

PROGRESSIONS:
PEER-LED TEAM LEARNING

Module 1: Overview and Hierarchy of Life

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I. Introduction

It may seem silly, but in order to understand what makes the human body work and what goes wrong in human disease, we first have to understand how it is put together and what actually makes it “alive.” It’s not as straightforward as you think—scientists have argued for centuries (and still argue) over these ideas. In this module, you will explore several aspects of the structure (anatomy) and function (physiology) of all life (of course, this includes humans). This will set the stage for all of the information in the coming semester and the next. Indeed, some topics like homeostasis and feedback will reappear in your studies over and over. Before you attend workshop, read Chapter 1 pages 2-3 and 12-22 in your textbook and do the Pre-Workshop Activities.

II. Pre-Workshop Activities

Activity A. Briefly define each of the following. Use your own words first, then find a definition from your text. Try to give an example for each term.

1. Anatomy
2. Atom
3. Cell
4. Cell Theory
5. Development
6. Differentiation
7. Evolution
8. Excretion
9. Growth
10. Homeostasis
11. Matter
12. Metabolism

13. Molecule
14. Movement
15. Negative Feedback
16. Organ
17. Organ System
18. Organelle
19. Organism
20. Organization
21. Physiology
22. Positive Feedback
23. Reproduction
24. Responsiveness
25. Sensor
26. Set Point
27. Tissue

Activity B. Fill in the blanks.

An organism is made up of _____ like the Digestive System which are made of _____ (an example of which is _____).

All matter is composed of small particles called _____ which bond together to form _____ like H₂O.

A liver cell has no distinguishing features when it first divides, but it soon _____ to have all of the specialized features and functions of mature liver cells.

All cells have structures inside them (such as the nucleus) which have special functions that are essential to the life of the cell. These “little organs” are called _____.

_____ is the tendency of a living organism to maintain certain constantly fluctuating properties within a narrow acceptable range.

All living things consume food, break it down, and then use the pieces to build new cells (and tissues, organs, etc.). This whole process is called _____.

A group of cells having a common structure and performing the same function is called a _____.

III. Workshop Activities

Activity A: Hierarchy of Life. In groups of 2-4, write the following terms on individual sticky notes, then work together to put them in order from most to least abundant. After you are finished, share your answers with the group. There is room on this page to record your answers after your group has decided on a final answer.

