The Structure of a Stem

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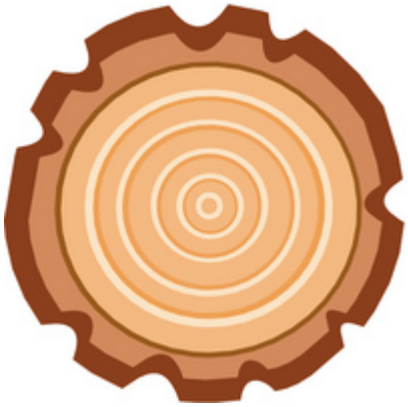

[1] Stems are considered to be plant organs. An organ is a group of tissues that performs a specialized task. The stem of a plant has two important jobs. It carries substances between the plant's roots and leaves. It also provides support for the plant and holds up the leaves toward the sun. In addition, some stems provide storage for the plant. A saguaro cactus, for example, stores water in its stem. Asparagus plants store food for the plant in their stems.

[2] Stems vary in size and shape. Some stems, like trees' stems, are the biggest and most easily seen part of the plant. Other stems, like those of a cabbage, are short and hidden.

[3] Stems can be either **herbaceous** or **woody**. Herbaceous stems are soft. Some plants that have herbaceous stems are dandelions, most flowers, and tomato plants. You can easily break these stems. In contrast, woody stems are hard and rigid. Maple trees, pine trees, and roses all have woody stems.

[4] Herbaceous and woody stems consist of phloem and xylem tissue as well as many other supporting cells. However, unlike herbaceous stems, woody stems have an outer layer of material called bark, which helps protect the cells inside it, and inner layers of heartwood for additional support.

[5] Bark covers the outer part of the stem. Bark keeps the tree from drying out, and it also protects it from injuries caused by insects, large animals, and fires. In addition, bark helps keep out disease. As the tree trunk gets thicker, the bark gets thicker, too. The outer layers of bark are dead. In some trees, the layers peel off, like dead skin. In other trees, the outer layers build up over the years and form a thick corky barrier against damage and decay.

[6] Just inside the bark is the phloem, sometimes called the inner bark. The phloem transports sugars made by the leaves to all parts of the tree. Inside the phloem is a layer of cells called the **cambium** (KAM bee um). The cells of the cambium divide to produce new phloem and xylem. This process increases the stem's width, or girth. Just inside the cambium is a layer of active xylem that transports water and nutrients. Inside that layer is a layer of xylem cells that no longer carries water and nutrients. This layer, which is called heartwood, strengthens the stem, providing the tree with additional support. In the center of the stem is a material called the

pith. In young trees, the pith stores food and water.

[7] Have you ever looked at a tree stump and seen a pattern of circles? These circles are called annual rings because they represent one year of a tree's growth. Annual rings are made of xylem. Xylem cells that form in the spring are large and have thin walls because they grow rapidly. They produce a wide, light brown ring. Xylem cells that form in the summer grow slowly and are small and have thick walls. They produce a thin, dark ring. One pair of light and dark rings represents one year's growth. You can estimate a tree's age by counting its annual rings.

[8] The width of a tree's annual rings can provide important clues about past weather conditions, especially rainfall. In rainy years, more xylem is produced, so the tree's annual rings are wide. In dry years, rings are narrow. By looking at a tree's annual rings, scientists can make inferences about the weather conditions during the tree's life. For example, when scientists studied annual rings from trees in the southwestern United States, they inferred that severe droughts occurred in the years 840, 1067, 1379, and 1632.

[9] Stems anchor plants in the soil. They support the plant, helping the leaves reach toward the sun. Stems transport water, minerals, and nutrients from the soil between the roots and leaves. Stems transport sugars made in the leaves to other parts of the plant. Stems from trees are very important to people who use the wood to make many useful items.

Name _____ Science Pd _____

The Structure of a Stem

1. What are two important functions of the stem? (A) Absorbs water and takes in nutrients (B) Makes food for the plant and gives off oxygen (C) Carries substances between the plant's roots and leaves and provides support for the plant (D) All of the above	2. Stems can be described as either _____ or _____. _____ _____
3. A plant stem you can easily break is called a: (A) Woody stem (B) Paper stem (C) Herbaceous stem	4. The outer bark on a tree is: (A) Dead (B) Protection from injury and disease (C) Protection from drying out (D) All of the above
5. The "inner bark" is called: (A) Cambium (B) Phloem (C) Xylem	6. What do the cells of the cambium do? (A) Transport water and nutrients through the stem (B) Divide to make new xylem and phloem (C) Transport food from the leaves