

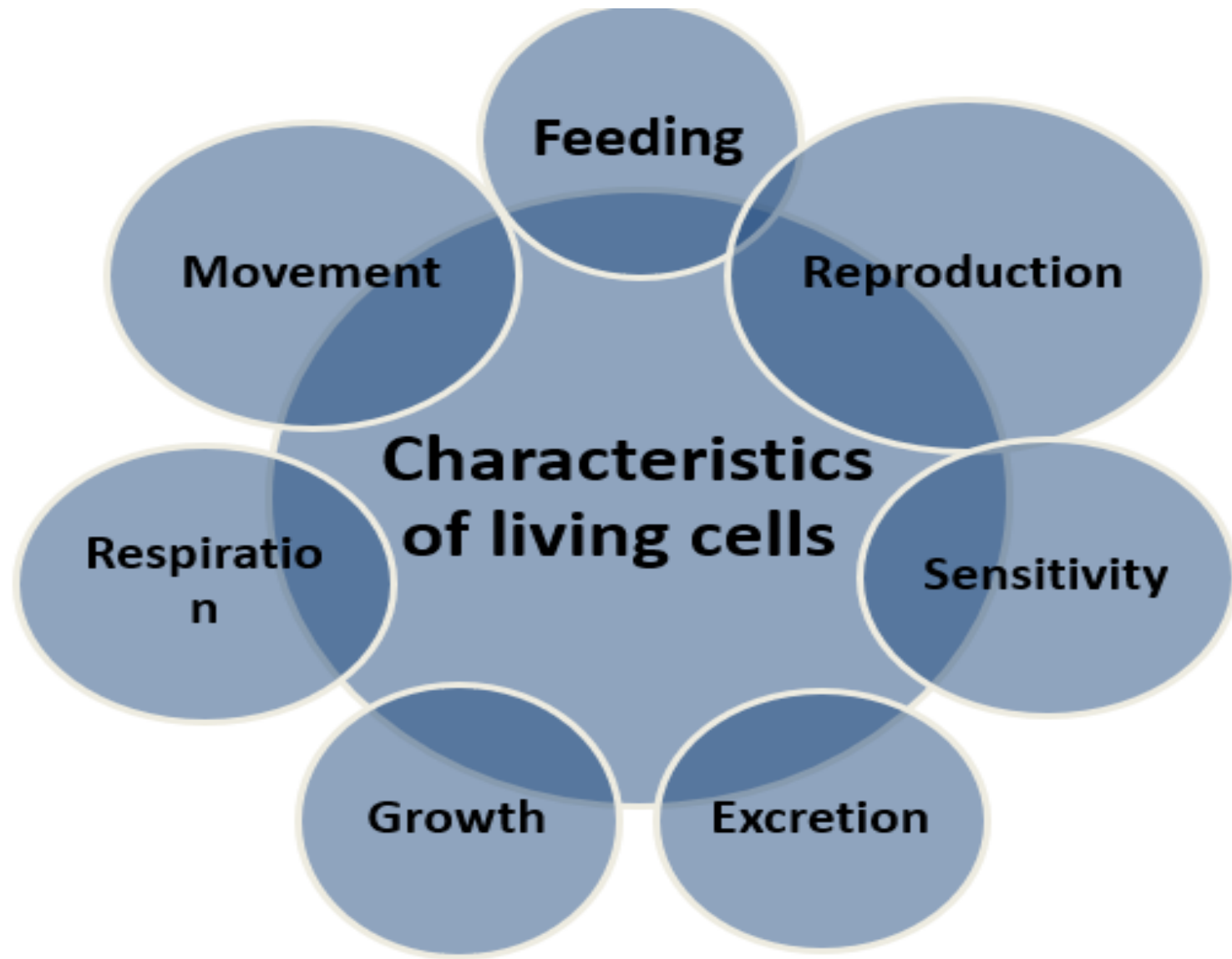


THE CHARACTERISTICS OF LIVING THINGS

Accredited by



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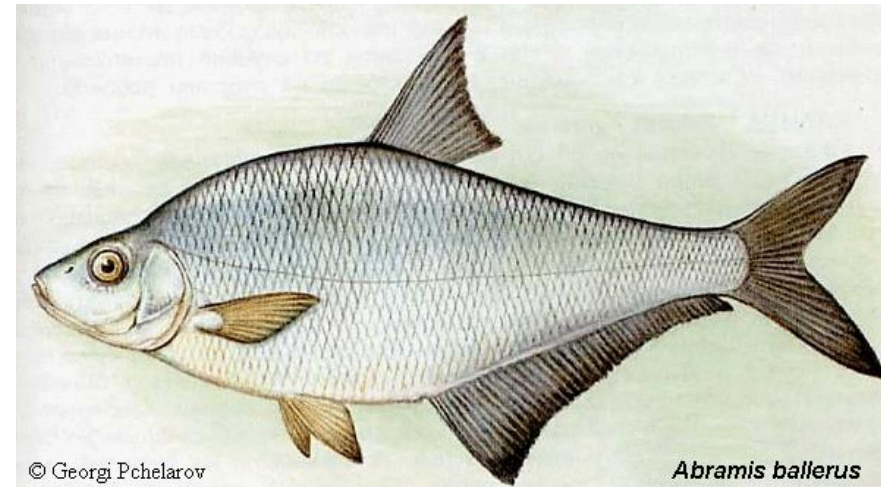


Movement

- **Movement:** an action by an organism or part of an organism causing a change of position or place.

Movement in animals:

- They have organs (limbs, fins, wings, and tails).
- Animals can move from one place to another.



