Chapter 10: Living Creatures: Exploring their Characteristics

Exercises — Let Us Enhance Our Learning

Q1 List the similarities and differences in life cycles of plants and animals.

SOLUTION

Similarities between life cycles of plants and animals:

- Both begin their life cycles from a reproductive unit (seed for plants; egg/newborn for animals).
- Both go through stages of growth and development.
- Both reproduce to produce the next generation, ensuring continuity of their kind.
- Both reach an adult stage and eventually die.

Differences between life cycles of plants and animals:

- Plants begin from a seed that germinates; animals begin as a newborn (or hatch from an egg).
- In some animals (e.g., mosquito, frog), dramatic body changes occur between stages (egg → larva → pupa → adult); plants show continuous growth without such dramatic transformation.
- Plants produce flowers and fruits containing seeds to complete their cycle; animals reproduce through eggs or live birth.
- A frog's tadpole lives in water and breathes through gills, while the adult frog lives on land and breathes through lungs and skin — a habitat change that does not occur in a typical plant life cycle.
- The duration of life cycles varies widely: some plants complete their cycle in weeks (bean plant ~3 months), while some animals live for years.

Answer: Similarities: both grow, reproduce, and die. Differences: plants start from seeds and go through germination → flowering → fruiting; animals start from eggs/newborns, and some (mosquito, frog) undergo dramatic body changes (metamorphosis) with possible habitat shifts.

Q2 The table below shows some data. Study the data and find out examples appropriate for the conditions given in the second and third columns. If you think that an example for any of the conditions is not possible, explain why.

S.no. | Does it grow? | Does it respire?
1. | No | No
2. | No | Yes
3. | Yes | No
4. | Yes | Yes

SOLUTION

S.no. 1 — Does NOT grow, Does NOT respire:
Example: A stone / a pen / any non-living object.
Non-living things neither grow nor carry out respiration.

S.no. 2 — Does NOT grow, Does respire:
This combination is NOT possible for any living being. All living beings that respire are also capable of growth — growth and respiration are both essential characteristics of living beings. A thing that respires must be alive, and all living beings grow.

S.no. 3 — Does grow, Does NOT respire:
This combination is also NOT possible. All living beings that grow must respire; respiration provides the energy needed for growth. There is no living entity that grows without respiring.

S.no. 4 — Does grow, Does respire:
Example: A bean plant / a frog / a human being.
All living beings grow and respire. This is a normal characteristic of all living things.

Answer: S.no. 1: Stone (non-living — neither grows nor respires). S.no. 2: Not possible — any organism that respires also grows. S.no. 3: Not possible — any organism that grows must respire to get energy. S.no. 4: Bean plant / frog / human — all living beings grow and respire.

Q3 You have learnt that different conditions are required for seed germination. How can we use this knowledge for proper storage of grains and pulses?

SOLUTION

From the chapter, seeds require water, air, and suitable temperature for germination.
Water softens the seed coat and enables the embryo to develop; air in soil spaces is needed for respiration during germination.

Applying this to grain/pulse storage:
- Keep grains and pulses completely dry — moisture triggers germination and leads to spoilage.
- Store in airtight containers to reduce the amount of air available, which slows germination and also prevents insect/fungal attack.
- Store at cool temperatures — warmth encourages germination; cool, dry conditions slow it down.
- Ensure no stagnant water or dampness in the storage area.

Conclusion: Denying seeds the conditions they need (mainly water and warmth) during storage prevents unwanted germination and keeps grains/pulses usable for longer.

Answer: Keep stored grains/pulses dry (no moisture), in airtight containers (reduced air), and at cool temperatures. These conditions deny seeds the water and warmth needed for germination, preventing spoilage.

Q4 You have learnt that a tail is present in a tadpole but it disappears as it grows into a frog. What is the advantage of having a tail in the tadpole stage?

SOLUTION

From the chapter (Section 10.5.2 and Fig. 10.8):
Tadpoles (Stage IIA and Stage IIB) live in water.
The tail helps tadpoles swim in water.

As the tadpole develops into a froglet and then an adult frog, it begins to spend time on land.
The legs become strong to help the frog jump and land.
The tail is no longer needed once the frog moves to land, so it disappears completely.

Advantage of the tail: The tail acts as a swimming organ for the tadpole, allowing

it to move through water and survive in its aquatic habitat during this stage.

Answer: The tail helps the tadpole swim in water. Once the tadpole develops legs and moves to land as a froglet/adult frog, the tail is no longer needed and disappears completely.

Q5 Charan says that a wooden log is non-living as it cannot move. Charu counters it by saying that it is living because it is made of wood obtained from trees. Give your arguments in favour or against the two statements given by Charan and Charu.

SOLUTION

Charan's statement: A wooden log is non-living because it cannot move.

Arguments against Charan:

- Movement alone is not the deciding characteristic of being living. Plants are living but do not move from place to place.
- However, Charan is correct that a wooden log is non-living.
- The reason is NOT just the absence of movement — it is because the log does not grow, does not respire, does not excrete, does not respond to stimuli, and cannot reproduce.
- A wooden log is a dead material; it has lost all the characteristics of a living being.

Charu's statement: A wooden log is living because it is made from wood obtained from trees.

Arguments against Charu:

- A wooden log was once part of a living tree, but it is no longer living.
- Being derived from a living source does not make an object living.
- The chapter states: when a living being is no longer able to exhibit the characteristics of life (growth, respiration, excretion, response, reproduction), it is considered dead.
- A wooden log cannot grow, respire, excrete, respond to stimuli, or reproduce — so it is non-living (dead material).

