Spot It ... Got It! A Photo Scavenger Hunt

Overview

Description
In this activity, students will locate and record real examples of processes and specimens that illustrate concepts discussed in a typical biology course. Students will then write a descriptive caption or statement that briefly explains how or why each image illustrates the concept.

Final Product: Students will use matrix writing to organize their collected documentation in order to produce a digital or hard copy image collection illustrating biological phenomena.

Course
Biology

Task Level
Grades 9–12

Cross-Disciplinary Standards Assessed

I. Key Cognitive Skills
   A.1. Engage in scholarly inquiry and dialogue.
   C.1. Analyze a situation to identify a problem to be solved.
   C.2. Develop and apply multiple strategies to solve a problem.
   C.3. Collect evidence and data systematically and directly relate to solving a problem.
   D.1. Self-monitor learning needs and seek assistance when needed.
   D.2. Use study habits necessary to manage academic pursuits and requirements.
   D.4. Persevere to complete and master tasks.
   E.1. Work independently.
   F.1. Attribute ideas and information to source materials and people.
   F.4. Understand and adhere to ethical codes of conduct.

II. Foundational Skills
   A.2. Use a variety of strategies to understand the meanings of new words.
B.1. Write clearly and coherently using standard writing conventions.
B.2. Write a variety of forms for various audiences and purposes.
C.5. Synthesize and organize information effectively.
C.6. Design and present an effective product.
C.8. Present final product.
E.1. Use technology to gather information.
E.2. Use technology to organize, manage, and analyze information.
E.3. Use technology to communicate and display findings in a clear and coherent manner.
E.4. Use technology appropriately.

Science Standards Assessed

I. Nature of Science: Scientific Ways of Learning and Thinking
D.1. Demonstrate literacy in computer use.
E.1. Use several modes of expression to describe or characterize natural patterns and phenomena. These modes of expression include narrative, numerical, graphical, pictorial, symbolic, and kinesthetic.
E.2. Use essential vocabulary of the discipline being studied.

III. Foundation Skills: Scientific Applications of Communication
A.1. Use correct applications of writing practices in scientific communication.
B.3. Recognize scientific and technical vocabulary in the field of study and use this vocabulary to enhance clarity of communication.
C.1. Prepare and present scientific/technical information in appropriate formats for various audiences.
D.1. Use search engines, databases, and other digital electronic tools effectively to locate information.

VI. Biology
B.1. Understand the major categories of biological molecules; lipids, carbohydrates, proteins, and nucleic acids. (biochemistry module)
B.2. Describe the structure and function of enzymes. (biochemistry module)
B.5. Know how organisms respond to presence or absence of oxygen, including mechanisms of fermentation. (biochemistry module)
C.1. Know multiple categories of evidence for evolutionary change and how this evidence is used to infer evolutionary relationships among organisms. (ecology module; evolution module)
E.1. Know ways in which living things can be classified based on each
organism’s internal and external structure, development, and relatedness of DNA sequences. (plant and fungal biology module; animal biology module)

F.2. Describe, compare, and contrast structures and processes that allow gas exchange, nutrient uptake and processing, waste excretion, nervous and hormonal regulation, and reproduction in plants, animals, and fungi; give examples of each. (plant and fungal biology module; animal biology module)

G.1. Identify Earth’s major biomes, giving their locations, typical climate, conditions, and characteristic organisms. (ecology module)

G.3. Understand typical forms of organismal behavior. (ecology module)

G.4. Know the process of succession. (ecology module)

Objectives

Students will:

• Become familiar with features, characteristics, and ways of recognizing and categorizing particular organisms, structures, and techniques in biological science.

• Become proficient in use of nomenclature that allows precise and concise reference to organisms, structures, and techniques in biological science.

• Demonstrate an understanding of biological definitions and concepts by locating and producing images of real objects that illustrate or exemplify the definition or concept.

• Prepare captions that explain how each image illustrates or exemplifies the definition or concept.

• Compile images and written explanations into a presentation format, either digital or hard-copy printout.

• Deliver a complete presentation to the course instructor and/or to classmates.

• Provide references or citations to literature to support their choice of illustrative images.

• Compare their examples (captured images) to those of classmates, and evaluate which images best convey or exemplify each term, description, or definition.

Preparation

• Read the Instructor Task Information and the Student Notes.

• Prepare student copies of the Student Notes pages.

