

EXAM VERSION 1

1. What substance makes wood a hard object?
 - a. Cellulose
 - b. Tylose
 - c. Suberin
 - d. Lignin
 - e. Pectin

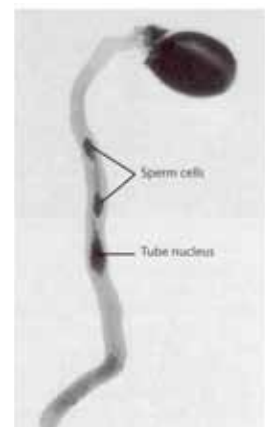
2. Which best describes gymnosperms, setting them apart from angiosperms?
A gymnosperm is a _____ .
 - a. Naked female
 - b. Naked male
 - c. Semi-naked female
 - d. Semi-naked male
 - e. Semi-naked hermaphrodite

3. What process produces eggs and sperm in plants?
 - a. Double fertilisation
 - b. Pollination
 - c. Lignification
 - d. Mitosis
 - e. Meiosis

4. Can plants have concentric cambia?
 - a. Yes, but can only have multiple concentric cork cambia
 - b. Yes, but can only have multiple concentric vascular cambia
 - c. Yes, can have both multiple concentric vascular and cork cambia
 - d. Yes, there is always only one vascular cambium that is concentric with the one cork cambium
 - e. No, there are no plants with concentric cambia



5. Why do I call pollen a “detachable penis”?
 - a. It delivers sperm
 - b. It can become erect
 - c. It penetrates a hollow, lubricated female organ
 - d. It contains a Y chromosome that is shorter than the X chromosome
 - e. It comes from a male plant (double entendre intended)



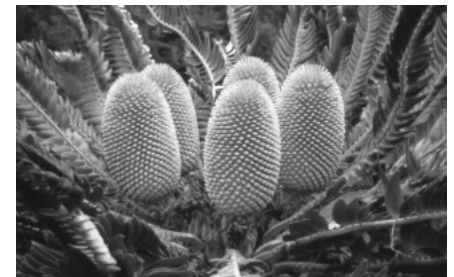
6. Would higher ploidy level be an advantage or disadvantage for nutritional tissue like endosperm?
- Advantage because higher ploidy levels are associated with higher metabolic rates
 - Advantage because diploidy does not require meiosis
 - Advantage because triploids cannot undergo proper meiosis (independent segregation)
 - Disadvantage because triploids cannot undergo proper meiosis (independent segregation)
 - Disadvantage because triploidy requires double fertilisation

7. What pollinates these bright orange flowers?

- Wind
- Water
- Gravity
- Birds
- Ants

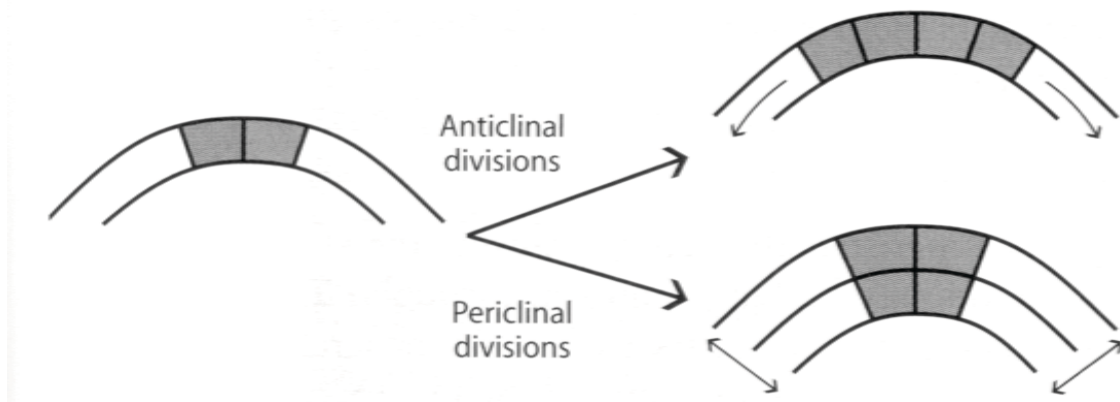


8. How do we know that cycads are pollinated by animals, not by wind?
- They have pollen droplets at their micropyle, i.e. at the opening of their integuments
 - Wind tunnel experiments show that smoke gets pulled into cone
 - They have colourful cones
 - Female and male cones are produced on separate diploid plants
 - Their cones heat up when ripe