Movement in plants:

They can't locomote (change place) because they are rooted to the ground.

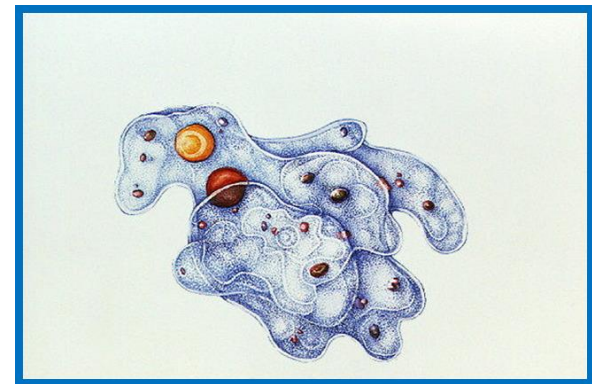
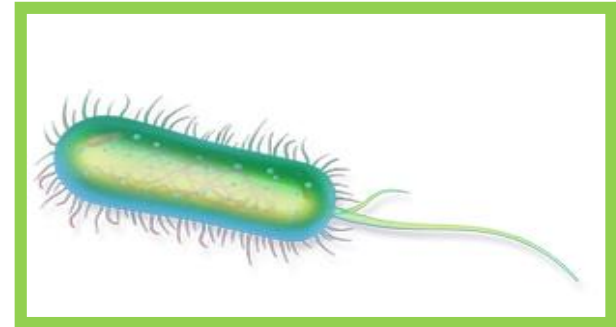
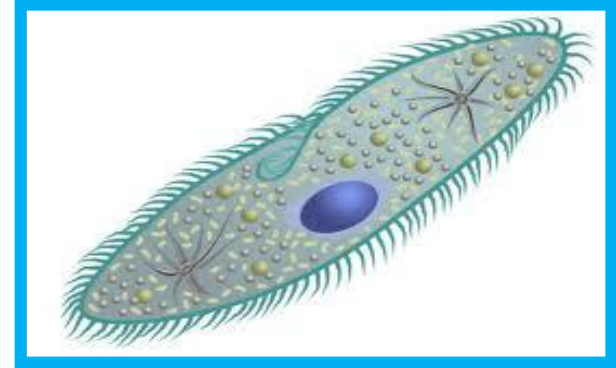
Types of movement (in plants):

- * Phototropism: Growth of stem and leaves towards the sunlight.
- * Geotropism: Growth of roots towards the gravity.
- * Hydrotropism: Growth of root towards water