• Look at the list of terms and descriptions in each assigned module to be sure that each term is familiar to the students, or that the definition or description
of each term can be readily located by students using available information resources.

- Choose which module(s) to assign. Due dates should be set within the time frame in which the selected module or unit is being taught in class. Some modules have many more items listed than other modules, so you may wish to edit the list of items based on the time available.

- Decide whether points will be awarded for examples that students have found online or downloaded from the Web, but have not actually seen themselves. The items in each module have been chosen to be readily available to students throughout Texas, but not all the items are available everywhere in the state during every season. It should also be decided and made clear to students whether examples observed outside Texas will count for credit.

- Consult with the school librarian about resources that the library can provide (hard-copy or online) for students needing help with definitions or explanations of terms.

- Consult with the school librarian about resources that the library can provide for students needing help with the graphic organizers and presentation software (e.g., PowerPoint, word-processing programs, etc.) that students will need to prepare and submit the final product with the compiled images.

- Arrange for an email address, FTP site, website, wiki, or other destination where the students can turn in their product electronically.

- Arrange for hardware and software for the classroom so each student can present their one or two best or favorite examples to the class.

- Make copies of the lists of terms for each assigned module, or post the lists online on a site where students can easily access them.

**Prior Knowledge**

Students possess a basic vocabulary of terms used in biology. They have experience using print and online references and information sources to obtain more detailed definitions or descriptions of biological structures, procedures, or concepts. They also have experience using cameras, cell phones, or other image-capture devices to record real objects. Students are able to upload captured images to a graphic organizer or assemble the images into a hardcopy presentation.

**Vocabulary**

- Dependent on module (see descriptions at the end of task)

**Time Frame**

Introduction of the assignment will take less than one class period. The modules (or units) into which the assignment is divided may take four to six weeks to cover in
The “Spot It … Got It!” activity, however, should take no more than two weeks, mostly out of class time. If the chosen module has a particularly long list of items, consider editing the list so the task can be completed within two weeks. At the conclusion of each module, you may choose to have each student select their one best or favorite example to present to the class. The presentations may take up one to two periods of class time.
Instructional Plan

Getting Started

CCRS Performance Expectations

Cross-Disciplinary Standards:

I. Key Cognitive Skills
   A.1. Engage in scholarly inquiry and dialogue.
   C.1. Analyze a situation to identify a problem to be solved.
   C.2. Develop and apply multiple strategies to solve problems.
   D.1. Self-monitor learning needs and seek assistance when needed.
   D.2. Use study habits necessary to manage academic pursuits and requirements.
   E.1. Work independently.
   F.4. Understand and adhere to ethical codes of conduct.

II. Foundational Skills
   A.2. Use a variety of strategies to understand the meanings of new words.

Learning Objectives

Students will:

• Become familiar with features, characteristics, and ways of recognizing and categorizing particular organisms, structures, and techniques in biological science.

• Become proficient in use of nomenclature that allows precise and concise reference to organisms, structures, and techniques in biological science.

Procedure

1. Be sure that each student has a copy of the list of items in the assigned module(s) (either hard copy or access to online document).

2. Give a descriptive overview of the scavenger hunt assignment. In class, discuss and work through one or two examples of items, modeling the search for more detailed explanations or expansion of concepts from the listed terms, definitions, etc. Share the rubric and timeline with students. Clearly establish which tasks are to be completed during class and which components are to be completed outside the class time. Allow students time to develop a personal task list and completion time
3. Instruct students to identify particular organisms, structures, or other appropriate real examples using the terms or description listed in the scavenger hunt instructions.

4. Provide copy of the matrix to be used for data collection and organization.

**Investigating**

**CCRS Performance Expectations**

Cross-Disciplinary Standards:

I. Key Cognitive Skills

A.1. Engage in scholarly inquiry and dialogue.

C.1. Analyze a situation to identify a problem to be solved.

C.2. Develop and apply multiple strategies to solve a problem.

C.3. Collect evidence and data systematically and directly relate to solving a problem.

D.1. Self-monitor learning needs and seek assistance when needed.

D.2. Use study habits necessary to manage academic pursuits and requirements.


E.1. Work independently.

F.1. Attribute ideas and information to source materials and people.

F.4. Understand and adhere to ethical codes of conduct.

II. Foundational Skills

A.2. Use a variety of strategies to understand the meanings of new words.