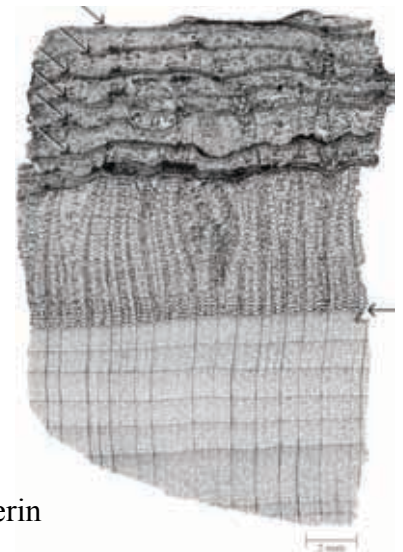


9. With flowering plants, which are more sexually varied and diverse, females or males?
- Males because they have longer genitalia
 - Males because they produce more pollen than females produce eggs
 - Males because they produce more sperm than females produce eggs
 - Females because of their greater variability in number of cells and nuclei per haploid stage
 - Females because only their haploid stages have multiple nuclei per cell

10. Apical meristems and vascular cambia can be differentiated from one another based on anticlinal and periclinal divisions because...
- Apical meristems only divide anticlinally, while vascular cambia only divide periclinally
 - Apical meristems only divide periclinally, while vascular cambia only divide anticlinally
 - Apical meristems divide both anticlinally and periclinally, while vascular cambia only divide periclinally
 - Apical meristems only divide periclinally, while vascular cambia divide both anticlinally and periclinally
 - There is no fundamental difference between apical meristems and vascular cambia

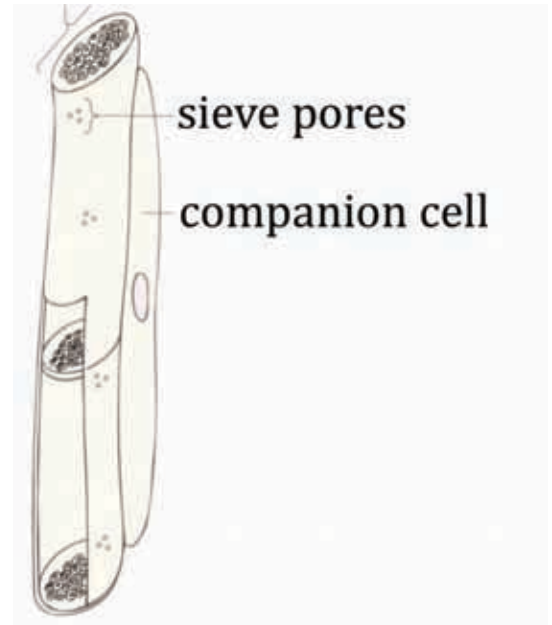


11. Why are there no parenchyma rays in outer bark (aka periderms)?
- Parenchyma rays are only produced by vascular cambia, not cork cambia
 - Periderms do not need to store, manufacture, or transport any substances
 - Periderms are formed of completely dead tissues
 - There can be multiple concentric cork cambia and periderms
 - Parenchyma rays can extend into outer bark if their cork cambium was produced from phloem parenchyma rays



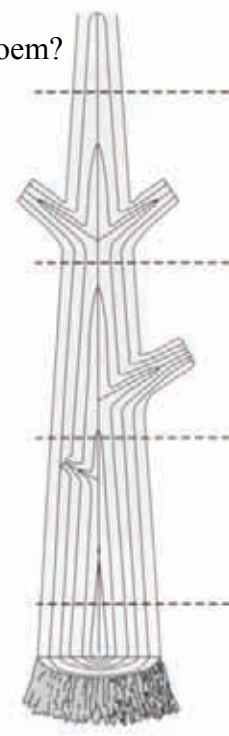
12. Why is it so easy to peel apart inner from outer bark?
- Inner and outer bark are separated by an endodermis
 - Inner and outer bark are separated by cortex
 - Inner and outer bark are produced by different cambia
 - Outer bark separates well from all other tissues due to lots of suberin
 - Inner and outer bark are not connected by plasmodesmata

