybeans. The combine harvester removes unnecessary parts of the plant and combines the kernels all together in one location. They are then loaded on a truck and sent down the highway before being sent to the grain elevator where they will be processed into more usable concentrated products such as cornstarch or high glucose corn syrup.

After reading the passage, match the different parts of John's operation up to a cell organelle that has a similar function. Provide a description as well.

Cell=_____
Why?
_____

Cell Wall=_____
Why?
_____

Plasma Membrane=_____
Why?
_____

Nucleus=_____
Why?
_____

Chloroplast=_____
Why?
_____

Golgi Apparatus=_____
Why?
_____

Mitochondria=_____
Why?
_____

Vacuole=_____
Why?
_____

Ribosome=_____
Why?
_____

Endoplasmic Reticulum=_____
Why?
_____

Demonstrating Knowledge

In the space provided below, illustrate John's farm in action. Label all of the organelles with the analogies you drew on the last page.

Name: _____

Gummy Bear Osmosis Lab

★ Purpose:

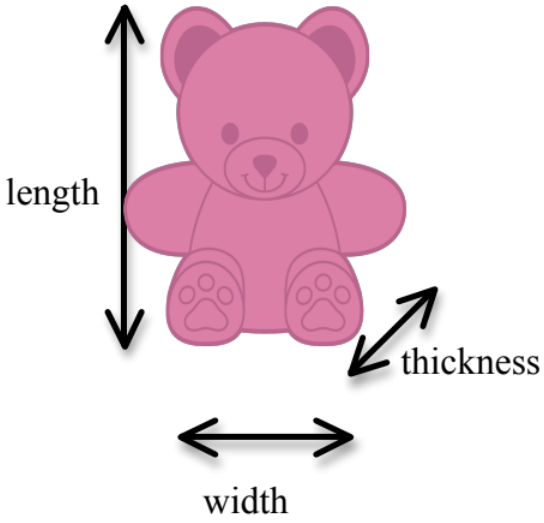
- To observe the effects of _____ on a gummy bear.

★ Hypothesis: (circle an answer for each statement below)

- The gummy bear left in plain water will: shrink swell stay the same
- The gummy bear left in salt water will: shrink swell stay the same
- The gummy bear left in no water will: shrink swell stay the same

★ Materials:

- 3 gummy bears
- 3 beakers
- 100 mL plain water
- 100 mL salt water
- Labels
- Scale & Ruler



★ Procedures:

Day 1:

1. Put labels on the beakers: "Plain Water", "Salt Water", and "Control Group No Water)".
2. Next, fill the "Plain Water" and "Salt Water" beakers with 100 mL of water each.
3. Next, add _____ salt into the "Salt Water" beaker and stir.
4. Measure and describe the 3 gummy bears in the table below before putting them into the beakers using a scale and ruler.
5. Place a gummy bear in each beaker.

Day 2:

1. CAREFULLY remove the gummy bears from the beakers using a spoon.
2. Measure and describe the 3 gummy bears in the table below.

★ Data Collection:

Observations and Measurements of gummy bear in "Plain Water" beaker:

	Color	Length	Width	Thickness	Mass
Before					
After					

Observations and Measurements of gummy bear in "Salt Water" beaker:

	Color	Length	Width	Thickness	Mass
Before					
After					

Observations and Measurements of gummy bear in "No Water" beaker:

	Color	Length	Width	Thickness	Mass
Before					
After					

★ Analysis:

In your own words, describe the difference between the three gummy bears AFTER the experiment:

★ Conclusion:

Water	Membrane	Cell	Selectively Permeable	Osmosis

Why did that happen? It has to do with a process called _____. Imagine the gummy bear is a real living thing. It would be made up of tiny, living units called _____. Each cell is surrounded by a _____ that protects the cell by keeping the cells parts inside and keeping other things outside. While it stops most things, _____ can pass through it. We call the membrane _____, because it decides what comes in and out.

Inside	Outside	Higher	Lower

Osmosis is a kind of diffusion. When diffusion occurs, molecules move from a _____ concentration of water towards a _____ concentration of water. If the water outside the cell has LESS water than inside, water will move from the _____ of the cell to the _____.

That is what happened to the gummy bear in the **salt water**. The water had to move OUT of the gummy bear to "even out" the concentration of water. The gummy bear became smaller with less water to fill it up.

Inside	Outside	Losing	Increased	Osmosis

The opposite happened to the gummy bear in the **plain water**. Water moved from the _____ of the gummy bear to the _____ to "even out" the concentration of water. As more and more cells gained water, the gummy bear became larger as more water filled it up.

So why didn't the gummy bear in **salt water** get as big as the gummy bear in plain water? Since there was salt in the water AND in the gummy bear, the water didn't have to move as much to "even out" the concentration.

What does that have to do with me? Osmosis works the same way for your cells as it does in the gummy bear. When you sweat a lot, you are _____ water. Osmosis takes over and starts to pull water out of your cells, which is not a good thing. Now that water has left your cells, the concentration of salt in your cells has _____. It is very important to drink LOTS of water if you are sweating a lot. _____ would occur again and balance out the water to keep you healthy.

Name: _____

Eukaryotic vs. Prokaryotic Cell Flipbooks

Using the information you have learned over the past few days about cells, you will be creating a flipbook to organize cell parts for an Animal Cell, a Plant Cell and Prokaryotic Cell. For each cell, the following cell structures need to be drawn, labeled, and defined individually in your flipbook. Also included in the flipbook needs to be a FULL cell drawing (note the rubrics on the back of this page) with labeled structures.

