

FAQ Sheet

Reproduction in Flowering Plants

Class 12 Biology — classorb..com


SECTION 1: Basic Concepts

Q: What is reproduction in flowering plants?

Ans: Students, think of it this way — reproduction simply means making more of the same kind. In flowering plants, the flower is the most important part for this. The flower has male and female parts. When these work together (or sometimes separately), a new seed is formed, and from that seed a new plant grows. Simple!

Q: Why is the flower called the reproductive organ of a plant?

Ans: Because the flower contains both the male part (stamen) and the female part (pistil/carpel). These are the organs that actually make reproduction happen. The petals and colors? They are just to attract insects and birds for pollination. The real work is done by stamen and pistil.

 **Teacher's Tip:** Always remember: Flower = Reproductive organ. Not leaf, not stem — FLOWER.

Q: What are the parts of a flower?

Ans: A complete flower has 4 whorls: (1) Calyx — the green sepals (outermost), (2) Corolla — the colorful petals, (3) Androecium — the male part (stamens), (4) Gynoecium — the female part (carpels/pistil). In board exams, if they ask 'essential whorls' — answer Androecium and Gynoecium. Calyx and Corolla are accessory whorls.

SECTION 2: Male Reproductive Organs

Q: What is a stamen? What are its parts?

Ans: The stamen is the male reproductive organ of a flower. It has two parts: (1) Filament — a thin stalk that holds the anther, (2) Anther — the important round/oval part at the top where pollen grains are made. In biology exams, remember: Anther makes pollen, pollen carries male gamete.

Q: What is pollen grain? What is inside it?

Ans: A pollen grain is a tiny, microscopic structure produced in the anther. It is the male gametophyte. Inside a mature pollen grain, there are TWO cells: (1) Vegetative cell (larger) —

controls the growth of pollen tube, and (2) Generative cell (smaller) — this divides later to form TWO male gametes. These two gametes are very important for double fertilization!

✓ **Remember:** Pollen grain has 2 cells: 1 vegetative + 1 generative. Generative cell divides to give 2 male gametes. This is a very common exam question!

Q: What is microsporogenesis?

Ans: It is the process of formation of microspores (pollen grains) inside the anther. The anther has 4 lobes, each with pollen sacs (microsporangia). Inside these sacs, cells called microspore mother cells (MMC) undergo meiosis to produce 4 haploid microspores. These microspores become pollen grains. So: MMC → Meiosis → 4 Microspores → Pollen grains.

Q: What is the wall of the pollen grain made of?

Ans: The pollen grain has two walls: (1) Exine — the outer, hard, thick wall made of sporopollenin. This is the toughest natural substance known — even fossil records preserve it! (2) Intine — the inner, thin, soft wall made of cellulose and pectin. The exine has small pores called germ pores through which the pollen tube comes out.

👉 **Teacher's Tip:** Sporopollenin is the most resistant organic material known. It can withstand high temperature, strong acids, and alkali. That is why pollen grains are preserved in fossils for thousands of years.

SECTION 3: Female Reproductive Organs

Q: What is a pistil? What are its parts?

Ans: The pistil (or carpel) is the female reproductive organ. It has three parts: (1) Stigma — the top, sticky surface where pollen lands, (2) Style — the long tube connecting stigma to ovary, (3) Ovary — the bottom part that contains ovules. Remember it as S-S-O (Stigma, Style, Ovary) from top to bottom.

Q: What is an ovule? What are its parts?

Ans: An ovule is a small structure inside the ovary. It eventually becomes the seed after fertilization. Parts of an ovule: (1) Nucellus — central tissue of the ovule, (2) Integuments — protective layers around the nucellus (1 or 2 layers), (3) Micropyle — a small opening at one end through which pollen tube enters, (4) Hilum — the point where ovule is attached to the ovary wall, (5) Chalaza — the opposite end of micropyle.


✓ **Remember:** Micropyle = entry point for pollen tube. Hilum = attachment point. Chalaza = opposite end of micropyle. These terms come in diagram-based questions!

Q: What is megasporogenesis?

Ans: It is the formation of megaspores inside the ovule. The nucellus contains a special cell called Megaspore Mother Cell (MMC). This MMC divides by meiosis to produce 4 haploid megaspores. Out of these 4, only ONE survives and becomes the functional megaspore. The other 3 degenerate (they die). This functional megaspore then develops into the embryo sac.

Q: What is an embryo sac? What is inside it?

Ans: The embryo sac is the female gametophyte. It develops from the functional megaspore. A typical embryo sac (Polygonum type) has 7 cells and 8 nuclei: (1) Egg cell (1) — female gamete, (2) Synergids (2) — beside the egg cell, help in guiding pollen tube, (3) Central cell (1) with 2 polar nuclei — most important for triple fusion, (4) Antipodal cells (3) — at the chalazal end, their function is not fully clear.

