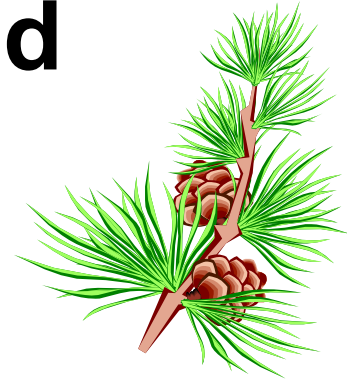
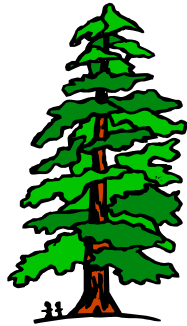


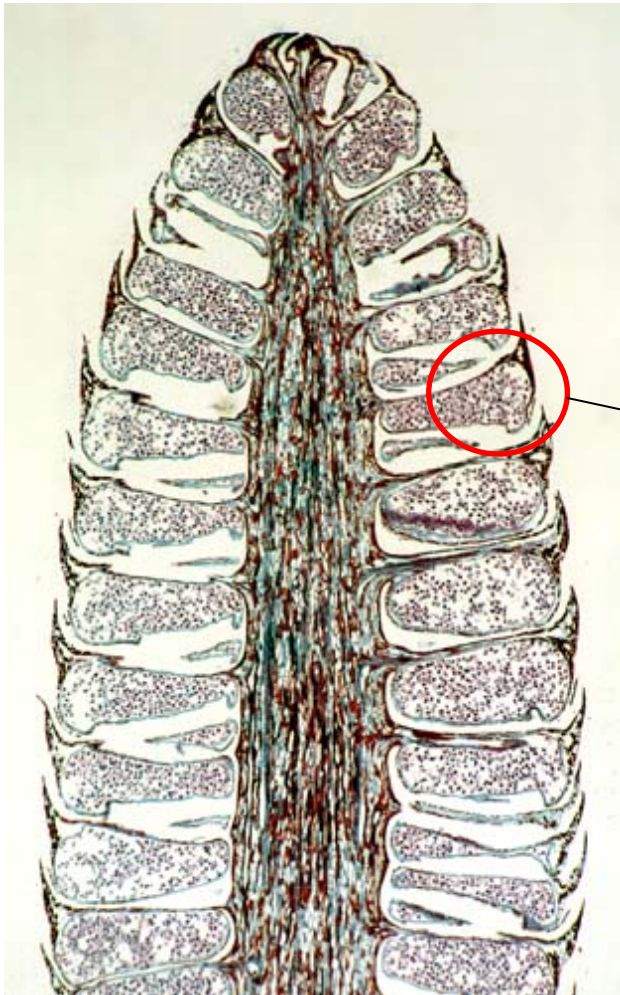
# Angiosperms and Gymnosperms



# Gymnosperms

A gymnosperm is a vascular plant that produces seeds lacking an outer fruit. Normally these seeds are contained in cones.

Gymnosperms have male and female cones. The male cones produce sperm, which are contained in pollen grains. Male cones are normally smaller than female cones.

