Plant reproduction:

Flowers are reproductive structures in plants [Fig. 31.9A, p. 634]:

- Sepals - cover/protect the flower before it opens.
- Petals - the brightly colored parts of the flower (if it is colored).
- Stamens - male reproductive parts. Composed of:
  - anthers - where pollen develop and are stored
  - filaments - structures holding up anthers
- Carpels - female reproductive parts. Composed of:
  - stigma - at tip of carpel, where pollen are placed.
  - ovary - contain ovules, which hold eggs and supporting cells.

Fertilization [Fig. 31.10, p. 635]:

- egg or sperm are also known (in plants) as gametophytes. These are haploid (have half the number of chromosomes).
  - in this case, though, the gametophytes generally make just sperm and/or egg. They don't make an “individual”.
- sperm formation is pretty straight forward. By meiosis, four haploid “spores” develop.
  - but again, in this case, the “spores” don't really make an “individual” like in mosses or ferns - instead they go almost directly to making egg or sperm (and a few associated structures)
  - each spore then divides again, forming a tube cell and generative cell.
    - the tube cell eventually forms a tube leading to the ovary
    - the generative cell eventually divides yet again, and forms two “sperm” cells.
  - but before this happens, the tube cell and generative cell are put together in a pollen grain.
- Pollen grains are distributed either through:
  - wind, or
- insects (hence the bright colors & nectar associated with flowers).

- Pollination occurs if the pollen lands on the stigma of the correct species (lots of variation in this, though).

- once this happens, the tube cell begins to make it’s tube, and the generative cell divides to make two sperm cells.

- tube grows downwards towards ovary and ovules.

  - grows around (underneath) one ovule, and enters the “embryo sac”

- In the ovule:

  - a central cell divides into four haploid spores (through meiosis).

    - three of these degenerate

    - remaining one survives, enlarges, and divides, making:

      - an embryo sac

      - this has a large central cell with two haploid female nuclei.

      - and an haploid egg

- as sperm enter ovule:

  - one fertilizes the egg (now diploid)

  - one fertilizes the central cell.

    - note that since this contains TWO haploid nuclei, the resulting cell is actually triploid (has two haploid copies of the female genes, and one haploid copy of the male genes)

    - this process is termed double fertilization.

Seed development [Figs. 31.11A & 31.11B, p. 636]:

- the triploid central cell divides and forms the “endosperm”, which is rich in nutrients for the embryo

- the zygote (fertilized egg) develops into the embryo. This will have either one or two leaves, based on whether or not it’s a monocot or dicot.
- the ovule forms a seed coat that protects and encloses both the endosperm and embryo.

- the seed can then lie dormant until conditions are right for germination (i.e., embryo grows out of seed coat).

- some seeds can be dormant for many years (hundreds or more).

Fruit development [Figs. 31.12 A & B, p. 637]:

- The ovary develops into a structure that stores and protects seeds.

- Apples, raspberries, pineapples are all examples of different kinds of fruit.

  - edible fruits are designed to be attractive so that animals will spread the seeds around.

  - seeds usually survive the trip through the digestive system, and are then deposited with rich fertilizer.

- in lab the differences in fruit types will be examined (see also p. 635 / 5th: p. 639).

Seed germination [Fig. 31.13A & B, p. 638]:

- seeds often germinate in response to water. Water ruptures the seed coat, and allows the embryo to start growing.

  - embryo starts to use food and grow

  - dicots: generally, root starts to grow downwards, followed shortly by the shoot.

    - shoot has a hook in it (tip is bent over) to prevent damage to the tip before it breaks the soil surface.

    - hook straightens out in response to light

  - monocot: root starts only just before shoot.

    - shoot is covered in protective sheath

    - once through the surface, the shoot grows through the sheath (the sheath is used like a “tunnel”).
Asexual reproduction:

plants readily grow by asexual reproduction:

- fragmentation

- runners

- root sprouts

- cuttings

- much of our agriculture depends on asexual (vegetative) reproduction

  - fruit trees in particular, but also raspberries, potatoes, etc.