

## Gymnosperms

1. What are three adaptations of seed plants that allow them to live on land?  
**Alternation of Generations**  
**Vascular Tissue to transport nutrients and water**  
**Needles with a waxy coating and small surface area to prevent moisture loss**
2. What are the functions of roots, stems, and leaves?
  - **Roots take in and store nutrients/water**
  - **Stems transport water and nutrients up and down the plant and hold leaves up to the sun**
  - **Leaves perform photosynthesis which provides sugars for the plant to store**
3. How are the leaves of gymnosperms adapted to protect against water loss?  
**They have a small surface area and they have a thick waxy coating on their needles**
4. How are xylem and phloem tissues similar? How are they different?
  - **They are both vascular tissue that transport the necessary elements for survival**
  - **They are different in that xylem transports water/sap in one direction (upward), and phloem transports nutrients in 2 directions.**
5. What is the function of a pollen cone?  
**The pollen cone carries the microsporangia that carry microspores that produce the male gametophytes - pollen grains**
6. What is the function of a seed cone?  
**The seed cone carries the megasporangia that produces the megaspores where you will find the female gametophytes - eggs**
7. What is a pollen grain in gymnosperms and how does it get dispersed?  
**The pollen grain carries the male gamete (sperm) and it is dispersed by the wind. It sticks onto the sticky part on the scales of the seed cone**

8. Why is pollination important?

**Pollination ensures genetic diversity - mixing of DNA from one plant to another - sexual reproduction.**

9. How does fertilization occur in gymnosperms?

**Fertilization occurs when the pollen lands on the sticky part of the scales of the seed cone. When the sperm lands near the female gametophyte, it forms a pollen tube that grows down into the ovule carrying the sperm nuclei which then fuses with the egg.**

10. What is a seed?

**A seed is the fertilized embryo of a plant when the 2 gametes of the plant have united to combine genetic material. The embryo is encased in a protective coating.**

11. How do seeds allow for plant survival?

**Seeds can be dispersed in order to reduce competition with parents. They also have a protective coating and a source of nutrition which allows it to stay dormant for a while until conditions are favorable to germinate.**

12. How do the mechanisms by which sperm reach the egg differ between gymnosperms and seedless vascular plants?

**Seedless vascular plants (i.e. ferns) require water for the sperm to find and unite with the egg. Gymnosperms no longer require water, the sperm reaches the egg via the wind or other pollinators.**

13. What is the dominant generation in gymnosperms?

**The tree (sporophyte generation) is the most dominant**

14. How does pollination differ from fertilization?

**Pollination is the distribution of the male gamete. Fertilization is when the 2 gametes combine.**

15. What is the difference between a spore and a seed?

**Spores are produced from one parent and are haploid  
Seeds are the combination of 2 parents and are diploid.**