

Take the next ten minutes and preview the chapter. Be sure to review the "How To" guide if you are not sure how to approach previewing the chapter. Brief instructions and tips are included in [...] throughout this first handout.

Introduction [Take a moment to read the brief introduction. In one short sentence, summarize what is said.]

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Learning Objectives. By the end of this session, you will be able to:

- [Look over the three learning objectives you wrote above. These are the focus of this section of the chapter. Notice the keywords like: **Identify**, **Describe**, **List**. These words tell you the task you should be able to do after reading the information. See the “How To” guide for more about what these action words mean and how to use them.]

- _____
- _____
- _____
- _____
- _____
- _____
- _____
- _____

- Fig 1.7
- Fig 1.8

- Fig 1.9

- Fig 1.11

[illegible]

1.2 _____ [what is the title of the second section of the chapter]

Learning Objectives. By the end of this session, you will be able to:

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

[This section introduces some new action words: **Understand** and **Compare**]

[In Section 1.2, there are many subsection list them below using the premade outline, do not read the chapter yet. When a figure is listed, give a brief description of what it shows. Make a list of the bolded terms in the box to the left, no need to define, yet. You can also include words that are unfamiliar or confusing, indicate those with a star so you can look them up.]

- _____
 - _____
 - _____
- _____
 - Fig 1.18
- _____
- _____

Key Terms

Questions. [Take the next few minutes to come up with some questions you have after previewing the chapter. What caught your attention? Were any of the words strange or interesting? The goal is to find the things you were most curious about to help keep your attention focused while you read the actual text.]

Make a Plan. [Use the space below to make a plan for when you will read the chapter and complete the reading guide. Consider breaking it up into two blocks of time, one for section 1.1 and one for section 1.2. You won't always need to devote so much time to each section, but it may be a little slow while you're learning to use this metacognitive study style.]

READING ACTIVITY [Now that you are familiar with what is covered in this chapter and have a few questions, it's time to dig into reading. The goal isn't to read as fast as you can. Instead, our goal is to gain a strong familiarity with the content. We can do this by stopping regularly to paraphrase the content, answer questions based on the learning objectives, and even by digging deeper into the topic by watching a related video or simulation. At first, this may seem slow, but remember, you are LEARNING the material. It should be a little challenging, and if you get stuck, that's okay, there are prompts along the way to help you. Any questions you still have at the end are perfect for asking in the next class period or at office hours.]

1.1 Themes and Concepts of Biology [in 1-2 sentences summarize the paragraph the begins with **biology**]

Properties of Life. Look back at the Learning Objectives for section 1.1, What should you be able to do after reading this section?

_____ and the properties of life.

Watch me
→



There are eight (8) characteristics that are used to define life, learn more about them by completing the table.

Property of Life	Description [include any questions you have]

Look back at the Learning Objectives for section 1.1, What should you be able to do after reading this section?

_____ the _____ among living things.

Date	Time	Location	Observations

- a) Tissues exist within organs which exist within organ systems.
- b) Communities exist within populations which exist within ecosystems.
- c) Organelles exist within cells which exist within tissues.
- d) Communities exist within ecosystems which exist in the biosphere.

Learn more about taxonomy



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What is another way to represent the relationships across organisms? [HINT: see the evolution in action box & QR link]



Branches of Biological Study

Look back at the Learning Objectives for section 1.1, What should you be able to do after reading this section?

_____ examples of different subdisciplines in biology.

Read this section of the book and list the different subdisciplines of biology given. Include brief descriptions of what each does. Your book gives 10 subdisciplines, go online and find one more that is of interest to you put it in the **bolded box** at the end.

Subdiscipline of Biology	Description
Your example here:	

Congratulations! You've finished the first section of chapter 1. Now take a moment and reflect on what you've learned. Look back over the activity and see if you have any questions or if there is anything you want to ask about during the next class, in-office hours, or on a class discussion board. Put them in the box below.

	Housekeeping: How long did it take you? Did you give yourself enough time? Will you do anything differently for 1.2?
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Take a break before starting the next section. Do an activity that requires you to look far away, to help your eyes relax. Consider a walk and be sure to drink water to keep your neurons firing!

1.2 The Process of Science

Look back at the Learning Objectives for section 1.2, What should you be able to do after reading this section?

_____ the _____ characteristics of the natural sciences.

In 1-2 sentences, summarize the paragraph the begins with ‘Like geology’ and answer the above learning objective.

The Nature of Science.

This section introduces some important terms.
Complete the table below to deepen your understanding.