13. Does a sieve cell or sieve tube have sieve pores all over its side (lateral) walls?
- Yes, it needs these pores to move sugars to all adjacent living cells
 - No, it only needs sieve pores to move sugars to other sieve cell or sieve tubes
 - No, it only needs sieve pores to move sugars to and from companion (albuminous) cells
 - No, it only needs sieve pores to move sugars to parenchyma (phloem) rays
 - No, it only needs sieve pores to move sugar and water between xylem and phloem



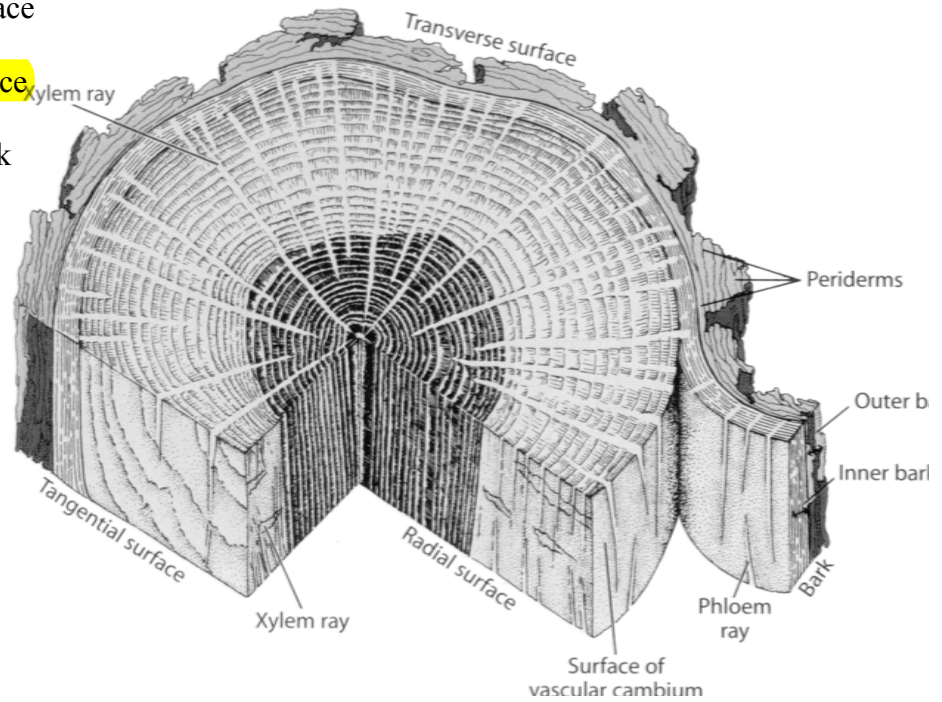
14. In summer, how does sugar get from functional phloem to functional xylem?
- Via sieve pores
 - Via sieve plates
 - Via xylem fibers
 - Via parenchyma, possibly including companion cells
 - Sugar does not go to functional xylem

15. In summer, how does water get from functional xylem to functional phloem?
- Via xylem pits
 - Via perforation plates
 - Via xylem fibers
 - Via parenchyma, possibly including companion cells
 - Water does not go to functional phloem



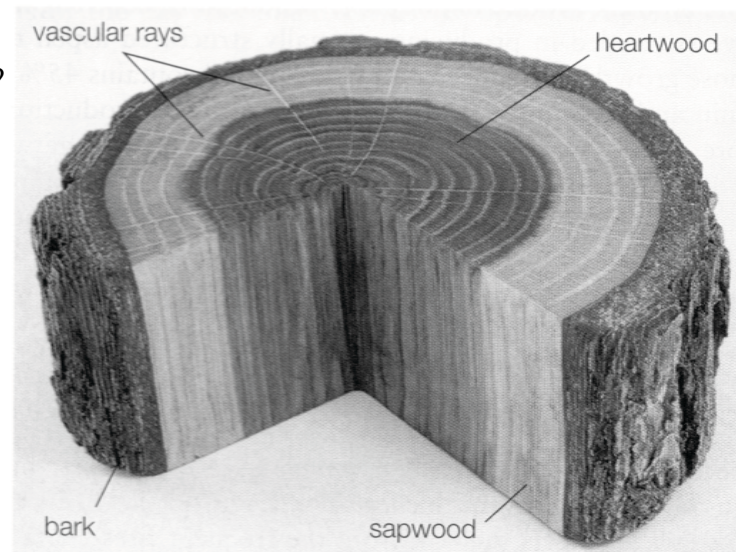
16. Where would you find the most annual rings?
- Base of a ten-year-old conifer
 - Base of a ten-year-old eudicot
 - Base of a ten-year-old monocot
 - Top of a ten-year-old conifer
 - Top of a ten-year-old eudicot