Eukaryotic Cells:

Animal Cell: (3 pieces of paper)

- Nucleus
- Cell Membrane
- Mitochondria
- Ribosome
- Golgi Apparatus
- Rough Endoplasmic Reticulum
- Smooth Endoplasmic Reticulum
- Vacuole
- Cytoplasm
- Lysosome

Plant Cell: (4 pieces of paper)

- Nucleus
- Cell Membrane
- Mitochondria
- Ribosome
- Golgi Apparatus
- Rough Endoplasmic Reticulum
- Smooth Endoplasmic Reticulum
- Vacuole
- Cytoplasm
- Lysosome
- Chloroplasts
- Cell Wall

Prokaryotic Cell: (3 pieces of paper)

- Cell Membrane
- Ribosomes
- Cytoplasm
- Cell Wall
- Capsule
- Pili
- Plasmid
- Flagella
- Nucleoid Region

Description	Points Possible	Points Earned
- Title (Animal Cell) - Name, Date, Hour	2	
- All 10 organelles	5	
- All 10 functions	5	
- All 10 drawings	5	
- Full cell drawing	5	
- Neatness, color, and effort shown	3	
Total Points	25	

Description	Points Possible	Points Earned
- Title (Plant Cell) - Name, Date, Hour	2	
- All 12 organelles	6	
- All 12 functions	6	
- All 12 drawings	6	
- Full cell drawing	5	
- Neatness, color, and effort shown	3	
Total Points	28	

Description	Points Possible	Points Earned
- Title (Prokaryotic Cell) - Name, Date, Hour	2	
- All 9 organelles	4.5	
- All 9 functions	4.5	
- All 9 drawings	4.5	
- Full cell drawing	5	
- Neatness, color, and effort shown	3	
Total Points	23.5	

Lesson Review Questions

Lesson 7.1: Life is Cellular

1. _____
2. _____
3. _____
4. _____
5. _____

Lesson 7.2: Cell Structures

1. _____
2. _____
3. _____
4. _____
5. _____

Lesson 7.3: Cell Transport

1. _____
2. _____
3. _____
4. _____
5. _____

Lesson 7.1 & 7.2 Quiz Review:
Cell Structure

1. Know the three main components of the Cell Theory.
    a. Know the technology advancement that was important to the development of the Cell Theory.
2. Know the difference between a Prokaryotic Cell and a Eukaryotic Cell.
    a. What organelles make them different?
    b. Where is the DNA located in each cell?
    c. What are common examples of each?
3. Be able to identify the organelles of an Animal Cell.
    a. Also be able to describe the function of each organelle.
4. Be able to identify the organelles of a Plant Cell.
    a. Also be able to describe the function of each organelle.
5. Be able to identify what type of cell it is (prokaryotic or eukaryotic) from a diagram.

Lesson 7.3 Quiz Review:
Cell Transport

Terms to Know: Cell Transport

Osmosis	Solute	Solvent	Hypotonic
Hypertonic	Isotonic	Facilitated Diffusion	Simple Diffusion

Other Topics to Know:

- Differences between simple and facilitated diffusion
- Scenarios of hypertonic/hypotonic solutions
- Steps in Active Transport
- Questions from the Gummy Bear Lab

Ice Cream Lab Design

- ADD IN AFTER UNIT IS DONE

Broilers

- How did the chicks arrive at school?
- Where did the chicken feed come from?
- Know the starting and ending protein feed percentages, and be able to describe why we changed the amount of protein over the duration of the project.
    - What is the main health issue high protein could cause?
- Identify the supplement we added to the water.
- When the birds first arrived, what material did we put on top of the shavings? Be able to explain why.
- What was the frequency of completing chores? (changing water, bedding, food)
- Identify the three criteria judges looked for at the contest, and the number of birds taken to the contest.

Macromolecules

- Be able to identify, define, and give an example of the 4 macromolecules.
- Marshmallow Lab - Making Models of Macromolecules
    - What do the lines in a structural formula represent?
    - What is the main structural difference between carbohydrates and protein?
    - What can you learn from models that you cannot learn from structural formulas?
- Protein:
    - What is it made of?
- Carbohydrates:
    - What is it made of?
    - What is the difference between a monosaccharide, disaccharide, and a starch?
    - Describe what carb loading is, and why athletes do it before an event.
- Lipids:
    - What are the three forms of lipids?
- Nucleic Acids
    - Know where you can find nucleic acids in a meal.

Types of Cells

- Identify the three parts of the Cell Theory.
- Prokaryotes
    - Know a common example
    - Know the components
- Eukaryotes

- What are the two different types of eukaryotic cells?
- Be able to label/identify structures, and define functions of organelles for each type.
- Name three differences between the two types.
- Know common examples of each.

Cell Transport

- Passive Transport
  - Know Simple Diffusion vs. Facilitated Diffusion
  - Osmosis:
    - What type of diffusion is it an example of?
    - Know the difference between solute and solvent, and give an example of each.
    - Define hypertonic, hypotonic, and isotonic.
    - Be able to describe what's happening in the following scenarios: salt trucks, red blood cells, gummy bear lab, saltwater fish, and athletes sweating.
- Active Transport
  - Function of active transport and moving of molecules.
  - How does ATP enable the transportation of molecules?
  - What are the proteins used in active transport called?