Video about →
theory v. law



Define:

Hypothesis	Scientific theory	Scientific law
	Example:	Example:
Compare and contrast these three terms:		

Natural Sciences. Define the *natural sciences*:

Scientific Inquiry. Look back at the Learning Objectives for section 1.2, What should you be able to do after reading this section? [NOTE: these are out of order compared to the list at the beginning of the section intentionally. This is the order you will encounter them in the actual text.]

_____ inductive reasoning with deductive reasoning.

Before starting this section, consider watching these videos explaining inductive and deductive reasoning.
[TIP: get a blank or lined sheet of paper and take notes while you watch the videos. You can always pause and repeat as needed until you’ve got a good feel for these two important but sometimes confusing ways of logical reasoning.]



Define inductive and deductive reasoning and come up with your own example of each.
[TIP: You may find it helpful to summarize the examples given in the videos to get you started.]

Inductive Reasoning	Deductive Reasoning
Define:	Define:
Example:	Example:

Hypothesis Testing. Look back at the Learning Objectives for section 1.2, What should you be able to do after reading this section? **[NOTE:** these are out of order compared to the list at the beginning of the section intentionally. This is the order you will encounter them in the actual text.]

_____ the process of scientific inquiry.

Scientific Method song –
 don't let the cartoon fool
 you, this is a great walk →
 through of the steps of the
 Scientific Method



Review Figure 1.18 and create your own diagram of the Scientific Method. Describe what happens at each step for yourself.

	<p>In the example below, the scientific method is used to solve an everyday problem.</p> <ol style="list-style-type: none"> 1. My toaster doesn't toast my bread. 2. Why doesn't my toaster work? 3. There is something wrong with the electrical outlet. 4. If something is wrong with the outlet, my coffeemaker also won't work when plugged into it. 5. I plug my coffeemaker into the outlet. 6. My coffeemaker works. <p>Which statement in the example above is the hypothesis?</p> <p>_____</p> <p>Which is the prediction?</p> <p>_____</p> <p>Based on the results of the experiment, is the hypothesis supported? If it is not supported, propose some alternative hypotheses.</p> <p>_____</p>
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Basic and Applied Science

Look back at the Learning Objectives for section 1.2, What should you be able to do after reading this section?

_____ the goals of basic science and applied science.

Before you read this section, take a moment to reflect on what you already know about basic vs. applied science.

Consider the following question: is it valuable to pursue science for the sake of simply gaining knowledge? Or, does scientific knowledge only have worth if we can apply it to solving a specific problem or bettering our lives?

Now, read the section and watch the videos, using the links to the right, and **summarize** the difference between basic and applied science. And **reflect** on your position before learning more, have your thoughts changed about the value of basic and applied science?



Reporting Scientific Work. Read the section and summarize the ways scientific work is reported.

Congratulations! You've finished the second section of chapter 1. Now take a moment and reflect on what you've learned. Look back over the activity and see if you have any questions or if there is anything you want to ask about during the next class, in office hours, or on a class discussion board. Put them in the box below.

Reflection. Good job, you finished the first reading guide for Concepts of Biology. This type of learning is often new to students. It can take time to become accustomed to the amount of effort needed to learn the material.

Take a few minutes to think and write about your experience with this first chapter.

Planning. Students new to taking science courses often underestimate the amount of time that will be needed to prepare for class and complete the assignments. Take a few minutes and plan for the next week or so, when can you make time to do practice problems for Chapter 1? When will you be able to start working on Chapter 2? By keeping a plan, you'll find it easier to see if you're getting your work done. [See the 'How To' guide for an example.]

Research shows that multiple rounds of retrieval practice are more effective than rereading the chapter. Complete the three retrieval activities in separate sessions. They will be most effective if spaced out. They also increase in difficulty as you go, so be sure to complete them in order and without referring to your notes. Treat this as a quiz, anything you aren't able to answer, you can look up after you finish.

RETRIEVAL ACTIVITY #1

1. List the properties of life:

- _____
- _____
- _____
- _____
- _____
- _____
- _____
- _____

2. Organize the levels of living things from largest to smallest, the largest has been indicated with the #1 to get you started.

- _____ Atoms
- 1 The Biosphere (Earth)
- _____ Cells
- _____ Ecosystem
- _____ Molecules
- _____ Organelles
- _____ Organisms, populations, and communities
- _____ Organs and organ systems
- _____ Tissues

3. What are the steps of the Scientific Method? Place them in the correct order below:

- Make an observation
- _____
- _____
- _____
- _____
- _____
- _____

4. Indicate whether the statement refers to **Applied** or **Basic** research:

- _____ Sometimes this is referred to as 'pure' research
- _____ aims to use science to solve real-world problems
- _____ the problem is usually defined for the researcher
- _____ seeks to expand knowledge regardless of public or commercial value

5. What process ensures the reliability and originality of a scientist's work before publication?

Reflect and Review Now that you've finished your first retrieval exercise, correct your work, refer to the book, and your Reading Activity answers. List any of the topics you were not able to recall in the box below; these are areas you need to spend more time reviewing. This exercise focused on **direct recall of knowledge**, a good way to improve this level of information is by using flashcards with definitions, and outlines of the lists.