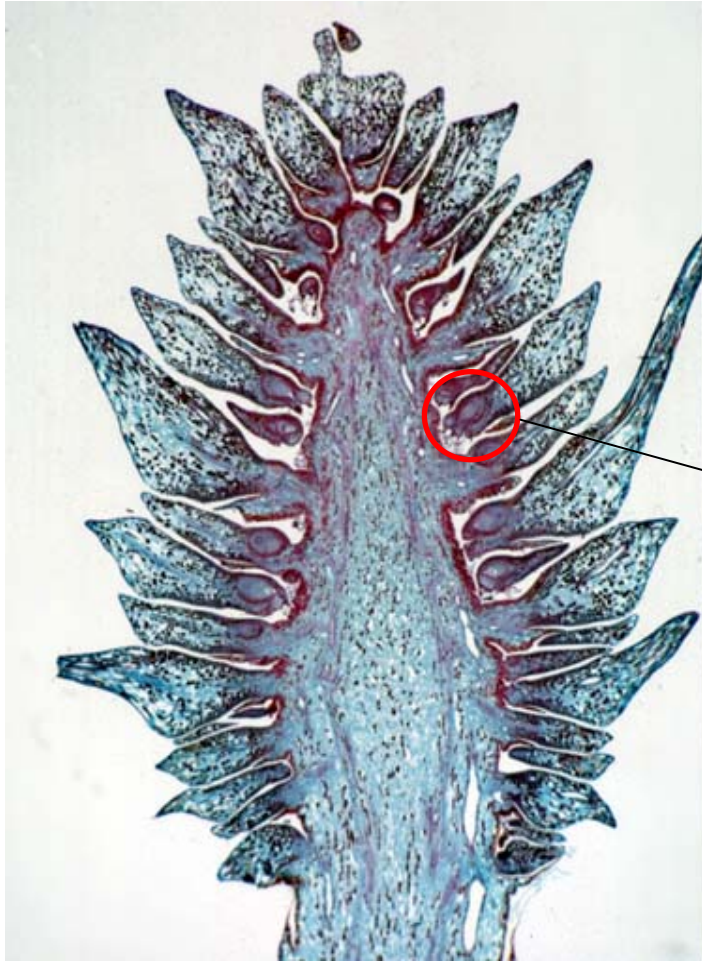


Pollen Grains



Microscope Slide of Male Pine Cone

# Gymnosperms



Microscope Slide of Female Pine Cone

The female cones produce eggs, which are contained in ovules. Female cones have a sticky resin that “catches” the pollen released by the male cone.

When fertilized, the female cone enlarges and the scales separate. This separation seeds to drop out of the cone and are dispersed by animals, such as chipmunks & squirrels.

Ovule with egg



Female Pine Cones with separated scales



# Gymnosperms

Identify the following cones as male or female. Remember that it takes female cones time to mature and before they are brown, they are a green color.



Cone A

Cone B



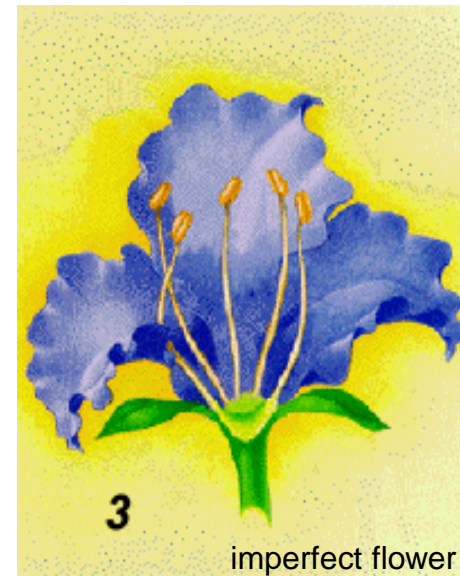
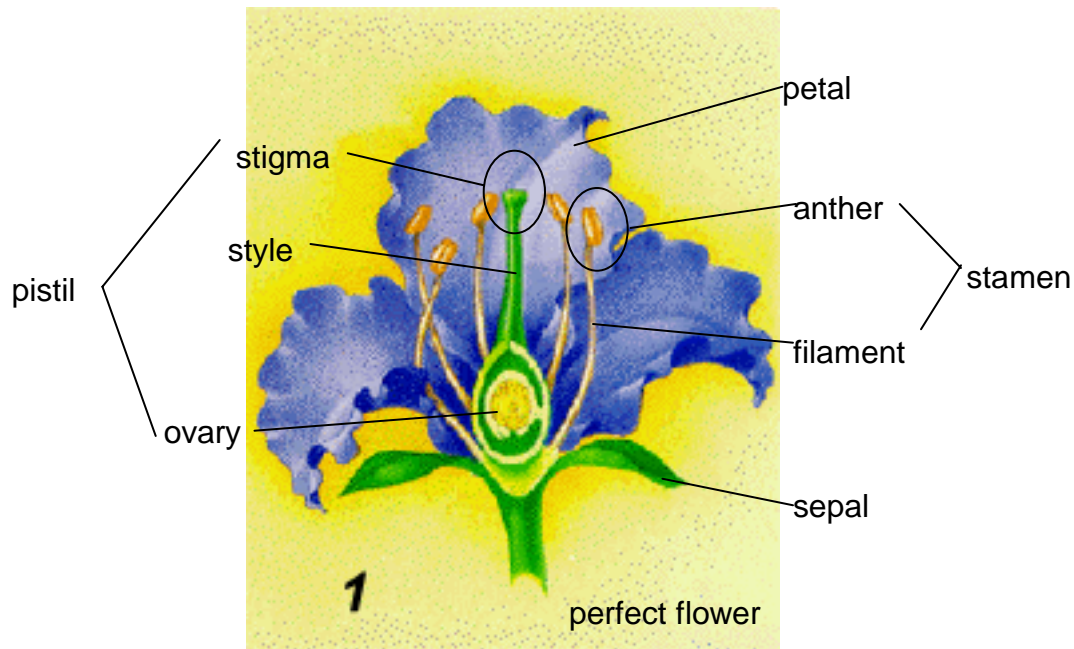
Cone C