 **Teacher's Tip:** 7 cells, 8 nuclei — this number is frequently asked! The central cell has TWO nuclei (polar nuclei), that is why we get 8 nuclei from 7 cells.

SECTION 4: Pollination**Q: What is pollination?**

Ans: Pollination is the transfer of pollen grains from the anther of a flower to the stigma of the same or another flower of the same species. Note carefully — pollination is NOT fertilization. Pollination is just the transfer of pollen. Fertilization happens later inside the ovule.

Q: What is the difference between self-pollination and cross-pollination?

Ans: Self-pollination (Autogamy): Pollen from anther transfers to stigma of the SAME flower. Example: Wheat, Rice, Pea. Cross-pollination (Allogamy): Pollen transfers to the stigma of a DIFFERENT flower (same species). Example: Maize, Papaya. Cross-pollination produces more genetic variation and healthier offspring, which is why most flowering plants encourage cross-pollination.


Q: What are the agents of pollination?

Ans: Wind — Anemophily: Light, dry, non-sticky pollen. Flower has feathery stigma. Example: Maize, Coconut. Water — Hydrophily: Rare. Example: Vallisneria, Hydrilla. Insects — Entomophily: Bright, fragrant, sticky, nectared flowers. Example: Salvia, Bougainvillea. Animals/Birds — Zoophily: Bat-pollinated (chiropterophily) or bird-pollinated. Example: Strelitzia by birds.

✓ **Remember:** Anemophily = Wind. Hydrophily = Water. Entomophily = Insects. Zoophily = Animals. Easy trick: Anemo = Air (like anemometer), Hydro = Water, Entomo = Insects (Entomology), Zoo = Animals.

Q: What are outbreeding devices? How do plants avoid self-pollination?

Ans: Plants have clever tricks to avoid pollination from the same flower: (1) Dichogamy — Anther and stigma mature at different times. If anther matures first = protandry (e.g., sunflower). If stigma matures first = protogyny (e.g., Mirabilis). (2) Self-incompatibility — Pollen from the same plant is rejected by stigma. (3) Dioecy — Male and female flowers on different plants (e.g., Papaya, Mulberry). (4) Herkogamy — Anther and stigma placed at different positions.

 **Teacher's Tip:** Dichogamy is the most common outbreeding device. Protandry (anther matures first) is more common than protogyny (stigma matures first). Remember the 'proto'

means 'first'.

SECTION 5: Pollen-Pistil Interaction & Fertilization

Q: What happens after pollen lands on stigma?

Ans: Step 1: Pollen grain lands on stigma. Step 2: If compatible, pollen grain germinates and forms a pollen tube (through germ pore). Step 3: Pollen tube grows through the style, guided by synergids (they secrete chemicals). Step 4: Pollen tube enters the ovule through micropyle. Step 5: Pollen tube enters the embryo sac through synergids. Step 6: The two male gametes are released inside the embryo sac. Step 7: Double fertilization takes place!

Q: What is double fertilization? (Most important concept!)

Ans: Double fertilization is unique to flowering plants. It means TWO fusions happen simultaneously: (1) Syngamy — One male gamete (n) fuses with the egg cell (n) to form the zygote ($2n$). This zygote later develops into the EMBRYO. (2) Triple Fusion — The other male gamete (n) fuses with the two polar nuclei ($n+n$) in the central cell to form Primary Endosperm Nucleus (PEN) which is triploid ($3n$). This develops into ENDOSPERM (food for the embryo). Together, syngamy + triple fusion = Double Fertilization.

✓ **Remember:** Double Fertilization = 1 gamete + egg = Zygote (Embryo) AND 1 gamete + 2 polar nuclei = PEN (Endosperm). The endosperm is $3n$ (triploid). This is a VERY important exam question — expect it every year!

Q: What is the significance of double fertilization?

Ans: It is highly significant because: (1) It gives rise to the embryo (from zygote) which is the new plant. (2) It gives rise to endosperm (from PEN) which provides nutrition to the developing embryo. So nothing is wasted — both male gametes are used productively. This efficiency is unique to flowering plants (angiosperms) and not found in gymnosperms.

SECTION 6: Post-Fertilization — Seed & Fruit

Q: What happens after fertilization?

Ans: After fertilization: (1) Zygote → develops into Embryo, (2) Primary Endosperm Nucleus (PEN) → develops into Endosperm, (3) Ovule → becomes Seed, (4) Ovary → becomes Fruit, (5) Ovary wall → becomes Pericarp (fruit wall), (6) Petals and other parts → wither and fall off. So remember: Ovule = Seed, Ovary = Fruit.

