

Stems, greens and Wreaths

Fall/Winter activity

Activity: Students learn about the structure of stems by shaping grape vines into circular wreaths. They can also attach greenery or found objects to the grape vine base.

Goals: Students will learn about the different structures on the outside and inside of a stem. They will discuss the function of stems and how they grow. They will learn the difference between evergreen and deciduous plants.

Supplies: grape vines, other greenery, pruning shears (for garden parent), twine, wire, ribbons, rubber bands, found material, scissors from classroom

How to proceed: Have students examine the grape vines and other greenery provided for you. As they are looking at these elongated vining stems discuss various parts of the stem structure such as where the leaves attach and the small buds (=future branches) at the bases of the buds. Note that the older parts of the grape vines become woody and brown on the outside. Newer stems remain green or "**herbaceous**." Using the pruning shears, cut cross-sections of the thicker stems and point out the main parts of the stem: the central **pith** (may be brown or white), the outer ring of **xylem** and **phloem**, and the outermost **epidermis** covered by a thin layer of **bark** (see background info below). If you peel apart the thicker stems you can see how the xylem and phloem make thin "stringy" structures (like celery strings) in the grape vine.

After you have examined the vines, students may shape them into small, circular wreaths by bending the vines into a circle then looping the vine over onto itself to secure the circle. Keep adding more vines until you get the look you want. Thinner vines will bend more easily. If vines are too thick, they will break when you try to bend them into smaller circles. You can use the jute twine to help with your construction.

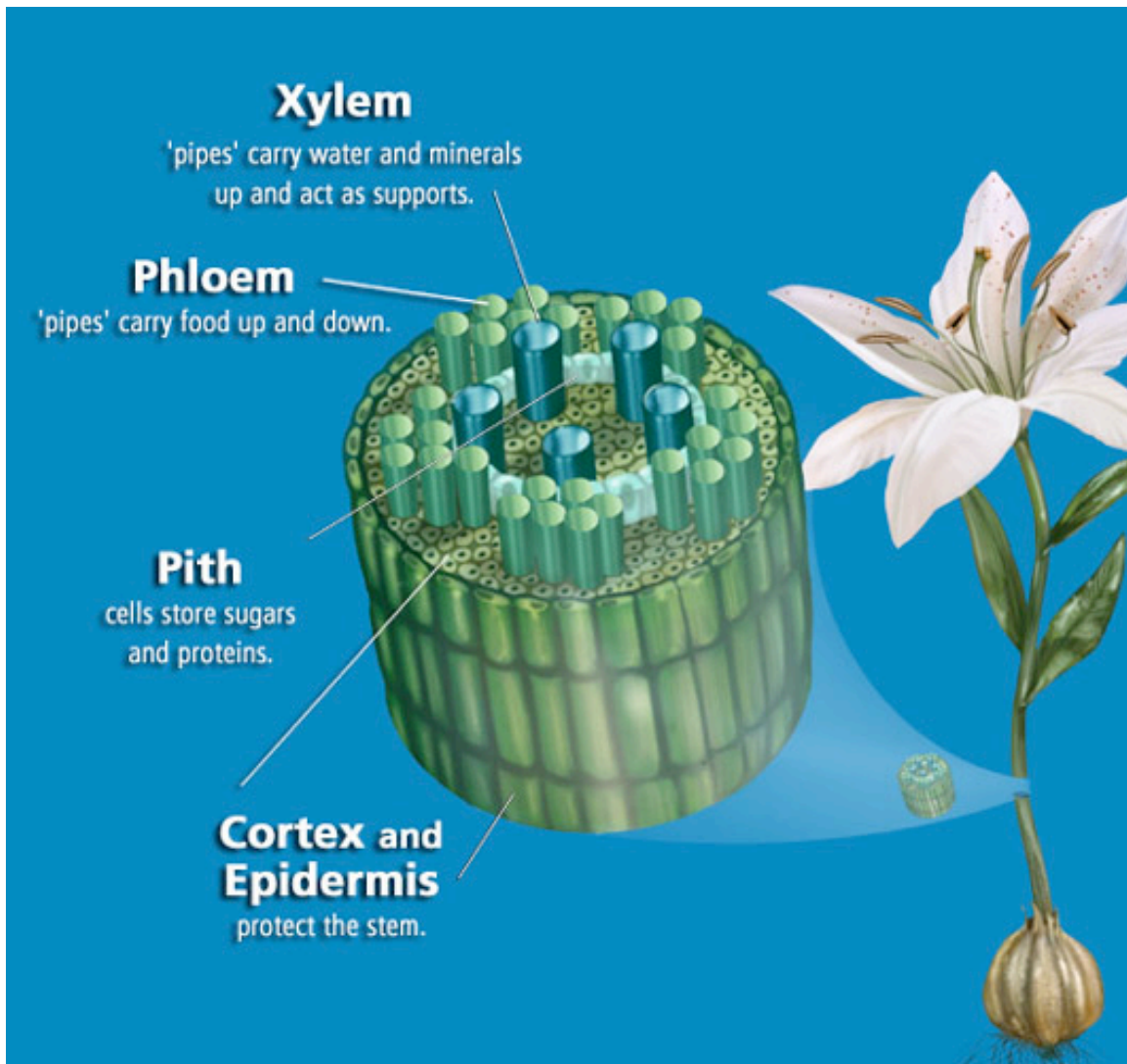
Once you have made the vine framework, you can tuck in other greenery or decorations. You can also apply glitter or paint to the vines if you wish. Students should take the wreaths home for a holiday decoration.