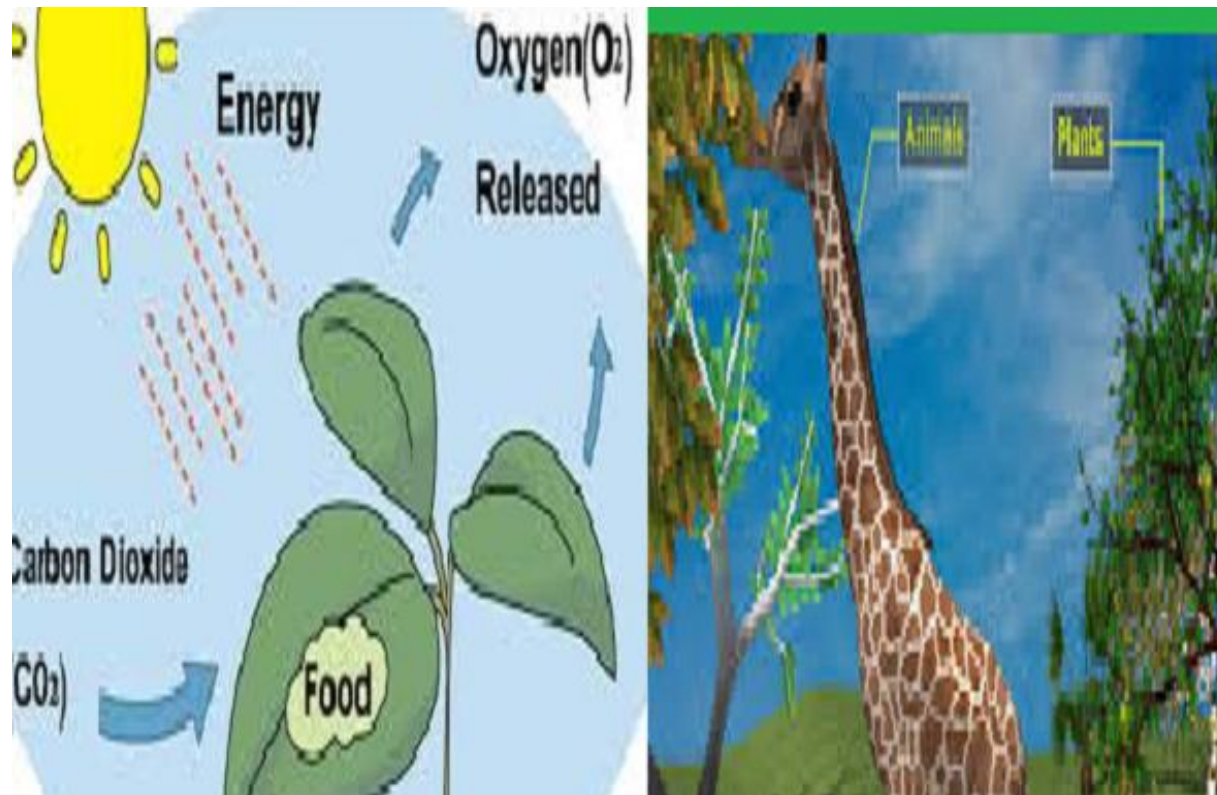
Movement in microorganisms

- Movement **by cilia** as in the paramecium
- Movement by **Flagella** as in some bacteria
- Movement by **pseudopodia** (false feet) in Amoeba



Nutrition

Defined as taking in materials **for energy, growth and development;** plants require light, carbon dioxide, water and ions; animals need organic compounds and ions and usually need water.



Types of feeding

Organisms are divided into Autotrophs and heterotrophs

- **Autotrophs** (producer): They can make their own food by a process called photosynthesis in the presence of sunlight and some inorganic substances: (carbon dioxide and water)
- **Heterotrophs** (consumers): Have to feed on readymade food; from this they derive their energy.

Types of Heterotrophs

https://www.youtube.com/watch?v=Ch_g8X88Q3E

1- **Herbivores:** organisms that eat plants (plant eaters).

e.g: Rabbit, Cow, Sheep

2- **Carnivores** (in Latin, *caro* meaning 'meat' or 'flesh'): organisms that eat meat (meat eaters)

eg: Lion, Tiger

3- **Omnivores** (in Latin *omni*, means "all, everything") : organisms that eat both plants and other animals' meat.

e.g: Humans.