Cone D

# Angiosperms

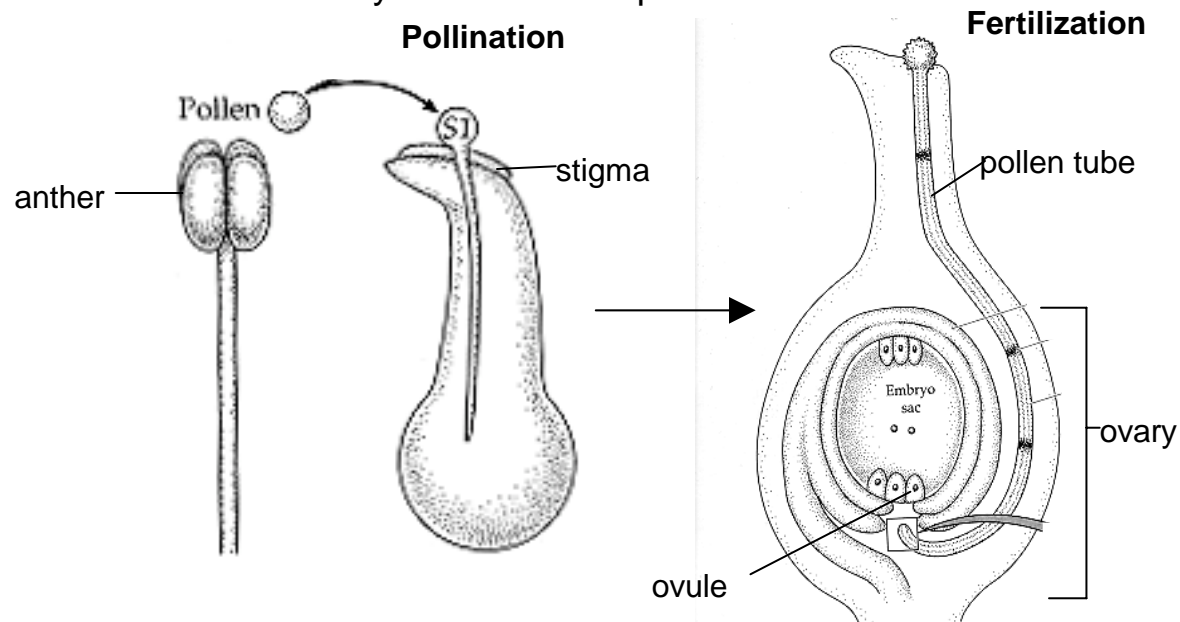
Angiosperms are flowering plants that reproduce through seeds that are contained in fruit. The flower of a plant can contain male anatomy, female anatomy and sterile structures. A plant that contains both male and female anatomy is known as a **perfect flower**. A flower that only contains male or only female anatomy is called an **imperfect flower**.