Conclusion: Both statements are partially flawed. The wooden log IS non-living — not just because it cannot move (Charan's incomplete reasoning), and not because being from a tree makes it living (Charu's error). It is non-living because it no longer exhibits any essential characteristics of life.

Answer: A wooden log is non-living. Charan is right that it is non-living, but wrong that movement is the only criterion. Charu is wrong — origin from a tree does not make it living. The log cannot grow, respire, excrete, respond to stimuli, or reproduce, which makes it non-living (dead material).

Q6 What are the similarities and distinguishing features in the life cycles of a mosquito and a frog?

SOLUTION

Similarities:

- Both mosquitoes and frogs pass through four distinct life stages.
- Both begin their life cycles as eggs.
- Both undergo significant changes in body shape and structure during their life stages.
- In both, the early stages (larva/tadpole) live in water and require water as their habitat.
- Both reproduce to maintain continuity of their kind.

Distinguishing features:

Mosquito life cycle: Egg → Larva → Pupa → Adult mosquito.

- Has four stages: egg, larva, pupa, adult.
- The pupa is a non-feeding, transitional stage before the adult emerges.
- The adult mosquito can survive for 10 to 15 days.
- Larvae and pupae live in stagnant water; adult mosquitoes are flying insects living on land/air.

Frog life cycle: Egg (Spawn/Embryo) → Tadpole (with tail; with legs) → Froglet → Adult frog.

- Has four stages but the tadpole stage has sub-stages (tail only, then legs develop).
- Tadpoles have tails that help them swim; the tail disappears as they become froglets.
- Frogs change habitat — tadpoles live in water, adult frogs live both in water and on land (amphibians).
- Frogs do not have a pupal stage; mosquitoes do.
- The frog's change in habitat is more dramatic than the mosquito's.

Answer: Similarities: both have four life stages, begin as eggs, live in water in early stages, and show significant body changes. Differences: mosquito has an egg-larva-pupa-adult cycle with a distinct pupa stage; frog has spawn-tadpole-froglet-adult cycle with no pupa stage. The frog's tadpole develops legs and changes habitat (water to land); the mosquito larva and pupa stay in water while the adult flies.

Q7 A plant is provided with all the conditions suitable for its growth (Fig. 10.9). Draw what you expect to see in the shoot and the root of the plant after one week. Write down the reasons.

SOLUTION

Fig. 10.9 shows a pot lying on its side along the ground (horizontally).
The plant inside it is therefore growing sideways initially.

Expected observations after one week (drawing activity):
- Shoot: will bend and grow upward, away from gravity and toward light.
- Root: will bend and grow downward, toward gravity.

Reasons:
- Shoots grow toward sunlight (they respond to light). Even if the pot is sideways, the shoot bends upward toward the light source.
- Roots always grow downward in response to gravity. Even if initially pointing sideways, the root bends and grows downward.
- These responses help the plant anchor itself and make food even when the pot is not upright.

Answer: Fig. 10.9 shows a pot lying on its side. After one week, the shoot will bend upward (toward light) and the root will bend downward (toward gravity), regardless of the pot's sideways orientation.

Q8 Tara and Vijay set up the experiment shown in the picture (Fig. 10.10). What do you think they want to find out? How will they know if they are correct?

SOLUTION

Fig. 10.10 shows an experimental set-up comparing seed germination under different conditions (seeds in containers with varying amounts of water or other conditions).

What they want to find out:

Tara and Vijay want to find out what conditions are needed for seed germination — for example, whether seeds need water, air, or a suitable temperature to germinate.
This is the same kind of investigation as Activity 10.2 in the chapter.

How they will know if they are correct:
- They will observe all the set-ups daily for 7–10 days.
- If seeds in the set-up with the expected condition show sprouting (tiny root and shoot emerging), their idea is correct.
- If seeds without that condition do not sprout, it confirms which condition is needed.
- By comparing results across all set-ups, they can identify which condition causes or prevents germination.

Answer: Fig. 10.10 shows a germination experiment comparing different conditions. Tara and Vijay want to find out which conditions (such as water, air, or temperature) are needed for seed germination. They will know they are correct if seeds in the expected condition sprout within 7–10 days while seeds in other conditions do not.

Q9 Design an experiment to check if temperature has an effect on seed germination.

SOLUTION

Experiment design:

Aim: To find out whether temperature affects seed germination.

Materials needed: Bean or gram seeds, identical pots or containers, garden soil, water.

Steps:
1. Take three identical pots and fill each with the same type and amount of garden soil.
2. Sow the same number of bean seeds (e.g., 4-5 seeds) in each pot.
3. Water each pot with the same amount of water to keep the soil moist.
4. Place the three pots at three different temperatures:
   - Pot A: In a refrigerator (very cold temperature).
   - Pot B: At normal room temperature.
   - Pot C: In a warm location (e.g., near a heater or in direct sunlight).
5. All other conditions (amount of water, type of soil, amount of light) should be

the same for all three pots — only temperature should differ.

6. Observe all three pots daily for 10–15 days. Record which pots show germination (sprouting) and how many seeds germinate.

Expected result: Seeds at normal or warm temperature are likely to germinate; seeds in very cold conditions may not germinate or germinate more slowly.

Conclusion: If germination occurs at one temperature and not another, we can conclude that temperature affects seed germination.

Answer: Set up three identical pots with the same seeds and moist soil. Place them at three different temperatures: cold (refrigerator), room temperature, and warm. Keep all other conditions the same. Observe for 10–15 days and record which pots show germination. If germination differs across pots, temperature has an effect on seed germination.