4- Scavenger: Scavengers are animals that **feed on dead or injured animals** decaying the organic matter.

Scavengers play an Important role in the environment by consuming the dead animal and plant material. e.g. Hyenas

5- Decomposers: (Saprotrophs)

Decomposers produce digestive enzymes outside their bodies, then the dead matter will be digested externally; eventually they absorb some of the digested molecules.

e.g.: some Fungi, Bacteria, Bread, and Mould

6-Parasites: which derives its food from another organism called the host **while the host is still alive.**

e.g.: Fungi, Bacteria, Worms, bugs, Lice, Mites.



Bedbug



Lice



Mite

Excretion

Defined as the removal from organisms of the **waste products of metabolism** (chemical reactions in cells including respiration), toxic materials, and substances in excess of requirements

Each waste product has a specific way of getting out of our body:

- **carbon dioxide**: Gets out during exhalation, through the lungs.
- **Sweat**: (Urea, water, minerals) get out through skin.
- **Urine**: (Urea, Uric acid, water, minerals) get out through Kidneys.

Respiration

- **Respiration**: the chemical reactions in the cell that break down food molecules to release energy.

There are two types of respiration

Aerobic respiration:
Breaking down of glucose
in the presence of oxygen
to release energy

Anaerobic respiration:
breaking down of glucose
in the absence of oxygen

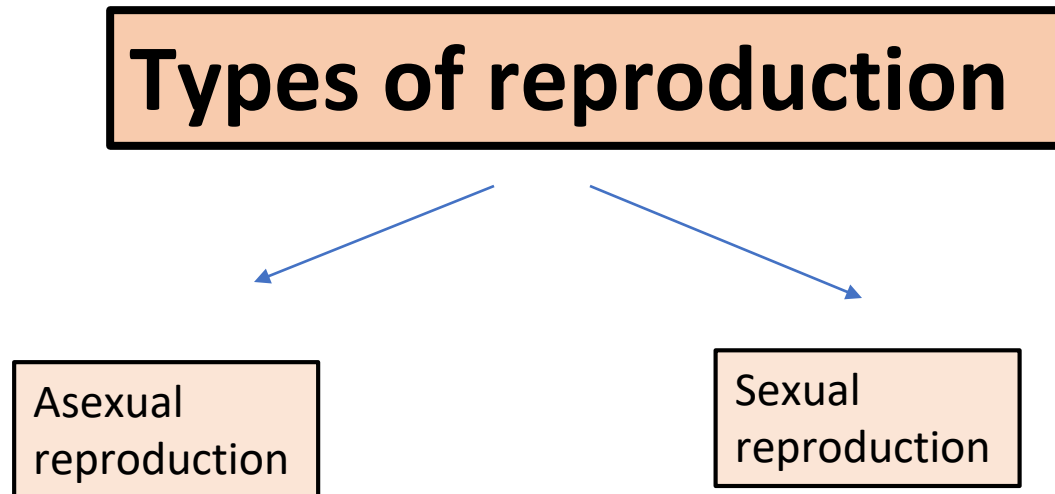
Comparison between aerobic and anaerobic respiration:

| Anaerobic respiration | Aerobic respiration |
|---|---|
| It takes place inside the cytoplasm | It takes place inside the mitochondria |
| It produces 2 ATP | It produces 38 ATP |
| Without oxygen | It needs oxygen |
| <p>(In yeast) 1: Glucose \rightarrow Ethanol (Alcohol) + Carbon dioxide + 2 ATP</p> <p>In Yeast: $C_6H_{12}O_6 \rightarrow 2C_2H_5OH + 2CO_2 + 2ATP$</p> <p>(in muscles) 2: Glucose \rightarrow Lactic acid + 2ATP</p> <p>In <u>muscles</u> : $C_6H_{12}O_6 \rightarrow 2C_3H_6O_3 + 2 ATP$</p> | <p>Glucose + Oxygen \rightarrow Carbon Dioxide + Water + 38 ATP (Energy)</p> <p>$C_6H_{12}O_6 + 6O_2 \rightarrow 6CO_2 + 6H_2O + 38ATP$</p> |

Reproduction

Reproduction is the process that make more of the same kind of organism

Reproduction is important **to allow the continuation of species and prevents extinction.**



Asexual reproduction

In this type of reproduction, only one parent is needed, for this reason the offspring produced will inherit the same genetic material of this parent, as a result the offspring generated will be identical to their parent.

