21.1 Plants have specialized \_\_\_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ systems

Plant tissues are made of \_\_\_\_\_ basic cell types.

* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ cells are the most common plant cell type.
  + store \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, \_\_\_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
  + help \_\_\_\_\_\_\_\_\_\_\_ wounds to the plant
  + have thin flexible \_\_\_\_\_\_\_\_\_\_\_\_
* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ cells provide support to a growing plant
  + they are \_\_\_\_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
  + \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ strings are strands of collenchyma.
  + they have \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ cell \_\_\_\_\_\_\_\_\_\_\_\_\_.
* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ cells are the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ plant cell type
  + \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ cell wall hardened by \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
  + \_\_\_\_\_\_\_\_\_\_ when they reach maturity
  + used by humans to make linen and \_\_\_\_\_\_\_\_\_\_\_\_\_

Plant organs are made of \_\_\_\_\_\_\_\_ tissue systems.

* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ tissue covers the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of a plant.
  + \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ the plant
  + secretes \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of leaves
  + forms outer \_\_\_\_\_\_\_\_\_\_\_\_\_ of trees
* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ tissue is found \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ a plant
  + provides \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
  + stores materials in \_\_\_\_\_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_\_\_\_
  + most commonly made of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ tissue transports \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ compounds.
  + \_\_\_\_\_\_\_\_\_\_\_\_ networks of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ tubes
  + \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ transports \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
  + \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ transports \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

21.2 The Vascular System

The vascular system allows for the transport of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

Water and dissolved minerals move through \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

* Xylem contains specialized cells.
  + \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ are short and wide
  + \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ cells are long and narrow
  + \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ cells die at maturity
* The \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ explains \_\_\_\_\_\_\_\_\_\_\_\_\_ movement.
  + Plants passively transport \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ through the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
  + \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ is the tendency of water molecules to bond with \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ other.
  + \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ is the tendency of water molecules to bond with \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ substances.

Water travels from \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ to the \_\_\_\_\_\_\_\_\_\_\_\_\_ of trees.

* + \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ occurs at \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
  + \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ in \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
  + \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ at \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ is the loss of water vapor through leaves.

* + water vapor exits leaf \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
  + helps \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ water to the top branches

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ carries sugars from photosynthesis throughout the plant.

* Phloem contains specialized cells.
  + \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_ elements have holes at ends
  + \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ cells help sieve tube elements
  + unlike xylem, phloem tissue is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

The \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ explains sugar movement.

* + plants \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ transport sugar from the source
  + sugar flows to the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ due to pressure differences

21.3 Roots and Stems

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ form the support system of vascular plants.

* Roots \_\_\_\_\_\_\_\_\_\_\_\_ plants and \_\_\_\_\_\_\_\_\_\_\_\_\_ mineral nutrients from soil.
* Roots provide many functions.
  + \_\_\_\_\_\_\_\_\_\_\_\_\_\_ the plant
  + absorb, transport, and store \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
  + root \_\_\_\_\_\_\_\_\_\_\_\_\_\_ help \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* There are several parts of a root.
  + root \_\_\_\_\_\_\_\_\_ covers the \_\_\_\_\_\_\_\_
  + \_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ is an area of growth
  + \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ contains xylem and phloem
* There are two main types of roots.
  + \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ root systems have fine branches.
  + Taproot systems have one main root.

Stems support plants, transport materials, and provide storage.

* Stems have many functions.
  + \_\_\_\_\_\_\_\_\_\_\_\_\_\_ leaves and flowers
  + house most of the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ system
  + store \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
  + grow underground for \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
  + Form new plants
* Some stems are \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and conduct \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
* Some stems can be \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, and form \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ bark.
* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ growth increases a plant’s \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ growth increases a plant’s \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
* Tree \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ help determine the \_\_\_\_\_\_\_\_\_\_\_ of a tree.

Draw & Label

21.4 Leaves

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ absorb \_\_\_\_\_\_\_\_\_\_\_\_\_\_ and carry out \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

Most leaves share some similar structures.

* The \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ is usually \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_\_\_\_.
  + collects \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ for photosynthesis
  + \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ is between the leaf’s \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ tissue layers.
* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ cells surround each \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
  + \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ open and close when guard cells change \_\_\_\_\_\_\_\_\_\_\_\_\_.
  + When stomata are open, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
  + Stomata \_\_\_\_\_\_\_\_\_\_\_\_\_\_ at \_\_\_\_\_\_\_\_\_\_ & when plant loses too much \_\_\_\_\_\_\_\_.
* Leaves may be \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, or \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
* Leaf veins may be \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ or \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
* Leaf margins may be \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, or \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

Most leaves are specialized systems for \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

* There are \_\_\_\_\_\_\_\_\_ types of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ cells.
  + \_\_\_\_\_\_\_\_\_\_\_\_\_\_ types contain \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
  + \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ mesophyll absorbs \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
  + \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ mesophyll connects to \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\* Leaves have many \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

* + for \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ temperatures, ex: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
  + for water \_\_\_\_\_\_\_\_\_\_\_\_\_, ex: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
  + for \_\_\_\_\_\_\_\_\_\_\_\_\_\_ environments, ex: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
  + for getting \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, ex: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_