# Pollination & Fertilization

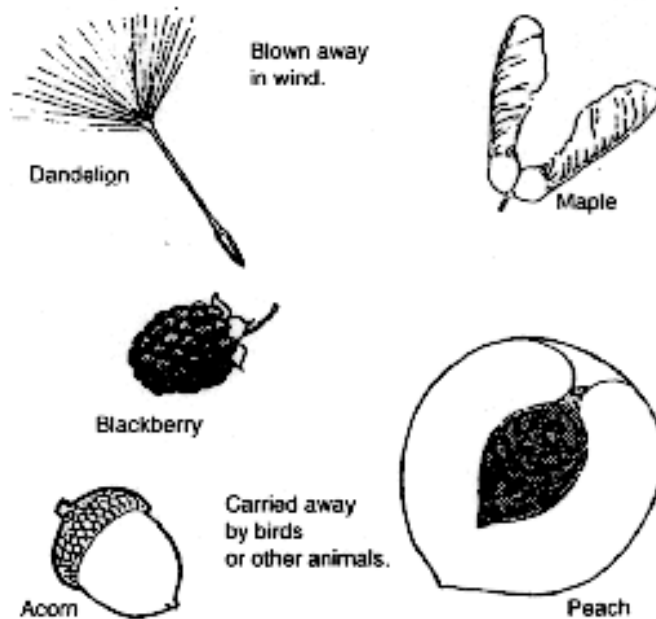
The anther of the stamen releases pollen grains that contain sperm cells. The pollen lands on the stigma of the pistil. The transfer of pollen from the anther to the stigma is known as **pollination**.

When the pollen grain makes contact with the stigma, it starts to grow a **pollen tube**. The pollen tube connects to the ovule in the ovary and delivers the sperm cell to the ovule. The sperm meets with the egg in the ovule and **fertilization** occurs. The fertilized egg will become a **seed** and the ovary will become a protective fruit.



# Pollinators

Pollinators are organisms that transfer the pollen from one plant and place it on another plant. Common pollinators are insects, such as bees, butterflies and lady bugs, and animals.



# Seed Dispersal

Seeds are dispersed away from the parent plant in a manner of ways. The three main ways are: wind, water and animals.