	Plan when you'll do the next exercise:
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RETRIEVAL ACTIVITY #2 Before beginning this activity, make sure you have reviewed any of the content you had trouble with on the previous activity. This activity focuses on the next level of content knowledge: **Understanding**, which means you need to have more than just a grasp of the definitions.

1. One of the properties of life is the ability to respond to stimuli, what does that mean? Give an example.

2. Use the taxonomic hierarchy to answer the following questions:

DOMAIN Eukarya	Dog	Wolf	Coyote	Fox	Lion	Seal	Mouse	Human	Whale	Bat	Fish	Snake	Earthworm	Paramecium	Tree
KINGDOM Animalia	Dog	Wolf	Coyote	Fox	Lion	Seal	Mouse	Human	Whale	Bat	Fish	Snake	Earthworm	Moth	
PHYLUM Chordata	Dog	Wolf	Coyote	Fox	Lion	Seal	Mouse	Human	Whale	Bat	Fish	Snake			
CLASS Mammalia	Dog	Wolf	Coyote	Fox	Lion	Seal	Mouse	Human	Whale	Bat					
ORDER Carnivora	Dog	Wolf	Coyote	Fox	Lion	Seal									
FAMILY Canidae	Dog	Wolf	Coyote	Fox											
GENUS Canis	Dog	Wolf	Coyote												
SPECIES Canis lupus	Dog	Wolf													

a) Using the binomial name system, what is the scientific name of both dogs and wolves?

b) What is the most specific level that can be used to describe both a dog and a seal?

c) This example shows the Domain: Eukarya, there are two additional domains of life, what are they?

3. How is a Scientific Theory different from a common language theory?

4. State and describe the two requirements of a hypothesis:

1.
2.

5. Give an example of inductive reasoning:

Reflect and Review Now that you've finished the second retrieval exercise correct your work, refer to the book, and your Reading Activity answers. If you had any difficulty with the questions above, indicate the topics you want to review in the box below. This exercise focused on your **understanding** of the chapter content. Activities you can do to improve this level of knowledge include: making concept maps, writing about the different topics in your own words without referring to your notes, creating a study guide, and finding a friend to talk about the chapter with.

	Plan when you'll do the next exercise:
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RETRIEVAL ACTIVITY #3 Before beginning this activity, make sure you have filled any gaps in your knowledge that were revealed by the previous two retrieval activities. This activity focuses on your ability to **apply** what you have learned. A good way to prepare for this third activity is to pretend you are going to be teaching this chapter to a class or your study group partners. Review examples provided and try to come up with some of your own.

1. You and a friend are sitting on a wooden bench, your friend tells you the bench is alive, are they correct? Why or why not? Use at least 5 of the properties of life to justify (explain) your response.

2. Consider the organization levels of living things, at which level can we describe something as living? Why?

3. What is the purpose of the taxonomical hierarchy and the binomial naming convention?

4. You are a researcher in a microbiology lab at the CDC. A series of tissue samples arrive that were collected from people all with the same symptoms. You observe that the same type of bacteria is present in all the samples, and you ask yourself, "Is this bacterium the cause of these people's illness?"

a) Write a simple hypothesis based on the information above:

b) You want to design an experiment, what features should your experiment have to ensure your findings are reliable?

c) Germ Theory states: microorganisms or "**germs**" can lead to disease. As a scientific theory, what can you say about the validity of Germ Theory?

d) After several careful, well-planned experiments, your results indicate that the new bacterium causes the illness in question. What will you do to share this information?

Reflect and Review Congratulations, you have finished the last and most difficult of the retrieval exercises. Now your task is to correct your work. You may not be able to find all of the exact answers in the book or your notes. An excellent way to work through this last activity is to get together with a group from your class and discuss your answers. Explain to each other why you think your answer is correct. At the end, if you have any that you are uncertain about or have more questions, write them in the box below and bring them to class, office hours, or your campus tutoring center.

Questions you still have:

Reflection Think about your experience with chapter 1, did you plan enough time to learn the material? Are there any new study strategies you want to try to chapter 2? What are your goals for Chapter 2?

Make a Plan In the box below plan when you are going to work in time to start chapter 2 and continue to review chapter 1. One of the keys to success on exams is to practice regularly and to keep looking over past material. That will make studying for your exams much easier since you won't be relearning the material.

