**Guided Notes: Structural Adaptations**

1. Remember that \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ is about maintaining a balance between the environment *\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_* your body and the environment *\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_* your body. Structural adaptations have \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ to help animals thrive and assume specialized roles (niches) in even the most \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of environments.

1. Four different types of adaptations:
   1. Transport and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
   2. Respiration
   3. Nutrition
   4. Reproduction, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and development

1. Transport and excretion - Organisms must constantly focus on maintaining a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ in pH, water, and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. Examples: salt water animals, desert animals, plants – vascular VS non vascular

1. Fresh and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ water organisms: Marine organisms must constantly \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ the amount of the fresh and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ in their bodies. This process is called *\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.*

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| **Marine Organism** | **Freshwater Organism** |
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6. Remember not all animal cells have \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_; some do, and if so they are called \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ vacuoles. Their purpose is to remove excess \_\_\_\_\_\_\_\_\_\_\_\_\_ build up inside the cell.

7. The \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ apparatus is a photoreceptive organelle found in the flagellate or (motile) cells of green algae and other unicellular photosynthetic organisms such as euglenids It allows the cells to sense \_\_\_\_\_\_\_\_\_\_\_\_\_ direction and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and respond to it by swimming either towards the light (\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ phototaxis) or away from the light (\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ phototaxis).

8. Lower pH = more \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, hydrogen ions (H+)

Higher pH = more \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, hydroxide ions (OH-)

9. Recall carbon cycle: carbon dioxide diffuses into ocean water

2CO2 + H2O → 2CHO3 (carbonic acid)

Carbonic acid takes up an excess carbonate that \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ organisms need to make shells, and that zooxanthellae need to make \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. Thin, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, or deformed shells of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ organisms that make up base of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ in oceans. \*Could lead to collapse of ecosystems. Weaker \_\_\_\_\_\_\_\_\_\_\_\_ structures more susceptible to \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ from storms and strong waves.

10. Due to the \_\_\_\_\_\_\_\_\_\_\_\_\_\_ temperatures and \_\_\_\_\_\_\_\_\_\_\_\_\_\_ precipitation, animals that live in the desert must have many adaptations to adjust to the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. Examples of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ to adjust to hot dry climate include:

(1) Concentrated urine

(2) Absence of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ glands in some animals

(3) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ behavior to limit loss of water during the day

(4) Plants have an extensive network of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ roots to catch any precipitation

(5)Plants have small/no \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ to prevent water loss

11. Transport and excretion

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| **Vascular Plants** | **Non Vascular Plants** |
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12. In \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ plants, xylem takes water and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ from the roots to the rest of the plant (\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_). \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ carries sugars down to the roots (\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_).

13. Respiration is how different organisms \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_ and release gases. Recall plants utilize \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ while animals utilize \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. \****Note the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ OF PHOTOSYNTHESIS = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ OF CELLULAR RESPIRATION***

14. Fish have gills to help them \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. Water enters mouth and exits the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. As water flows over the gills, dissolved \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ diffuses into the gill structures. Gills increase the surface area through which gases can \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (think cristae in mitochondria!)

15. Evolved 3 types of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ to aid in respiration (only one present in each arthropod):

(1) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ – same function and purpose as fish, found in arthropods like crabs

(2) Tracheal \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

(3) Book lungs

16. Tracheal tubes are branching \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of hollow air passages that carry air throughout the body. Muscle activity helps to \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ air through the tubes. Air enters and leaves tubes through openings on exoskeleton called *\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_*. Reduces water loss.

17. Book lungs – seen in spiders; book lungs are air-filled \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ that contain leaf-like plates. The stacked plates are arranged like pages of a book; the membranes are folded to \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ the surface area of blood-rich tissue exposed to air.

18. Autotrophs get their food from the \_\_\_\_\_\_\_\_\_\_\_\_\_; use the radiant energy from the Sun to make chemical energy (food). Heterotrophs get their food from other \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

19. Some organisms use \_\_\_\_\_\_\_\_\_\_\_\_\_ or \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ to move to get their food.

20. Darwin noticed that bird’s beaks have evolved to assume the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and size correlated to the types of \_\_\_\_\_\_\_\_\_\_\_\_\_\_ that they consume.

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| **Sexual Reproduction in Animals** | **Asexual Reproduction in Animals** |
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22. Advantages of Sexual Reproduction:

Advantages of Asexual Reproduction:

23. Asexual reproduction in plants results in a new plant that has \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ genetic information to the parent plant. A new plant can form from \_\_\_\_\_\_\_\_\_\_\_\_ of an existing plant. EX: dividing \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, growing an entire new plant from part of a \_\_\_\_\_\_\_\_\_\_\_\_\_ or other part of the plant

24. Sexual reproduction in plants occurs in the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_; male reproductive organs include the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. The anther is where the \_\_\_\_\_\_\_\_\_\_\_\_\_\_ grain is produced.

25. Female reproductive organs include the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_:

(1) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ – receives pollen grain

(2) \_\_\_\_\_\_\_\_\_\_\_\_\_ - connects stigma to the ovary

(3) \_\_\_\_\_\_\_\_\_\_\_\_\_ – develops into the seed

26. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ occurs when pollen grain is transferred from the anther to pistil. It occurs by \_\_\_\_\_\_\_\_\_\_\_\_\_, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, or insects.

27. Fertilization of plants results in the fusion of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ gametes. There is one \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ grain for each \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, that then develops into the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

28. In order to form a fruit, the surrounding \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ enlarges to become fruit. There are two types of fruits: (1) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ – apples, oranges, and tomatoes, and (2) \_\_\_\_\_\_\_\_\_\_\_\_ – peanuts, sunflower seeds.

29. A \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ is a reproductive cell that forms without fertilization, but still produces a new organism. EX: Protists, fungi, ferns. The advantage of spores is that it prevents them from \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ until they are ready to be released, and a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ number of spores can be produced at one time (\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ chances of survival). Also, they are \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ which means they can be carried far distances to aid in fertilization.

30. Mammals reproduce \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and the embryo develops inside the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, which provides blood, nutrients, and removes wastes. *\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_* of the placenta describes the folding of the membranes between the mother and fetus–for the purpose of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ surface area to exchange \_\_\_\_\_\_\_\_\_\_\_\_, nutrients, and remove \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

31. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ are the group of mammals commonly thought of as pouched mammals. They have live birth, but instead of having long \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ periods, babies are born early and climb from the mother’s \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ canal to the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. There it nurses and develops further.

32. Evolution of the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ egg was a major step in reptilian adaptations to land environments. Amniotic eggs close the embryo in \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ fluid, provide energy in the \_\_\_\_\_\_\_\_\_\_\_\_\_, and surround everything with a tough \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ shell. These adaptations help prevent \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of the embryo as it develops on land.

33. Bird eggs are encased in a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ shell, and they \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ the eggs by sitting on them and keeping them warm. The egg is turned \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ to ensure proper development.

34. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ fertilization occurs when an egg is released into the environment by a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and is fertilized by a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. A \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ habitat is essential for this type of fertilization so the gametes don't dry out. Aquatic invertebrates and most \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ practice external fertilization. Organisms clustered in the same area release their eggs and sperm in the water at the same time in a process called \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

35. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ fertilization, where the egg and sperm fuse during internal fertilization inside the animal. EX: humans, placental mammals