Examples:

- **Vegetative propagation:** (Tubers, Rhizomes)
- **Spore formation :** (Fungi)
- **Budding :** (Yeast)
- **Binary fission** (Bacteria)
- ***All of these examples will be discussed in details later on.***

Sexual Reproduction

- In this type of reproduction, two parents are needed, each parent produces a gamete, and the two gametes fuse together in a process called fertilization to produce a fertilized egg called "zygote". This zygote contains genetic material inherited from both parents; as a result the produced offspring will be unique and not exactly identical to either of the parents due to the new combination of genetic material produced upon fertilization of the two gametes.

Gametes in animals

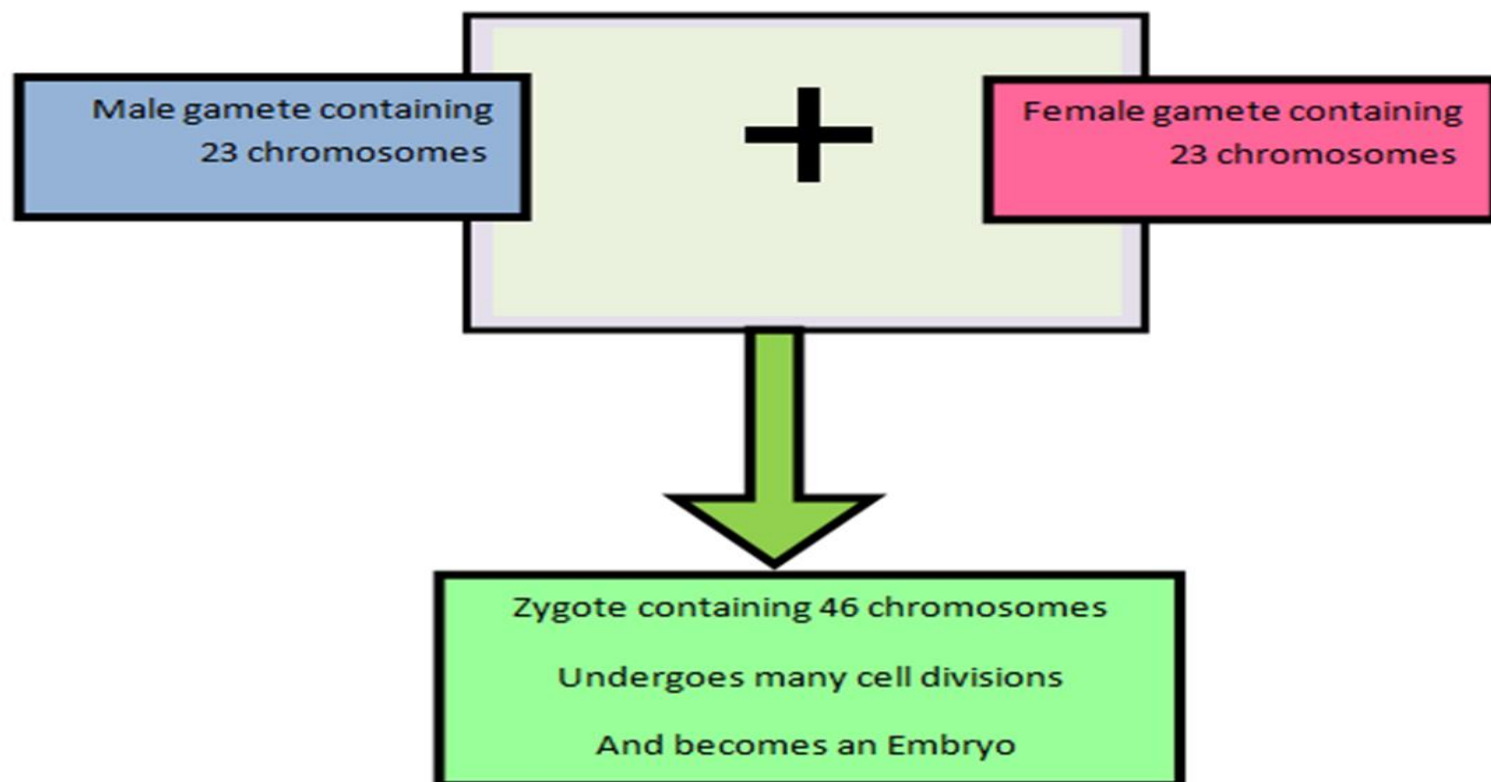
a) Male → sperm

b) Female → Ovum

Gametes in Plants

a) male → pollen grain

b) female → Ovules



Growth

Growth is the permanent increase in size and dry mass by an increase in cell number or cell size or both

Growth in animals: Involves increasing in size, mass, and complexity.

✓ Growth starts from the zygote stage and continues until maturity.

Growth in plants: Starts at the zygote stage and continues until the plant dies.

Growth of micro-organism: The unicellular organism starts growing and increasing in size until they divide into 2 daughter cells.

Sensitivity

Sensitivity involves the ability to detect a stimulus (which is a change in the environment) and to make responses (any reaction that takes place due to the stimulus).

✓ All living things sense stimuli and respond to it.

Stimulus: changes in the environment that cause a response.

Sensitivity of animals:

External stimuli: light, temperature.

Internal stimuli: diseases, concentration of sugar in the blood.

Animals have sense organs (nervous system) which detect the changes and respond.

Sensitivity in plants:

Phototropism, Hydrotropism and Geotropism.

