2) Xylem- for H2O transport

   a) Vessel elements- perforated ends

   b) Tracheids- not perforated

Tracheary elements- with lignin in their cell walls (the two above)

Types:

1-Annular: Zea mancerated (ring)

2-Helical: Tilia mancerated (spiral)

3-Reticulated (net-like)

4-Pitted: Cucurbita mancerated (many, non-lignified pits)

5-Bordered pits: Pine mancerated

6-Scalariform: Cucurbita mancerated

*Stomata: for cellular respiration

   a) guard cells (2) flexible anticlinical walls

   b) accessory/subsidiary cells- participate in osmotic changes involved in movements of guard cells (variable #)

   c) stoma
- radial and alternating vascular tissue arrangement  
- has endodermis with Casparian strip  
- EXARCH (protoxylem on the outside while inwards is the metaxylem)  
- has pericycle (gives rise to lateral roots)  
- fibrous  
- with pith  

Cross regions:
1) Epidermis- outer region (gives rise to root hairs)
2) Cortex- middle (largest area of root)
   a) outer- parenchyma cells
   b) endodermis- has Casparian strip (made of suberin)
   *may also have hypodermis (monocot root) which can be of suberin and lignin component
3) Stele- inner region
   a) pericycle- gives rise to laterl roots/branch root (opposite protoxylem pole)
   b) vascular tissues

*Patterns for primary xylem: diarch, triarch, tetrarch, polyarch