17. When splitting a piece of wood, where should you place the sharp edge of the blade of the ax?
- On the tangential (side) surface
 - On the radial (side) surface
 - On the transverse (top) surface
 - Between wood and bark
 - Between inner and outer bark



18. Why is heartwood darker colour than sapwood?

- Heartwood has tyloses
- Heartwood has suberin
- Heartwood lacks rays
- Heartwood lacks lignin
- Heartwood is denser than sapwood



19. Do maple trees produce maple syrup in autumn?

- Yes
- No, there are no freeze/thaw cycles
- No, their rays are filled with starch
- No, their phloem is inactive in autumn
- No, their xylem cells are too small in autumn



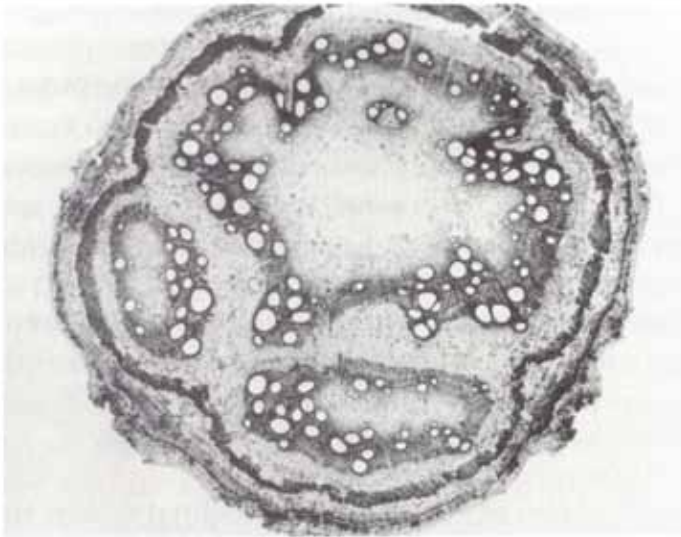
20. When tapping a maple tree, where do you place the opening of the tap?

- a. Outer bark
- b. Inner bark
- c. Vascular Cambium
- d. Xylem**
- e. Xylem rays



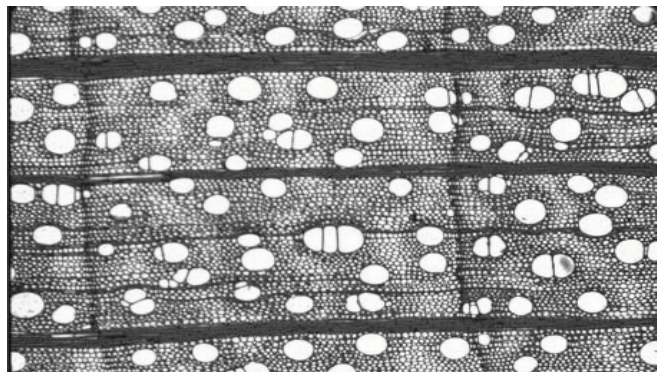
21. The picture below contains one big circle with three somewhat smaller circles inside it. What are these circles from?

- a. One cork cambium and three vascular cambia**
- b. Three cork cambia and one vascular cambium
- c. Four cork cambia
- d. Four vascular cambia
- e. One vascular cambium containing three large areas of aerenchyma



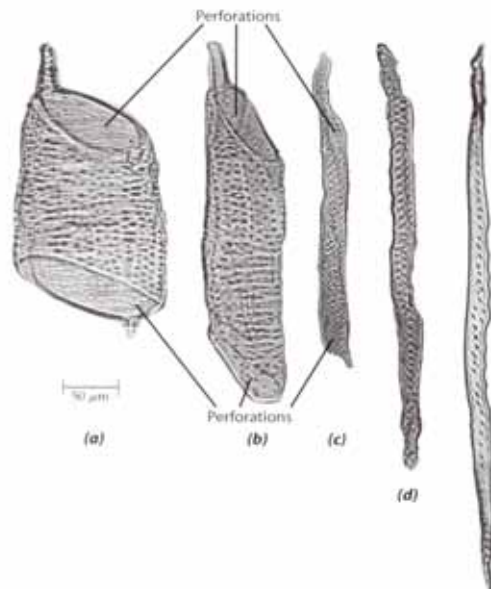
22. How many winters can you see in this cross (transverse/horizontal) section of maple wood?