Plants don't have a nervous system they can only produce special hormones.

Text book page 13 :

QUESTIONS

- ~~1. For each of the seven characteristics, give one example for:
 - a human
 - an animal of your choice
 - a plant.~~
2. For each of the seven characteristics, explain why they are essential to a living organism.

2. by photosynthesis.
- movement – to reach best place to get food or other conditions favourable for growth
 - respiration – to release energy from food that can be used for all life processes
 - sensitivity – to detect changes in the environment
 - growth – to increase in size until large/mature enough for reproduction
 - reproduction – to pass genes on to next generation
 - excretion – to remove harmful substances from body
 - nutrition – to take in substances needed by the body for growth and reproduction

End of topic questions

Note: the marks in brackets give an indication of the level of detail you should include in your answers.

1. State and describe the seven processes of life. (7 marks)
2. Give two life processes necessary for an organism to release energy. (2 marks)
3. Explain why dry mass is often used to measure growth. (2 marks)
4. When you place a crystal of copper(II) sulfate in a saturated solution of the same compound, the crystal will increase in size. Does this mean that the crystal is alive? Explain your answer. (2 marks)
5. Plants cannot move about, as animals can. Does that mean animals are more alive than plants? Explain your answer. (2 marks)
6. During winter, an oak tree in the UK will lose its leaves and not grow. Is the tree still living during this time? Explain your answer using all the

Answers

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End of topic questions mark scheme

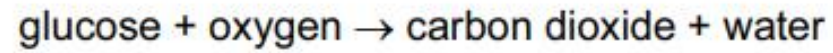
The marks available for a question can indicate the level of detail you need to provide in your answer.