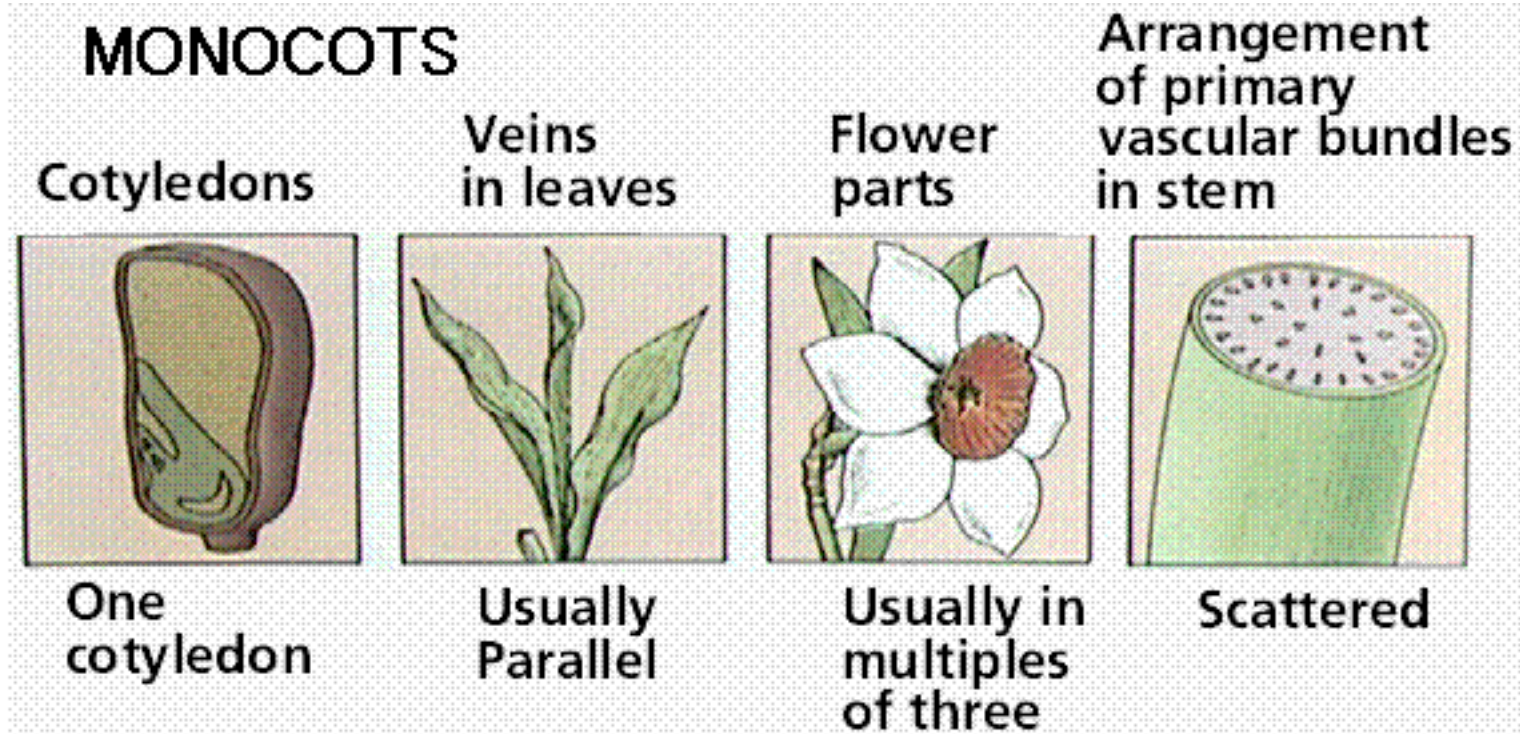


Electron Micrograph of Cocklebur Seeds



# Monocot Angiosperms

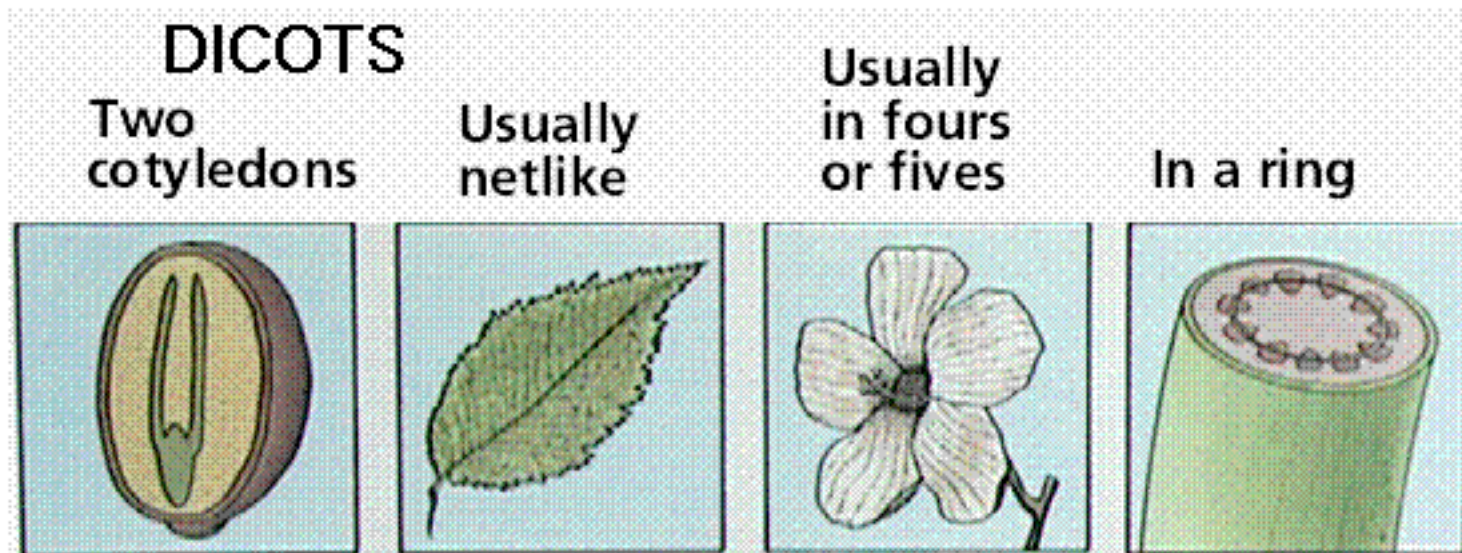
Angiosperms are broken into 2 groups: the monocots and the dicots. Monocots have 1 cotyledon, parallel veins, flower parts in multiples of 3 and scattered vascular bundles through out the stem. Examples of monocots are corn and grasses.





