Since we’re talking about plants (kingdom Plantae) let’s review sporic meiosis. Remember alternation of generations?

Draw a cycle including a diploid sporophyte generation and a haploid gametophyte generation, with the processes of meiosis and syngamy involved in the transition from one to the other. Plants differ in how much time and growth is spent in one generation versus the other. The first plants had a gametophyte-dominated life cycle.
The first group of plants are the bryophytes. This is a group of 3 phyla. So what taxonomic level would that be? (superphylum)

Here are some things the 3 phyla have in common:
- A gametophyte dominated life cycle.
- No vascular tissue (and therefore no true organs).
- Small size.
- Sperm that must be dispersed in water.
- Restricted to moist habitats. (can you think of why?)
The 3 phyla are:

**phylum Bryophyta** – the true mosses
we’ll spend most time on this one and talk about the whole life cycle. Then we’ll compare the other 2.

**phylum Hepatophyta** – the liverworts

**phylum Anthocerophyta** – the hornworts
Phylum BRYOPHYTA

Here you can see both gametophyte and sporophyte, but the sporophyte is attached to and dependent on the gametophyte.
The haploid (gametophyte) generation starts with a meiospore that sprouts into protonema (the first stage of the gametophyte). It soon develops leafy shoots and forms a mature gametophyte.
These are gametophytes of Different moss species.
Gametophytes produce gametes by mitosis. Gametes are produced in a gamete container called a gametangium (-ia).

Male gametangia are called antheridia. Female gametangia are called archegonia.
Male shoots with antheridia in splash cups. What do you think is the significance of the splash cup? (dispersal in water)

Aids in sperm dispersal
Female shoots with archegonia at the tips. Each vase-shaped archegonium contains a single egg or ovum.
From the fertilized egg (=zygote) within the archegonium, grows the diploid sporophyte. It is still attached to the gametophyte. It consists of a seta and capsule. The capsule has spores inside, formed by meiosis. The spores are aided in their dispersal by the peristome teeth which are hygroscopic (move in response to changing humidity). An operculum and calyptra cover the opening of the capsule.
The calyptra is actually a remnant of the archegonium and is the only haploid part of this whole structure. See it here in the hairy-cap moss? Once it is removed by wind, etc. the operculum can open to release the spores. The peristome teeth move up and down, helping to disperse the spores.
General Life Cycle of a Moss
Phylum HEPATOPHYTA - liverworts
The gametophyte of liverworts is a simple sheet-like structure called a thallus. It is lobed (like a liver) and dichotomously (2-way) branched. See the rhizoids in the upper right?
Liverworts have gemma (-ae) in gemma cups for asexual reproduction. Each gemma can disperse and grow into a new thallus.
Liverwort antheridia are born on structures called antheridiophores.
Archegonia are born on archegoniophores.
Spores are aided in dispersal by hygroscopic elaters. (the corkscrew-like structures seen with the spores on the right.

Sporophytes develop from the fertilized egg within the archegonium, are short, and hang upside down.
Marchantia Life Cycle

1. Antheridium
2. Sperm
3. Archegonium
   - Egg nucleus
   - Sperm nucleus
4. Egg
5. Zygote
6. Enlarged archegonium
7. Foot
8. Seta
9. Elater
10. Spore mother cell
11. Spore tetrad
12. Spores
13. Dehiscent sporophyte
14. Capsule
15. Germinated spores
16. Gemma
17. Asexual cycle
18. Thallus male gametophyte
19. Thallus female gametophyte
20. Archegetionophore
21. Archegetionophore
22. Antheridiophore
23. Antheridiophore
The gametophyte is a simple thallus and the sporophyte, attached and dependent on the gametophyte, is a horn-shaped structure.
Spores are produced by meiosis within the sporophyte. See the tetrads of spores to the right? When mature, the Sporophytes simply dehisces (splits) to release the spores.
Hornwort sporophytes release meiospores through simple dehiscence.