B.2. Write a variety of forms for various audiences and purposes.

C.5. Synthesize and organize information effectively.

C.6. Design and present an effective product.

E.1. Use technology to gather information.

E.2. Use technology to organize, manage, and analyze information.

E.3. Use technology to communicate and display findings in a clear and coherent manner.

E.4. Use technology appropriately.
Science Standards:

I. Nature of Science: Scientific Ways of Learning and Thinking
   D.1. Demonstrate literacy in computer use.
   E.1. Use several modes of expression to describe or characterize natural patterns and phenomena. These modes of expression include narrative, numerical, graphical, pictorial, symbolic, and kinesthetic.
   E.2. Use essential vocabulary of the discipline being studied.

III. Foundation Skills: Scientific Applications of Communication
   A.1. Use correct applications of writing practices in scientific communication.
   B.3. Recognize scientific and technical vocabulary in the field of study and use this vocabulary to enhance clarity of communication.
   C.1. Prepare and present scientific/technical information in appropriate formats for various audiences.
   D.1. Use search engines, databases, and other digital electronic tools effectively to locate information.

VI. Biology
   B.1. Understand the major categories of biological molecules; lipids, carbohydrates, proteins, and nucleic acids. (biochemistry module)
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   C.1. Know multiple categories of evidence for evolutionary change and how this evidence is used to infer evolutionary relationships among organisms. (ecology module; evolution module)
   E.1. Know ways in which living things can be classified based on each organism’s internal and external structure, development, and relatedness of DNA sequences. (plant and fungal biology module; animal biology module)
   F.2. Describe, compare, and contrast structures and processes that allow gas exchange, nutrient uptake and processing, waste excretion, nervous and hormonal regulation, and reproduction in plants, animals, and fungi; give examples of each. (plant and fungal biology module; animal biology module)
   G.1. Identify Earth’s major biomes, giving their locations, typical climate, conditions, and characteristic organisms. (ecology module)
   G.3. Understand typical forms of organismal behavior. (ecology module)
   G.4. Know the process of succession. (ecology module)
Learning Objectives

Students will:

- Demonstrate an understanding of biological definitions and concepts by locating and producing images of real objects that illustrate or exemplify the definition or concept.
- Prepare captions that explain how each image illustrates or exemplifies the definition or concept.

Procedure

1. Share a sample image and caption with students that can serve as a model for the images and captions they are to create.
2. Instruct students to search for real examples during class, and document their observations by photographing or sketching the example.
3. Instruct students to prepare captions or descriptive statements for each image, explaining how or why the object illustrates the term or description.
4. Monitor students work, periodically checking for accuracy and re-directing searches as needed.
5. After the first few days of research, instruct students to start searching for real examples outside of class.
6. Remind students daily of the amount of time remaining until interim reports (if required) or final reports are due.
7. Pair up students for peer review of their interim reports. A primary focus of the peer review should be the clarity and appropriateness of the images and captions. During the peer review, students should attempt to discover rules or guidelines that contribute to high-quality images and define the features that make some images more instructive or informative than others.

Drawing Conclusions

CCRS Performance Expectations

Cross-Disciplinary Standards:

I. Key Cognitive Skills
   D.1. Self-monitor learning needs and seek assistance when needed.
   D.2. Use study habits necessary to manage academic pursuits and requirements.
   D.4. Persevere to complete and master tasks.
   E.1. Work independently.

II. Foundational Skills
B.1. Write clearly and coherently using standard writing conventions.
B.2. Write a variety of forms for various audiences and purposes.
C.5. Synthesize and organize information effectively.
C.6. Design and present an effective product.
C.8. Present final product.
E.2. Use technology to organize, manage, and analyze information.

Science Standards:
I. Nature of Science: Scientific Ways of Learning and Thinking
   D.1. Demonstrate literacy in computer use.
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III. Foundation Skills: Scientific Applications of Communication
   A.1. Use correct applications of writing practices in scientific communication.
   B.3. Recognize scientific and technical vocabulary in the field of study and use this vocabulary to enhance clarity of communication.
   C.1. Prepare and present scientific/technical information in appropriate formats for various audiences.

Learning Objectives
Students will:
• Deliver a complete presentation to the course instructor and/or to classmates.
• Provide references or citations to literature to support the explanations of their chosen images.
• Compare their examples (captured images) to those of classmates, and evaluate which images best convey or exemplify each term, description, or definition.