# Dicot Angiosperms

Dicots contain 2 cotyledons, have a network vein pattern in their leaves, have flower parts in multiples of 4 or 5 and have their vascular bundles in a ring around the edge of the stem. Examples of dicots are roses and maple trees.



# Angiosperms

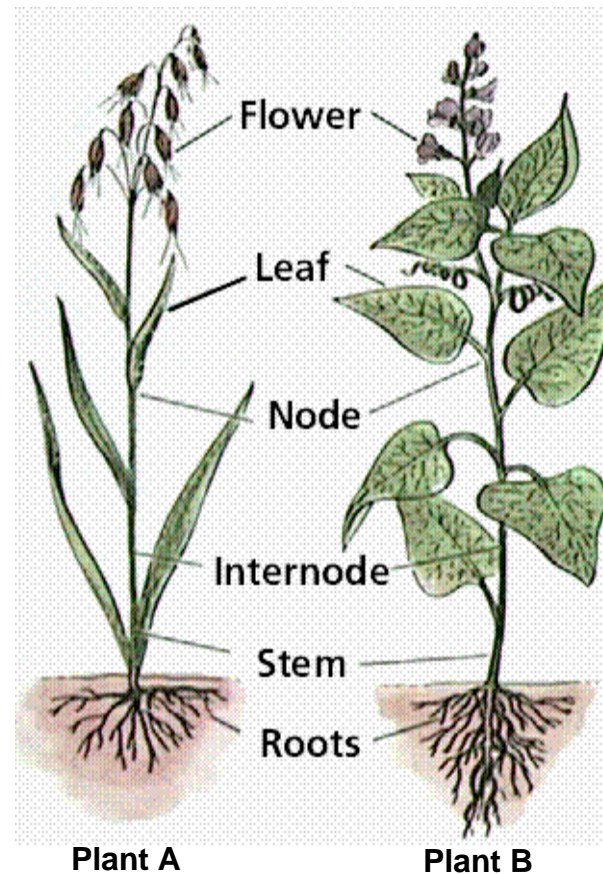
Identify the following pictures as an example of a monocot or dicot. Justify your reason.