- a. 1
- b. 2**
- c. 3
- d. 4
- e. 5 or more

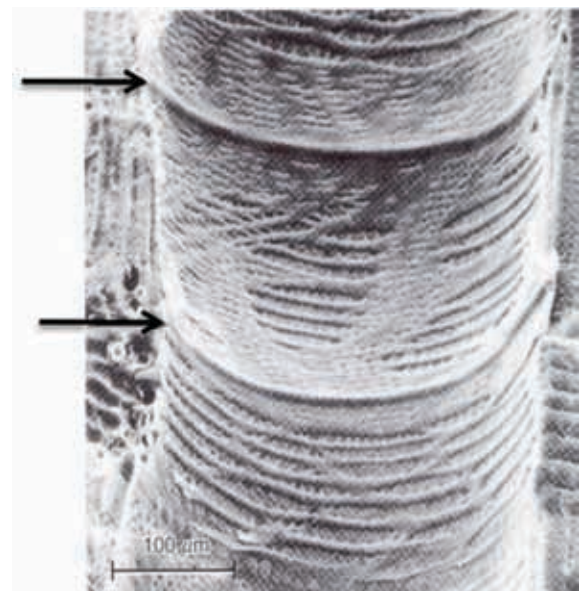


23. Seeds contain nutritional tissue that feeds the growing embryo in the seed.
 What is the ploidy level (number of each homologous chromosome) in nutritional tissue?
- Triploid (3N) in most angiosperms and most gymnosperms
 - Triploid (3N) in most angiosperms and haploid (1N) in most gymnosperms**
 - Diploid (2N) in most angiosperms and most gymnosperms
 - Diploid (2N) in most angiosperms and haploid (1N) in most gymnosperms
 - Haploid (1N) in most angiosperms and most gymnosperms

24. Can the following five xylem cells all be found in the same plant?
- Yes, all plants contain vessels and tracheids
 - Yes, all angiosperms contain vessels and tracheids
 - Yes, some angiosperms contain vessels and tracheids**
 - No, angiosperms only contain vessels and gymnosperms only contain tracheids
 - No, angiosperms only contain tracheids and gymnosperms only contain vessels

