**SC.912.l.14.7 Relate the structure of each of the major plant organs and tissues to physiological processes.**

**Processes:**

1. **Photosynthesis** – light energy is converted to chemical energy, uses carbon dioxide and water to produce oxygen and glucose
2. **Cellular Respiration** – produces ATP (energy) for the organism to use, happens in living things including plants Photosynthesis products are Cellular Respiration reactants. They are interrelated.
3. **Transpiration** –loss of water in plants through the leaves, uses the stomata, surrounded by the guard cells that open and close due to the water pressure
4. **Reproduction** – making new plants *sexual* OR *asexual processes.*

**Tissues**

1. **Meristematic** –only in the tips of roots and shoots, for plant growth
2. **Ground** – most photosynthetic processes occur here, mainly leaves – makes up the majority of the plant
3. **Dermal** – covers the outside of plants, thick epidermis, cuticle on the upper and stomata and guard cells on the lower epidermis
4. **Vascular** - transports water, minerals, nutrients and organic compounds to all part of the plant EX – xylem and phloem

**Roots**

The start of the vascular system that moves water and minerals from the soil up to the leaves and fruits.

**Function**

* Absorb and conduct water and minerals
* Anchor and support plants
* Store products of photosynthesis (carbohydrates, sugars, proteins)

**Structure**

* **Root hairs –** Absorptive unicellular extensions of epidermal cells of a root.  The major site of water and mineral uptake.
* **Phloem** – carries products of photosynthesis throughout plant.
* **Xylem -** carries water/minerals up from the roots up through the plant.
* **Root cap –** A thimble-shaped group of thick-walled cells at the root tip helping to push though soil and protect the meristem tissues.

**Stems**

Stems are the part of a plant that bear leaves and flowers and they are the continuation of the vascular system pipeline that starts in the roots.

**Function**

* Framework for leaves, flowers and seeds
* Continuation of vascular system carrying water and minerals from the soil, and sugars manufactured in leaves throughout the plant.
* Green stems also manufacture food (photosynthesis).
* Food storage

**Structure**

* **Xylem tissues –** Distribute water and minerals through the plant. Provides structural support in plants, becoming the “woody ” tissue.
* **Cambium tissues -** the single-celled layer of meristematic (dividing) tissues that continually divides to form phloem tissues toward the outside and xylem tissues toward the inside. Adds width to the stem.
* **Phloem tissues (inner bark) –** distribute sugars (products of photosynthesis) throughout the plant. When the phloem is blocked, the stem may enlarge just above the block due to the sugars moving from the leaves for distribution through the plant. Tissues below the block slowly starve. Roots die, leading to death of the plant.

**Leaves**

Produced on stems, where photosynthesis happens. Cacti are an exception.

**Functions**

* To compete for light for photosynthesis, makes the sugars
* Transpiration moves water and nutrients up from the roots.
* Regulate moisture, gas exchange and temperature.

**Structure**

* **Stomata –** Natural openings in leaves and herbaceous stems that allow for gas exchange (water vapor, carbon dioxide and oxygen).
* **Guard cells –** Specialized cells that open and close the stomata.

**Flowers**

Flowers are the reproductive structures of a flowering plant. Flowers are the primary structures used in grouping plant families.

**Function**

* Reproduction
* lure a pollinator

**Structure**

* **Pistil –** Central female organ of the flower. It is generally bowling-pin shaped and located in the center of the flower.
* **Stigma –** Receives pollen, typically flattened and sticky
* **Style –** Connective tissues between stigma and ovary
* **Ovary –** Contains ovules or embryo sacs
* **Ovules –** Unfertilized, immature seeds
* **Stamen –** Male flower organ
* **Anthers –** Pollen-producing organs
* **Filament –** Stalk supporting anthers
* Pollen is plant sperm
* **Petals –** Usually colorful modified leaves that make up the “flower”. They may contain perfume and nectar glands.
* **Sepals –** Protective leaf-like enclosures for the flower buds, usually green. Sometimes highly colored like the petal.

**Fruit**

Fruit develops from the ovary following pollination and fertilization. Fruits can be either fleshy or dry. They contain one or more seeds.

**Function**

* Reproduction

**Structure**

* **Carpels -** where the ovules (seeds) develop and the ovary wall or pericarp, which may be fleshy (as in apples) or dry and hard (as in an acorn). Some fruits have seeds (mature ovules) enclosed within the ovary (apples, peaches, oranges, squash and cucumbers). The pea pod, and pit of a peach are derived from the pericarp.

**Fruit Types**

**Cones (conifers)**

* **Conifers** are best known for their woody cones, pinecones. Junipers are an example of a conifer with a fleshy cone (Juniper berry).

**Seeds**

A seed (mature ovule) is a miniature plant with a protective cover in a suspended state of development. Most seeds contain a built-in food supply called endosperm. The endosperm can be made up of proteins, carbs or fats.

**Function**

* Reproduction

|  |  |  |
| --- | --- | --- |
| **Tissue** | **Structure (made of)** | **Function**  |
| **Vascular** |  |  |
| **Dermal**  |  |  |
| **Ground** |  |  |
| **Meristematic** |  |  |
| **Organ** | **Structures involved**  | **Function** |
| **Leaves** |  |  |
| **Stems** |  |  |
| **Roots** |  |  |
| **Flowers**  |  |  |
| **Fruits** |  |  |
| **Cones** |  |  |

1. In some flowers, the ovary is hidden within the base of the flower, while pollen is held up in the air, often near a source of nectar. How is this design helpful to the plant?
2. It keeps the pollen dry by exposing it to air while keeping the ovary moist.
3. It makes it possible for seeds to develop both in the ovary and pollen grains.
4. It encourages animals to carry pollen for cross-fertilization while leaving the ovary alone.
5. It allows the plant to self-fertilize easily since the pollen can drop into the ovary.
6. A unique characteristic of the banyan tree is that roots grow down from its branches into the ground. The tree can appear to have several trunks. What advantage does this root characteristic give the banyan tree over other trees?
7. The roots provide shelter for ground-dwelling animals, which carry nutrients to the tree.
8. The banyan can grow near the equator, because aboveground roots are more protected from the sun.
9. The banyan can only grow in humid climates, because aboveground roots are more likely to dry out and die during droughts.
10. The banyan can grow in areas prone to hurricanes and typhoons, because the roots make the tree more stable in high winds.

# The diagram to the right shows a flower.

# Which parts of the flower are male reproductive

# structures?

1. parts A and B
2. parts C and D
3. parts E and F

# parts D, E, and F