## Roots

Plants can have one of two types of roots:

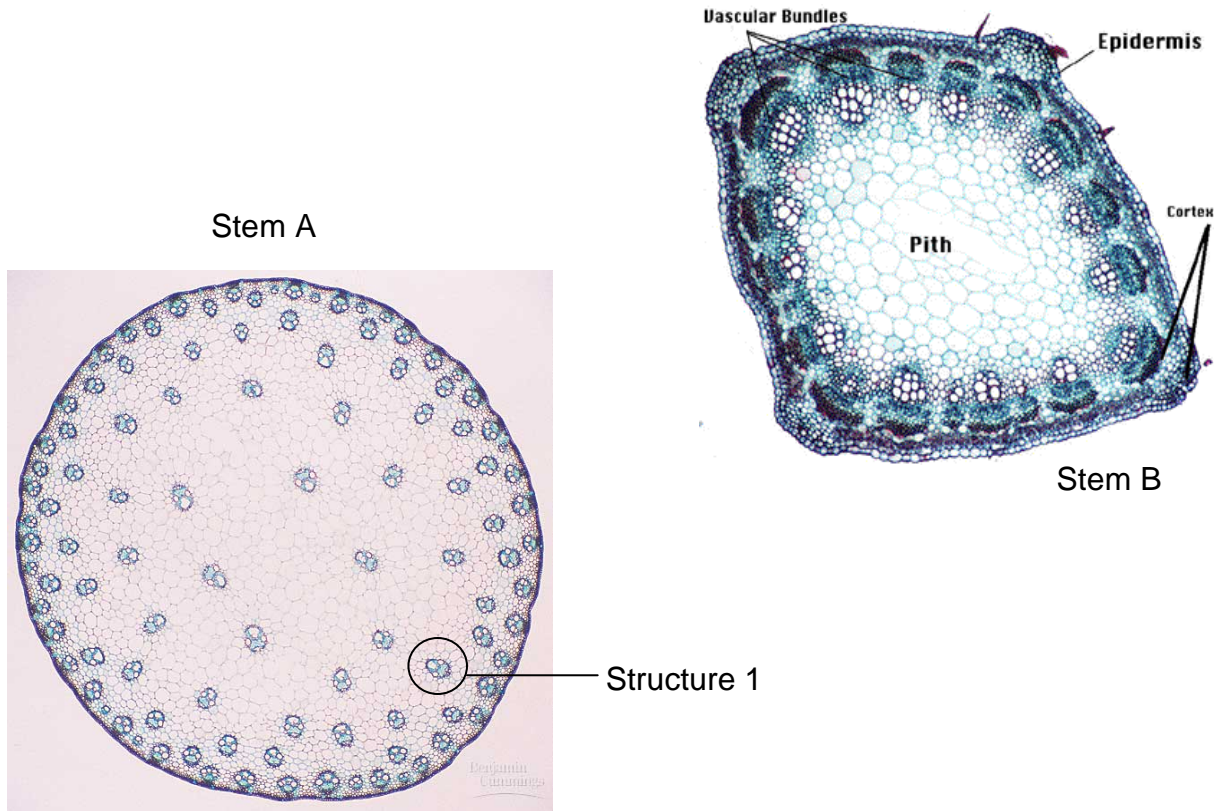
1. **tap root:** a long, main primary root with smaller roots branching off the tap root. Tap roots have the ability to grow deep into the ground. Dicots most often have tap roots.

2. **fibrous roots:** small, extensively branched roots. Fibrous roots stay close to the surface but cover a wide area of soil. Monocots most often have fibrous roots.



# Angiosperms

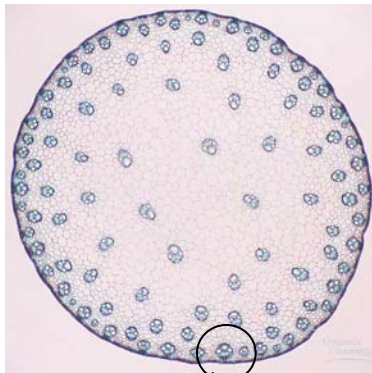
Identify the following pictures as an example of a monocot or dicot. Justify your reason.