Q: What is endosperm? What is its function?

Ans: Endosperm is the nutritive tissue in a seed. It develops from the Primary Endosperm Nucleus ($3n$). Its job is to provide food (nutrition) to the developing embryo. In seeds like wheat and maize, endosperm persists in the mature seed (endospermic seeds). In seeds like pea and


bean, the endosperm is completely absorbed by the embryo before the seed matures (non-endospermic seeds).

Q: What is the structure of a dicot embryo?

Ans: A dicot embryo has: (1) Embryonal axis — the main axis of the embryo. It has: Plumule (future shoot) at one end, and Radicle (future root) at the other end. (2) Two Cotyledons — also called seed leaves. They store food. The point where cotyledons join the embryonal axis is called Cotyledonary node.

Q: What is the structure of a monocot embryo (e.g., grass/maize)?

Ans: Monocot (grass) embryo is more complex: (1) Only ONE cotyledon called Scutellum (shield-shaped, absorbs food from endosperm). (2) Plumule — protected by Coleoptile (a sheath). (3) Radicle — protected by Coleorhiza. Remember: Monocot = 1 cotyledon = Scutellum. Dicot = 2 cotyledons.

 **Teacher's Tip:** Easy trick: Monocot = Mono = One = One cotyledon. Dicot = Di = Two = Two cotyledons. This is Class 6 knowledge, but many students forget it in Class 12!

Q: What is a true fruit vs false fruit?

Ans: True Fruit: Develops only from the ovary. Example: Mango, Tomato, Grape. False Fruit (Pseudocarp): Other parts of the flower (like thalamus, calyx) also participate in fruit formation. Example: Apple (thalamus forms major part), Strawberry, Cashew. In exams, Apple is the most commonly asked example of a false fruit.

✓ **Remember:** Apple = False fruit. Mango = True fruit. In Apple, the fleshy edible part is the THALAMUS, not the ovary wall. The actual fruit is the core part inside. Many students get confused here!

SECTION 7: Seed Dormancy & Apomixis

Q: What is seed dormancy?

Ans: Seed dormancy means the seed is alive but NOT germinating, even when conditions like water, air, and temperature are suitable. It is like the seed is in a deep sleep. Reasons for dormancy: Hard seed coat, presence of inhibitors, need for low temperature (stratification), need for light, etc. Dormancy is actually helpful — it prevents seeds from germinating at the wrong time or in the wrong place.

Q: What is apomixis? Why is it agriculturally important?

Ans: Apomixis is the formation of seeds WITHOUT fertilization. The embryo develops from the egg cell or any other cell of the ovule without fusion with the male gamete. Example: Some species of Asteraceae and grasses. Agricultural importance: (1) Useful in hybrid seed production — hybrid varieties can be maintained generation after generation without loss of hybrid vigor. (2) Seeds are genetically identical to the mother plant. Apomixis is seen in mangoes where polyembryony (multiple embryos in one seed) occurs.

Q: What is polyembryony?

Ans: Polyembryony means presence of MORE THAN ONE embryo in a single seed. Example: Citrus (lemon, orange), Mango, Groundnut. In Citrus, the extra embryos develop from the nucellus cells (not from fertilization). Practical use: In horticulture, polyembryonic seeds are preferred because nucellar embryos are genetically identical to the mother plant — so desired traits are preserved.

Teacher's Tip: Polyembryony in Citrus is a very important concept for NEET and Board exams. The extra embryos are called nucellar embryos and they are genetically like the mother plant (not hybrid).

SECTION 8: Important Diagrams & Exam-Ready Points

Most Asked Diagrams in Board Exams:

1. T.S. of Anther (showing 4 microsporangia / pollen sacs)
2. Structure of Pollen Grain (showing intine, exine, germ pore, vegetative & generative cells)
3. L.S. of Ovule (showing nucellus, integuments, micropyle, chalaza, embryo sac)
4. Embryo Sac (showing 7 cells and 8 nuclei — egg, synergids, central cell, antipodals)
5. Dicot Embryo (showing plumule, radicle, 2 cotyledons, embryonal axis)

Quick Revision: 5 Things You Must Never Forget

- Pollen grain = male gametophyte = has 2 cells (vegetative + generative)
- Embryo sac = female gametophyte = 7 cells, 8 nuclei
- Double fertilization = syngamy (egg + gamete = $2n$ embryo) + triple fusion (polar nuclei + gamete = $3n$ endosperm)
- Ovule → Seed; Ovary → Fruit after fertilization
- Sporopollenin = most resistant organic material (found in exine of pollen)

All the best, students! You've got this *Study smart, not hard.*

If you understand the concept, you will never forget it. Rote learning is for parrots — you are better than that!