Procedure
8. Mentor and coach students as they compile their images and written explanations by use of the matrix) and prepare for final presentations. Students' presentations should be either digital or a hard-copy printout.
9. Students will deliver their matrices and complete presentations to the course instructor or to classmates.
10. Display all students’ matrices and presentations so that students can see what examples their classmates chose to illustrate each term or definition. Ask students to write a brief summary, commenting on why different examples may be used to illustrate a single term or definition. Decide whether the author of the work will be identified or remain anonymous.
Scaffolding/Instructional Support

The goal of scaffolding is to remove support gradually to encourage student success, independence, and self-management. The following suggestions are examples of scaffolding that can be used by instructors to meet diverse student needs while students are completing this assignment:

- Provide one or two examples of images and captions (using descriptions that are NOT included in any of the modules) to which a student could compare his or her first specimens. For instance, here are a couple of examples that illustrate correct responses:
  - First definition: an organism that possesses a 4-chambered heart. Example: a human (any mammal could be used).
  - Second definition: an organism that shows high levels of parental care for offspring. Example: a human could be used for this definition, BUT if a human has already been used as the example for the first definition, it cannot be used again as the example for the second definition. (Each instructor should set specific rules as to how many times an example can be used.)

- Devote a class period to instruction on how to use electronic/digital programs to store images and attach captions.

- Provide specific, guided tutoring to students in need of greater direction and structure for a complex academic assignment.

- Students who have under-developed time-management skills may need more narrow due dates with smaller-sized interim products. Review their personal timelines to make sure they have set smaller windows of work time. Check students' assignments more frequently during development. Consider setting "progress dates" at regular intervals before the complete assignment is due. Many learners will need tangible reminders of due dates. For example, interim product due dates could be continuously posted in the classroom.

- Provide some students with definitions of key vocabulary and concepts related to their assignment.

- Students working in a group can divide up the tasks to be completed. Language-limited learners may need to be partnered during the research portion of the project.

- If a student is struggling to keep up with the task they are assigned, another student in the group could be assigned as a mentor.

- Students with reduced work IEPs may be assigned fewer terms or definitions.
Solutions

The solution provided in this section is intended to clarify the problem for instructors. This solution may not represent all possible strategies for approaching the problem or all possible solutions. It should be used for reference only.

Although PowerPoint will probably be the most commonly-used format, students will likely produce reports using a variety of media and software. Creativity is limited only by the required content.
Spot It … Got It! A Photo-Scavenger Hunt

Introduction

We can read about organisms, structures, procedures, and other items in books or online, but can we find real examples in our own environment? Many people overlook things they see every day, or fail to recognize real examples from descriptions. Over the next few weeks, you will be searching for actual specimens described in a checklist your instructor will give you. Your job is to figure out what specific organism, structure, or object satisfies each description. Then you must "collect" the items by photographing or sketching them. You will display your specimens to other observers in the form of a digital or hard copy image collection.

The Problem

Biologists often use specific terms to describe organisms, structures, or processes, but sometimes a picture or a set of pictures really is worth a thousand words. Imagine that you are trying to explain a biological concept to a sixth-grader. A picture would probably make your explanation more understandable, but where will these images come from? In this exercise, you must take on the jobs of explorer, photographer, editor, and publisher to produce an illustrated guidebook to biology.

Directions

Getting Started

1. Your assignment is to “collect” some of the biological items on the scavenger hunt list your instructor provides. Read through the list of terms and descriptions in the assigned list. As you read each term, ask yourself whether you understand its meaning. Then ask yourself whether you can think of or visualize a real example of that term. Begin making notes on the list, alongside each term. Which ones already remind you of an image? Which ones will need more thought?

2. Focus on the terms that are unfamiliar or the terms for which you cannot think of examples. Use printed or online references to make sure you know what you are looking for.

3. Begin thinking about where and how you will actually find or observe each object or example.

CAUTIONS:
a. Never touch plants or animals with exposed fingers. If you must handle an organism, use gloves and/or forceps.

b. Remember, you don't want to deplete the environment. Don't capture, kill, or transport organisms. Organisms should be photographed or drawn in their native habitat.

**Investigating**

1. Start collecting images of the biological items on your assigned list. An individual organism can only be used once. If you use a particular organism as an example of one concept, you cannot count that same organism as an example of another concept. Unless your instructor tells you otherwise, humans are acceptable for one category only. You may use Internet-based images for no more than three of the items on the list.