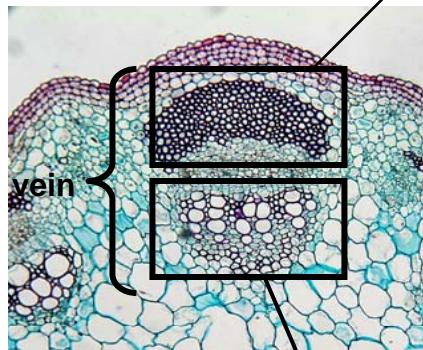


# Angiosperms

Veins in a plant transport water and nutrients. The **xylem** of the vein transports the water and it only flows up from the roots to the rest of the plant. The **phloem** transports the nutrients, including the glucose made in the leaves, and flows both up and down the length of the plant.



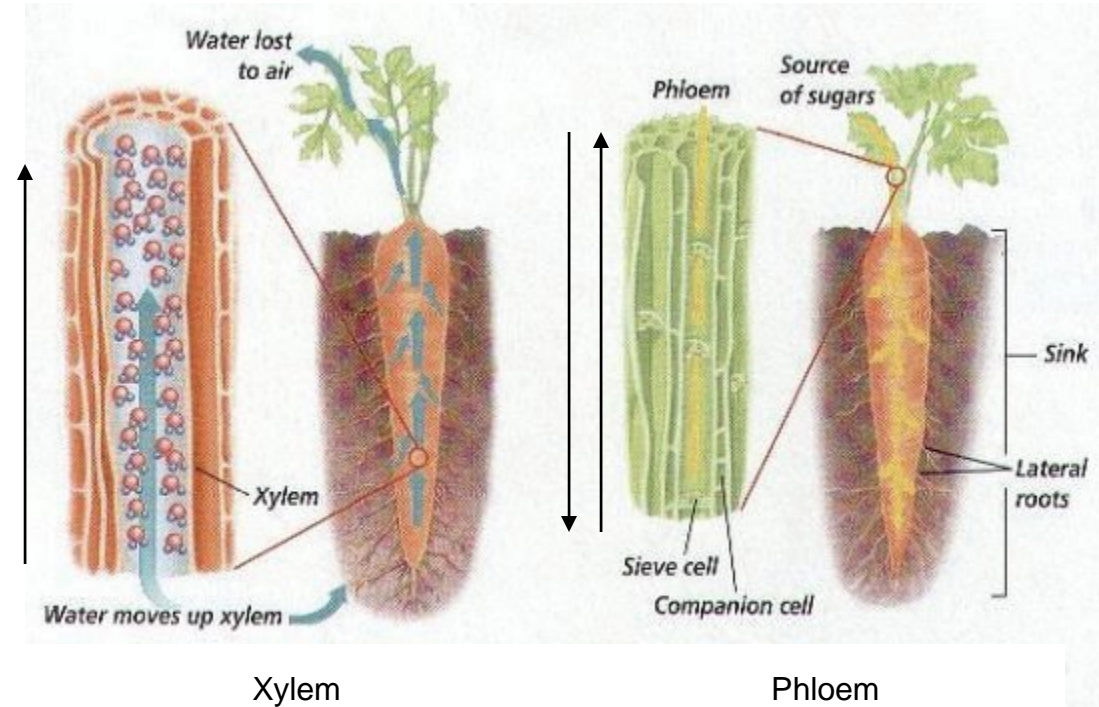
vein



phloem

vein

xylem



Xylem

Phloem



# Angiosperms

Identify the following pictures as an example of a monocot or dicot. Justify your reason.



Flower A



Flower B

# Angiosperms

Identify the following pictures as an example of a monocot or dicot. Justify your reason.



Flower C



Flower D

# Angiosperms

Identify the following pictures as an example of a monocot or dicot. Justify your reason.



Leaf A



Leaf B



Leaf C



Leaf D