1. Place all of the following in order according to their abundance in the universe (most to least abundant).

Giraffes
Bacteria
Water
Carbon

Mitochondria
DNA
Hearts
Nervous Systems

Red blood cells
Nuclei
Humans
Teeth

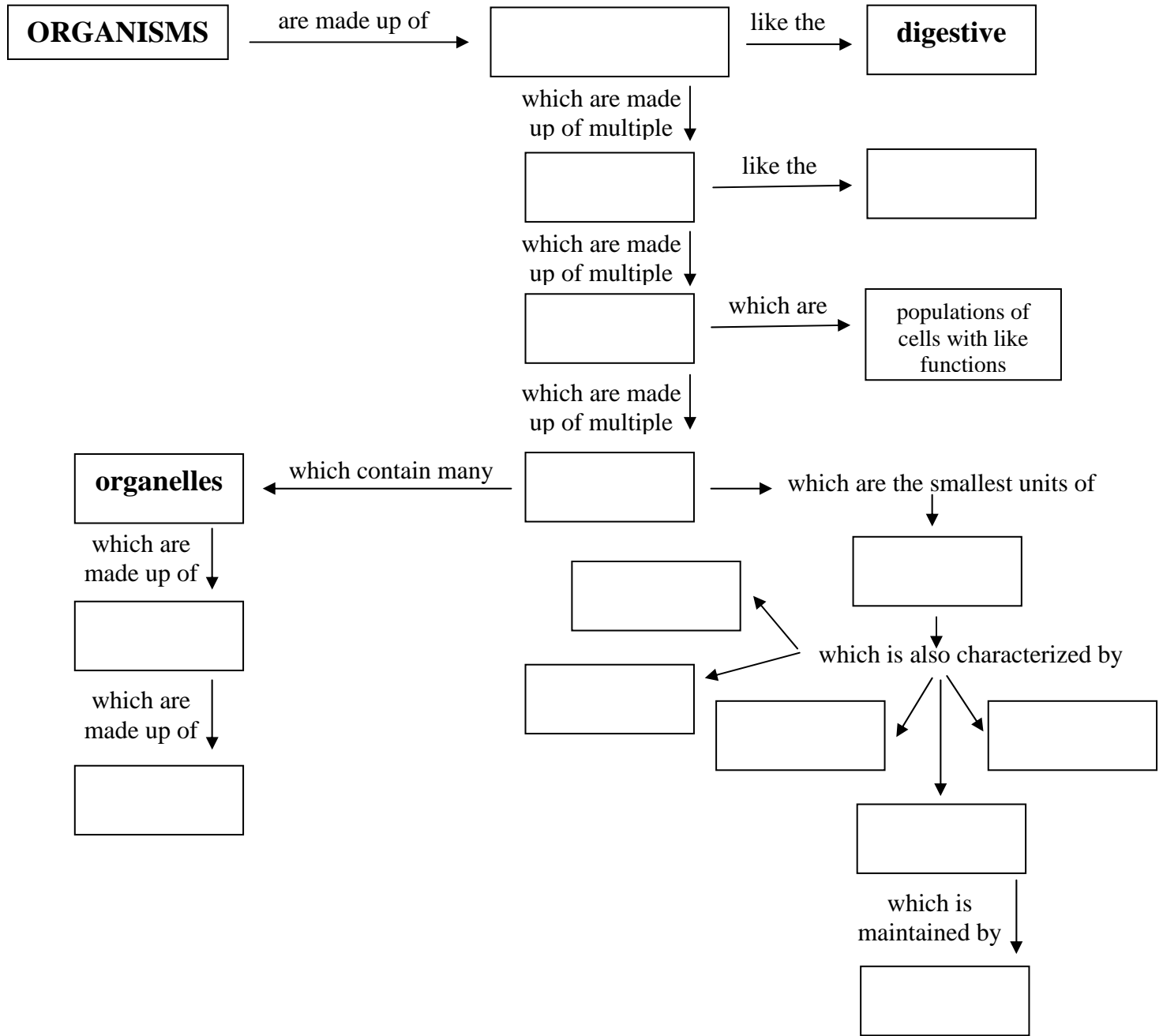
Activity B. Characteristics of Life

Determine which of the characteristics of life apply and which do not apply to the items below. This exercise will be done in Round Robin fashion using the chart below. The first person should explain to the group whether or not a characteristic applies (making sure to give evidence to support his or her claim). Then the next person will do the same thing with the next characteristic of life. Once each characteristic has been discussed, the group should decide whether the object is truly alive or not.

| | car | student | computer | cactus | bacteria |
|---------------------------------|-----|---------|----------|--------|----------|
| Organization | | | | | |
| Development | | | | | |
| Differentiation | | | | | |
| Growth | | | | | |
| Evolution | | | | | |
| Responsiveness | | | | | |
| Movement | | | | | |
| Cellular | | | | | |
| Homeostasis | | | | | |
| Reproduction | | | | | |
| Metabolism | | | | | |
| Excretion | | | | | |
| <i>Is it made of atoms?</i> | | | | | |
| <i>Is it made of molecules?</i> | | | | | |
| <i>Is it made of cells?</i> | | | | | |

| | | | | | |
|---------------------|--|--|--|--|--|
| <i>Is it alive?</i> | | | | | |
|---------------------|--|--|--|--|--|

Activity C. Concept Map. Complete the following using the vocabulary from the pre-workshop activities.



Activity D. Homeostasis and Feedback

Work in pairs. Are the following examples of negative feedback or positive feedback? How can you tell?

- a) You get thirsty after a hard workout at the gym and you drink a large glass of lemonade until your thirst is quenched.
 - b) You use a wooden match to light a campfire that spreads to the surrounding branches and trees to become a large forest fire.
 - c) The ovary, after releasing a mature egg, secretes estrogen to prevent any new eggs from maturing and being released.
 - d) A cat sees its tail and tries to catch it. The tail, of course, moves. The faster the cat runs, the faster the tail moves. The faster the tail moves, the faster the cat runs to catch it...
 - e) Calcium levels in the blood are low, so a hormone is released that causes the bones to give off calcium. This makes the calcium level too high, so another hormone is released to cause the bones to reabsorb calcium. This makes the calcium level in the blood too low...
 - f) A woman is nine months pregnant. The weight of the fetus pushing on her cervix causes the release of the hormone oxytocin. Oxytocin tells the uterus to contract. The contracting uterus causes the baby's head to push even harder against the cervix. This causes more oxytocin...
 - g) Normal body temperature hovers around 37°C.
 - h) The resting stomach is acidic. When you eat, the food in the stomach causes the stomach to become more basic. When the stomach contents become basic, acid secretion is stimulated. After the food is digested, the stomach becomes acidic again which inhibits further acid secretion.
2. Work in pairs. Use the following chart to record features of positive and negative feedback. Consider similarities and differences related to homeostasis, set points, fluctuations... In other words: what sorts of things should you look for if you're trying to identify negative or positive feedback? Share your answers with the group.

| Negative Feedback | Positive Feedback |
|-------------------|-------------------|
| | |

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