Your grade will be the point value of the items you collect. To prove that you've seen the items, you must submit either:

   a. A photograph of the object
   b. A hand-drawn image of the object in its found location
   c. A newspaper or magazine article that has that object as its primary subject
   d. An Internet article or image about the object (limited to 3 submissions maximum)

2. Every item (organism, structure, group, concept, etc.) submitted must be labeled. If the item is an organism, its label must include the properly formatted scientific name and the location of the organism. For structures, anatomical features, molecular examples, and other items, the label must include the name of the organism(s) from which the image came and the location where the image was observed. For example, a dog in your neighbor's yard would be labeled as "*Canis lupus familiaris*; 789 Home Boulevard, My Town, TX."

3. Newspaper and magazine articles must include a correct citation for the article and the article must have been published during the time when the assignment was active. If you use an Internet article or image, you must provide a complete website address (URL) where the item can be accessed and also the date and time when you viewed it. In addition, all web images or articles must still be available when the assignment is graded.

4. Using the matrix provided, you must write a descriptive caption or statement that briefly explains how or why each image illustrates the concept or definition. Be sure to point out any details or features of the picture that are especially important in linking the picture to the particular item it illustrates.
5. You will probably recognize many of the names, terms, or descriptions from your previous science courses. In some cases, we will discuss new terms in this course. There are also some names or descriptions that you may not have heard before. In such cases, you should research what the term means and in what organisms it can be found, and then go out and find one. Take a walk around your yard, neighborhood, and town. You should not spend any money collecting images.

6. Remember that no more than three of your images can come from the Internet. For all other items, you must take the photograph, draw the image yourself, or find an article about the item in a current periodical. The best way to prove that you have taken a photo yourself is to place an item in all of your photographs that only you could have added each time. For example, you could use something that you might usually have with you like a pen, coin, key, or phone. All the subjects you photograph must be naturally-occurring—not a model.

7. Compile and submit your portfolio, including all the images you have collected, and the data collection and organization matrix. These pages can be bound in a booklet form, presented digitally in a PowerPoint presentation, or compiled using another presentation format approved by your instructor. Use care in the organization and assembly of your project. Once submitted, they will be displayed in the classroom, and students will have an opportunity to browse and explore each other’s finished work product.

Drawing Conclusions

1. After completing your portfolio, thoughtfully answer the following questions in writing: Which images were easiest to find? Which were the most difficult to find? Were there any definitions/descriptions that no one in your class was able to locate? Which descriptions or concepts could be illustrated by a single image? Which required more than one image?

2. Think back to when you were in sixth grade. Would any of the images you collected have made it easier for you to understand biological concepts then?

3. One of the rules for this scavenger hunt was that each image could be used to illustrate only ONE concept or definition. Were there any organisms, structures, or techniques that could have been used to illustrate more than one definition?

4. Did any of your classmates find examples different from the one you used to illustrate the same definition or description? Were there any definitions or descriptions for which everyone used the same example?

5. Turn in your final summary.
## Data Collection and Organization Matrix

<table>
<thead>
<tr>
<th>Item</th>
<th>Location</th>
<th>Scientific Name</th>
<th>Descriptive Caption</th>
<th>Concept or Definition</th>
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Ecology Module

- Different Biomes (A maximum of five examples may be counted for credit; at least three must occur within Texas.) Within each biome that you depict, you must select at least one organism with a specific feature that makes the organism especially likely to survive and reproduce under the conditions found in that biome. For example, if you were showing a temperate forest biome, you might show leaves changing color (losing their photosynthetic pigments) as winter approaches, which is an adaptation to cold temperatures and short, overcast days during the cold months.
  - Batesian mimicry
  - Mullerian mimicry
  - Succession (must show at least 2 stages in the process of succession and state the Texas biome where this sequence could be observed)
  - Predation (must show a Predator organism and at least one organism that is the predator's typical prey); the Texas biome where these species could normally be found must be named in the caption
  - Biogeochemical cycle
  - Littoral zone organism
  - Mutualism
  - Commensalism
  - Detritivore
  - Organism's home (ex: a wasp nest or a beaver dam)
  - Parasitism (must show both the parasite and its typical host)
  - Territorial behavior
  - Instinctive behavior
  - Circadian rhythm
  - Role of microbes in energy transfer through an ecosystem
  - Role of microbes in transfer of materials (such as nutrients) through an ecosystem
  - Organisms on different levels of the same food chain (Organisms must be identified, the trophic level of each organism must be named, and the Texas biome where these organisms could be found must be named.)
  - Organism that is a member of an endangered species
  - Aquatic species
  - Native Texas wildflower (The Texas biome where this species could normally be
found must be named.)

