1. How does binary fission differ from multiple fission?

Feature	Binary Fission	Multiple Fission
Number of Offspring	Produces **two** daughter cells	Produces **many** daughter cells
Process	Parent cell divides **once** into two equal parts	Parent cell divides **repeatedly** to form multiple offspring
Example	**Amoeba, Paramecium**	**Plasmodium (malarial parasite)**
Condition	Usually occurs under **favorable conditions**	Often occurs under **unfavorable conditions**, with cyst formation for protection

---

2. How do simple animals like Hydra and Planaria give rise to new individuals through regeneration?

- **Hydra and Planaria** have the ability to regenerate due to the presence of **highly active stem cells** in their bodies.
- If they are cut into pieces, each piece can **develop into a completely new organism** under suitable conditions.
- Example:
    - **Planaria (Flatworm):** If cut into pieces, each part **regrows the missing body parts** to form a new individual.
    - **Hydra:** If a part of its body is detached, it can **grow into a new Hydra**.

Regeneration is different from reproduction because it usually happens as a **repair mechanism**, but in some organisms, it can lead to the formation of new individuals.

---

3. Why is vegetative propagation practiced for growing some types of plants?

Vegetative propagation is practiced because:

1. **Genetic Uniformity:** It produces plants **identical** to the parent, ensuring desirable traits are retained.
2. **Faster Growth:** Plants grow **faster** than those grown from seeds.
3. **Survival in Harsh Conditions:** Plants that do not produce viable seeds (e.g., **banana, rose, sugarcane**) can still be grown successfully.
4. **Economical and Efficient:** Large numbers of plants can be produced **quickly and economically**.
5. **Resistant Varieties:** Disease-resistant and high-yield varieties can be easily propagated.

---

4. Why is DNA copying an essential part of the process of reproduction?

DNA copying is crucial because:

1. **Inheritance of Traits:** It ensures that the **genetic information** is passed from parent to offspring.
2. **Continuity of Life:** It maintains the **continuity of species** over generations.
3. **Variation and Evolution:** Small **variations** in DNA occur due to errors in copying, leading to **genetic diversity** and evolution over time.
4. **Proper Functioning of Cells:** DNA provides **instructions** for the growth, development, and functioning of new cells.

5. Why is variation beneficial to the species but not necessarily for the individual?

1. Benefits to the species:

- **Survival in changing environments:** Variations help a species adapt to environmental changes. For example, bacteria developing resistance to antibiotics ensures the survival of some members.
- **Evolutionary advantage:** Over time, beneficial variations accumulate, leading to the evolution of better-adapted organisms.
- **Disease resistance:** Some variations may make certain individuals resistant to diseases, preventing the extinction of the species.

2. Why not necessarily beneficial for the individual?

- **Some variations may be harmful:** Not all variations are useful; some can lead to disadvantages like genetic disorders.
- **No immediate survival advantage:** A variation might not help an individual directly but could benefit future generations.
- **Competition and survival challenges:** If an individual's variation makes it different from others, it might face difficulty in survival (e.g., a different-colored animal might stand out to predators).

Thus, while variation is **key to the survival and evolution of a species**, it does not always provide an advantage to an individual organism.

---

6. Why do organisms like Hydra and yeast reproduce through budding? Explain the process with a diagram. *(3 marks)*

Answer:

- **Hydra and yeast** reproduce through **budding** because they have the ability to grow new individuals as an outgrowth from their parent body.
- In **favorable conditions**, cells in a particular region **divide rapidly** and form a small bud.
- The bud **gradually grows**, develops necessary organs, and eventually **detaches** to become an independent organism.

Diagram:

(You can draw a simple diagram of Hydra or yeast showing the budding process.)

---

7. How does fragmentation differ from regeneration? Give one example of each. *(2 marks)*

Answer:

Feature	Fragmentation	Regeneration
Definition	The parent body **breaks** into fragments, and each grows into a new individual.	If an organism is cut into pieces, each piece **regrows missing body parts** to form a complete organism.
Type of organisms	Seen in **algae (e.g., Spirogyra)**	Seen in **Planaria, Hydra**
Example	If a Spirogyra filament breaks into pieces, each piece can grow into a new filament.	If a Planaria is cut into two pieces, each piece **regenerates** into a complete new Planaria.

---

8. Spore formation is a common mode of reproduction in fungi. How does it help them survive in unfavorable conditions? *(2 marks)*

Answer:

- Fungi (e.g., **Rhizopus**) reproduce by forming **spores** inside **sporangia**.
- Spores are **lightweight, covered with a hard protective coat**, and can **easily disperse through air and water**.
- During unfavorable conditions (e.g., extreme heat, drought), spores **remain dormant**.
- When favorable conditions return, the spores **germinate** and grow into new fungi.

---

9. Why do potato, Bryophyllum, and ginger reproduce vegetatively even though they have seeds? Explain with examples. *(3 marks)*

Answer:

- Some plants like **potato, Bryophyllum, and ginger** reproduce through **vegetative propagation** because:
    1. It ensures **faster and identical offspring** without the need for pollination and seed germination.
    2. It allows plants to **survive in harsh conditions** where seed germination might fail.
    3. It helps in **commercial agriculture**, ensuring uniform quality of crops.

Examples:

- **Potato**: Grows from **"eyes" (buds)** present on the tuber.
- **Bryophyllum**: Grows from **buds on the leaf margins**.
- **Ginger**: Grows from **underground stems (rhizomes)**.

---

10. How does binary fission in Amoeba differ from multiple fission in Plasmodium? What environmental conditions favor multiple fission? *(3 marks)*

Answer:

Feature	Binary Fission	Multiple Fission
Definition	Parent cell divides into **two** equal daughter cells.	Parent cell divides into **multiple** daughter cells.
Example	**Amoeba, Paramecium**	**Plasmodium (malarial parasite)**
Process	Nucleus divides once, followed by the division of cytoplasm.	Nucleus divides **repeatedly** before cytoplasm splits.
When it occurs	**Favorable conditions** for reproduction.	**Unfavorable conditions**, allowing survival inside a cyst.

Environmental Conditions Favoring Multiple Fission:

- **Scarcity of food**
- **Extreme temperature changes**
- **Drought conditions**

In Plasmodium, multiple fission helps it survive inside the **human liver and red blood cells**, causing malaria.