You may also make wreaths by using purchased wire or foam frames, or by making wire frames out of coat hangers or similar heavy duty wire (you will need pliers).

Background: stems

Grape vines are elongated stems that grow primarily at the tips, creating the typical vine structure. Young vine stems are **herbaceous**, meaning they stay green and flexible, but older stems become brown or **woody**. Future side branches can form where you see small **axillary buds** at the bases of leaves. The growth pattern of the stem determines whether a plant is highly branched, like a bush; or whether it branches very little and forms a vine.

If you look at a cross-section of a grape stem, you will see a central **pith** region containing cells that are storing food, surrounded by a ring of **vascular** elements. Just like the vascular system of our body, the vascular plants (i.e. flowering plants, pines etc.) have a network of small microscopic pipes that transport water and food to the various parts of the plant. **Xylem** pipes carry water and minerals from the root to other parts of the plant. **Phloem** pipes carry food made in the leaves to other parts of the plant. This vascular transport system allowed these types of plants to grow very large.



Background: evergreen versus deciduous

Evergreen plants are those that don't shed their leaves all at once, while deciduous plants shed their leaves at the end of a growing season. In our temperate zone area this typically occurs in the fall, although there are some California native plants that lose their leaves in the dry summer months (e.g. California buckeye tree).

When we think of evergreen plants we often think of conifers like pines, firs and cypresses, but there are also evergreen tropical plants and evergreen oak and olive trees.

Temperate evergreen trees have tough or drought-tolerant foliage that can survive through harsh winter or summer conditions. These trees don't have to use as much of their energy making new leaves, but the tough structure of the leaves makes them not as efficient in photosynthesis to make more food for the tree.

By contrast, temperate deciduous plants and trees use more energy to replace all of their leaves, but their thinner and flimsier leaf structure allows for more efficient photosynthesis and energy production. So you can see there is a tradeoff between using more energy to make more efficient leaves versus saving energy to keep less efficient leaves.

Tropical plants have continuous growing seasons because of the lack of harsh winter or summer conditions so they don't face these sorts of tradeoffs. They can afford to have green, high efficiency leaves all the time.

Students can compare the tough, thin and often spiny evergreen conifer leaves to thin and flimsy deciduous leaves that have fallen from trees.

Wreath/swag samples



(1) grapevine, found objects, bow (2) wired greens to vines

(3) rubber band greens, add ribbon