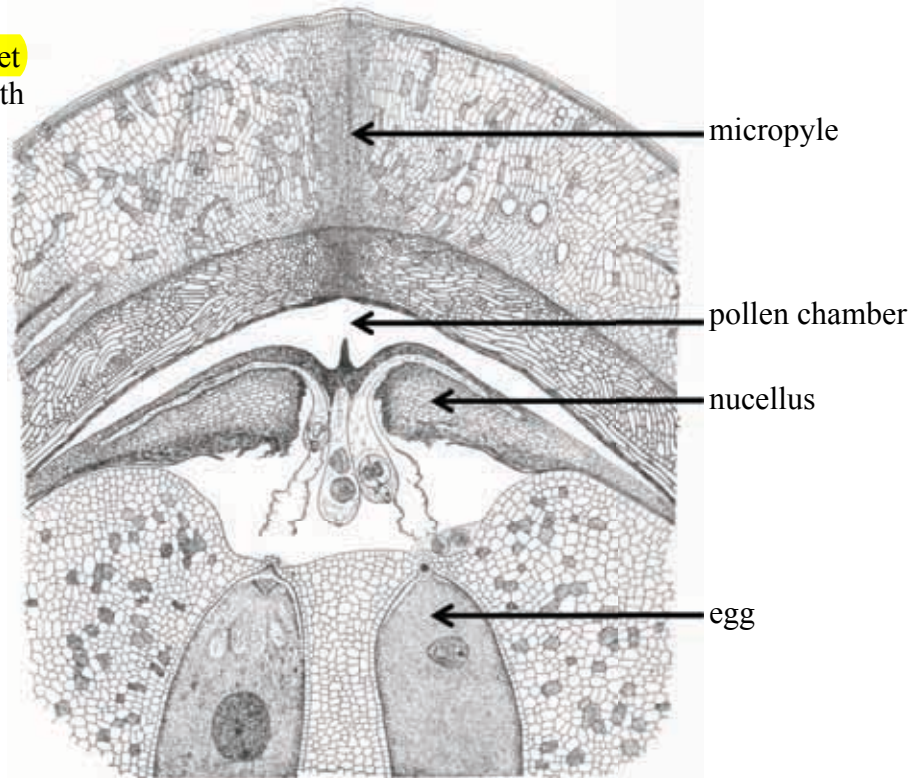


25. What are perforation plates? (see arrows on figure)
- Places rich in plasmodesmata
 - Large openings in cell walls**
 - Large solid plates that cap vessels
 - Small unligified areas in side walls of vessels
 - Small unligified areas in side walls of tracheids



26. For cycads and ginkgos, how does pollen get through the micropyle to the pollen chamber?

- a. Insects
- b. Pollination droplet
- c. Pollen tube growth
- d. Parasitism
- e. Swimming



27. For cycads and ginkgos, how do sperm get from the nucellus (diploid) to the egg (haploid)?

- a. Insects
- b. Pollination droplet
- c. Pollen tube growth
- d. Parasitism
- e. Swimming

28. In many, if not most, gymnosperms pollination occurs long before fertilisation.

Is this advantageous or disadvantageous?

- a. Advantageous, the diploid plant does not have to invest in a huge female gametophyte (haploid stage) unless pollination is successful
- b. Advantageous, the long period provides lots of selection for the most fit haploid male
- c. Advantageous, both male and female gametophytes (haploid stages) can disperse, rather than just male haploid stages dispersing
- d. Disadvantageous, the male gametophyte (haploid stage) is simply wasting its time undergoing many mitotic divisions to produce many sperm per pollen tube
- e. Disadvantageous, these species cannot produce annual plants (one complete generation per year) if pollination takes so long

29. What are the possible ploidy levels of nutritional tissue in seed plants?

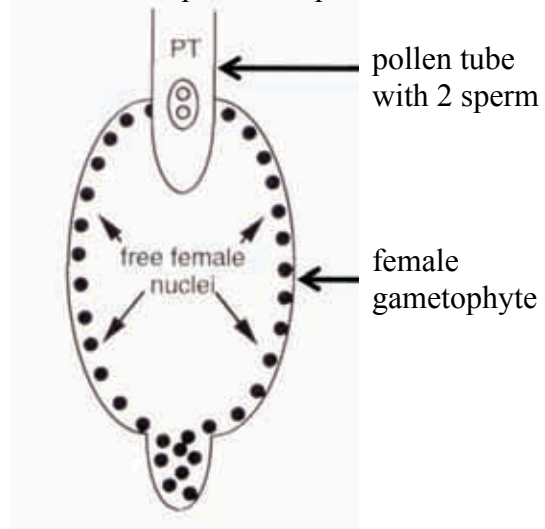
[I will only count one answer as correct here]

- a. 1N
- b. 2N
- c. 3N
- d. 4N
- e. All of the above

30. We have seen that reproductive structures of many seed plants are “free nuclear”, in other words they have cells containing multiple nuclei. We have seen this in coconut endosperm, many angiosperm central cells in the female gametophyte with two or more polar nuclei, and those parts of gymnosperm female gametophytes that are not destined to produce egg cells.

Why do we see this?

- a. Only haploid tissues can survive with multiple nuclei per cell
- b. Plant tissues that are not inherited by the next generation are developmentally more flexible
- c. Free nuclear cells are always unspecialized parenchyma, not highly specialized cells such as vessels, tracheids, sieve cells, or companion/albuminous cells
- d. Multiple nuclei in a single cell can be confusing because they all contain different DNA
- e. Only small tissues, such as gametophytes, can tolerate multiple nuclei per cell



31. This last question does not count for points, but please indicate which version of the exam you took. This is **version 1**.

- a. **Version 1**
- b. Version 2
- c. Version 3

Put your NAME and ID number on the scantron form and properly answer question 31. Otherwise it will take much longer to assign your mark and have it posted on WebCT.