- Animal native to Texas that is a year-round resident of the state
- Animal that migrates through Texas regularly but is not a permanent resident
- Animal that was a native resident of Texas within the past 500 years but is now extinct in the state or found only in zoos or wildlife parks
- Animal that did NOT occur in Texas 500 years ago, but is now a resident of the state (domestic livestock and pets cannot be included in this category)
- Introduced species (domestic livestock and pets belong in this category if the species was not originally native to Texas)
- Plant native to Texas that can be used for human food (Either the entire plant or the edible portion can be shown; the Texas biome where this species could normally be found must be named in the caption.)
- Organisms in different animal phyla (At least two organisms must be identified and each organism’s phylum must be named; the Texas biome where each species could normally be found must be named in the caption.)
- Organisms in different kingdoms (At least 2 organisms must be identified and each organism’s kingdom must be named; the Texas biome where each species could normally be found must be named in the caption.)
- Organisms in different plant divisions (At least 2 organisms must be identified and each organism’s division must be named; the Texas biome where each species could normally be found must be named in the caption.)
- Organisms in same class but different orders (At least 2 organisms must be identified and each organism’s class and order must be named; the Texas biome where each species could normally be found must be named in the caption.)
- Organisms in same genus but different species (At least 2 organisms must be identified and each organism’s genus and species must be named; the Texas biome where each species could normally be found must be named in the caption.)
- Organisms in same order but different family (At least 2 organisms must be identified and each organism’s order and family must be named; the Texas biome where each species could normally be found must be named in the caption.)

- Organism that excretes nitrogenous waste in the form of NH₃
- Organism that excretes nitrogenous waste in the form of urea
- Organism that excretes nitrogenous waste in the form of uric acid
- Semelparous organism (The Texas biome where this species could normally be found must be named in the caption.)
- Iteroparous organism (The Texas biome where this species could normally be
found must be named in the caption.)
Evolution Module

- Analogous structures (must show at least two structures and explain why they are analogous)
- Homologous structures (must show at least two structures and explain why they are homologous)
- Biogeography (examples: species that are found naturally only in certain parts of the world, including endemic species) Caption must explain where such organisms are native.
- Courtship display
- Convergent characteristics (must show at least two different species and state what characteristics show convergence)
- Evidence of two or more alleles for the same trait
- Evidence of evolution
- Example of reproductive isolation
- Haploid organism or haploid stage of an organism's life cycle
- Diploid organism or diploid stage of an organism's life cycle
- Polyploid organism or polyploid stage of an organism's life cycle
- Plant fossil found in Texas
- Invertebrate fossil found in Texas
- Vertebrate fossil found in Texas
- Genetic variation within a population
- Altruistic behavior
- An organism that cannot be classified according to the biological species concept
- Vestigial structure in an animal
- Dominant vs. recessive phenotypes
Biochemistry Module

- Properties of water important to the requirements of living organisms
- Different types of carbohydrates
- Two different storage saccharides (monosaccharides, disaccharides, oligosaccharides, or polysaccharides)
- Different classes of proteins (structural, hormonal, oxygen transport, immune defense, clotting factor, enzymatic, etc.)
- A lipid that is liquid at room temperature and a lipid that is solid at room temperature (must show both examples)
- A rich source of carotenoids
- A rich source of Vitamin C
- A rich source of Vitamin A
- Redox reaction
- Energy transfers
- Test, assay, or method to detect presence of fats or lipids
- Test, assay, or method to detect presence of glucose
- Test, assay, or method to detect presence of starch
- Test, assay, or method to detect presence of proteins
- Keratin
- Product of fermentation (caption must indicate what organism typically is used for the fermentation process that makes this product)
- Effect of an enzyme on a substrate (must specify enzyme, substrate, and product)
Plant and Fungal Biology Module

- A nonvascular plant that typically grows in a terrestrial habitat
- A nonvascular plant that typically grows in an aquatic habitat (either marine or freshwater)
- Angiosperm
- Asexual reproduction in a plant
- Auxin-producing part of a plant
- Axial bud vs. terminal bud (must state which is which)
- Bryophyte
- Pterophyte (Pteridophyte)
- C3 and either C4 or CAM organisms (must show at least 2 examples and state which organism is which type)
- A member of an invasive plant species
- Lichen
- Plant using either wind or water for seed dispersal
- Plant using animals for seed dispersal
- Plant that was first domesticated in Africa
- Plant that was first domesticated in Europe
- Plant that was first domesticated in South America
- Plant that was first domesticated in North America
- Plant that was first domesticated in Asia
- Modified leaf of a plant (caption must explain the type of modification and its role in the organism's life)
- Modified root of a plant (caption must explain the type of modification and its role in the organism's life)
- Modified stem of a plant (caption must explain the type of modification and its role in the organism's life)
- Monocot plant with flower and leaf
- Organism belonging to division Basidiomycota
- Gymnosperm leaf
• Gymnosperm reproductive structures
• Mycelium
• Plant hormones (abscisic acid, ethylene, gibberellins; must show location in plant where a hormone acts or exerts an effect)
• Pollen
• Rhizome vs. root (must show at least one of each and state which is which)
• Spore
• Sporophyte
• Stem – herbaceous
• Stem – woody
• Stigma and style of carpel
• Tendril of a plant
• Thorn of a plant
• Composite flower
• Cotyledons
• Cuticle layer of a plant
• Deciduous leaf
• Endosperm
• Organism belonging to a polyploid species
• Flower parts (sepal, petal, anther, ovary, etc.)
• Anther and filament of stamen
• Seed germination
• Sporangia in sori
• Tissues in a vascular plant
• Cambium
• Parenchyma cells
• Phloem
• Xylem
• Meristem
• Heartwood vs. sapwood
• Tropism (photo- / geo- / thigmo- / hydro-) / identify type of tropism as + vs - and by stimulus for
• Distinguishing characteristics between monocots and dicots
• Examples of palmate, pinnate and parallel venation patterns (must show at least 2 and state which is which)
• Reproductive structures of a plant or fungus
• Seed dispersal by animals
• Seed dispersal by wind or water
• Sporophyte and gametophyte generations of the same plant
• Native Texas wildflower
• Plant native to Texas that can be used for human food (either the entire plant or the edible portion can be shown)
• Plant native to Texas that is toxic or poisonous
• Introduced or non-native plant that is toxic or poisonous
Animal Biology Module

- Amphibian
- Animal larva or pupa
- Animal that was first domesticated in Africa
- Animal that was first domesticated in Asia
- Animal that was first domesticated in Western Hemisphere (the "New World" — North, Central, or South America)
- Amniotic egg
- Animal that has a segmented body
- Animal with two-chambered heart
- Annelid
- Arthropod that is not an insect
- Bilaterally symmetrical organism
- Coelomate organism
- Courtship display
- Crustacean
- Deuterostome
- Examples of endoskeleton, exoskeleton, and hydroskeleton (one each, must state which is which)
- Lepidopteran
- Mating behavior
- Mollusk that is not a gastropod
- Protostome
- Organism belonging to order Passeriformes
- Organism belonging to order Anseriformes
- Organism belonging to order Psittaciformes
- Organism belonging to order Orthoptera
- Organism belonging to order Hymenoptera
- Organism belonging to order Coleoptera
• Organism belonging to order Rodentia
• Organism belonging to class Gastropoda
• Organism belonging to phylum Nematoda
• Organism belonging to phylum Echinodermata
• Organism belonging to phylum Platyhelminthes
• Organism belonging to phylum Porifera
• A Protozoan
• Ectotherm
• Endotherm
• Population
• Radially symmetrical individual
• Structure composed of chitin
• Two different life stages of the same animal species (must be morphologically distinct; i.e., a caterpillar and butterfly or a tadpole and frog)
• Animal that uses gills to accomplish gas exchange
• Animal that uses lungs to accomplish gas exchange
• Animal that uses book-lungs to accomplish gas exchange
• Animal that uses its skin to accomplish gas exchange
• Animal that uses spiracles and tracheae to accomplish gas exchange
• Ruminant herbivore vs. non-ruminant herbivore (must show at least one of each and state which is which)
• Regeneration of a body part of an animal
• Marsupial