| Question | Correct answer | Marks |
|----------|---|---|
| 1 | Movement – changing position or place; respiration – chemical reactions that release energy; sensitivity – detecting and responding to changes in the environment; growth – increasing in size; reproduction – making more individuals; excretion – removal of waste products; nutrition – obtaining food. | 7 marks (1 mark for each correct answer) |
| 2 | Nutrition and respiration in animals, photosynthesis and respiration in plants. | 1 mark 1 mark |
| 3 | Dry mass is the mass of all the materials used to make the cells and tissues of the body. Water content in the body varies as water is gained and lost, so wet mass is not reliable. | 1 mark 1 mark |
| 4 | The crystal increases in size as more of the substance in solution attaches to the crystal, but this is not true growth because the substance can be lost to solution too, so it is not a permanent increase. The crystal also does not show any of the other six characteristics of life. | 1 mark 1 mark |
| 5 | Animals are not 'more alive' just because they have to move around to get their food, etc. Plants must remain attached to the ground because that is where they get support, water and nutrients, but they move parts of their body. Both plants and animals show all the life processes, so are equally 'alive'. | 1 mark 1 mark |
| 6 | The tree may not noticeably grow during winter, although there may be some cell growth. Respiration and therefore excretion may still occur, but at a very slow rate (as gas exchange continues slowly through the bark). Nutrition (photosynthesis), movement, reproduction and sensitivity may not take place during winter. As long as the tree can return to a state in which it can carry out all these processes (when leaves grow, during the rest of the year), it is still alive. | 1 mark 1 mark 1 mark 1 mark |

Check your understanding :

1. Phototropism demonstrates which two characteristics of living organisms?
 - A growth and nutrition
 - B growth and sensitivity
 - C movement and nutrition
 - D nutrition and sensitivity

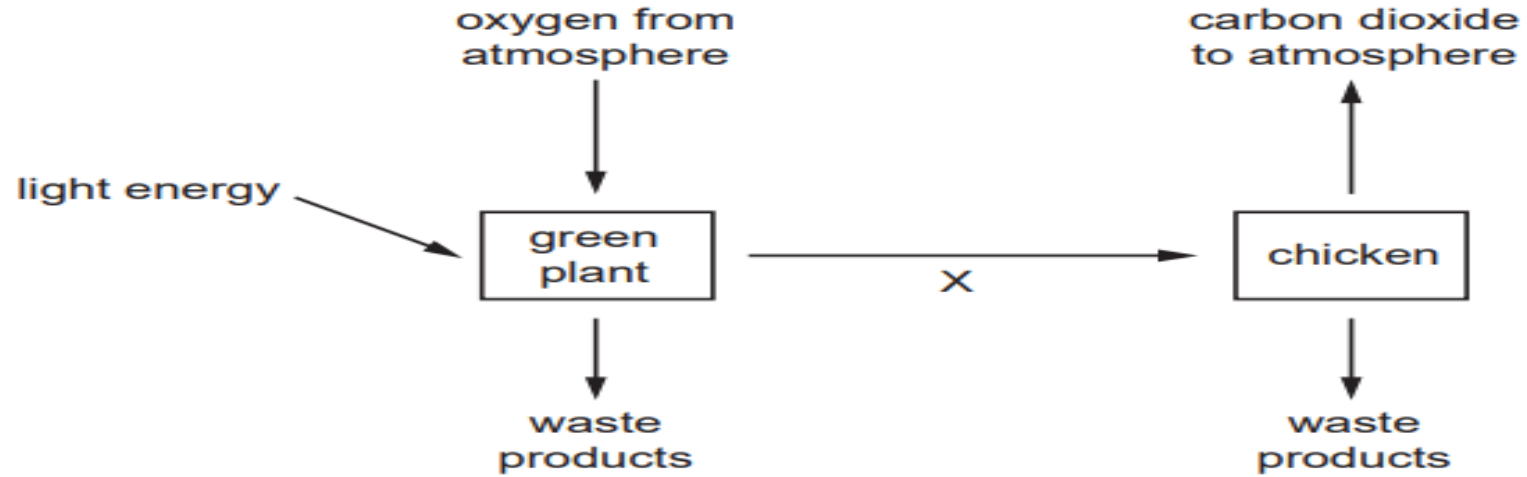
2. The equation shows a chemical reaction that occurs in living organisms.



Which of these characteristics of living organisms is this equation associated with?

| | respiration | nutrition |
|----------|-------------|-----------|
| A | ✓ | ✓ |
| B | ✓ | x |
| C | x | ✓ |
| D | x | x |

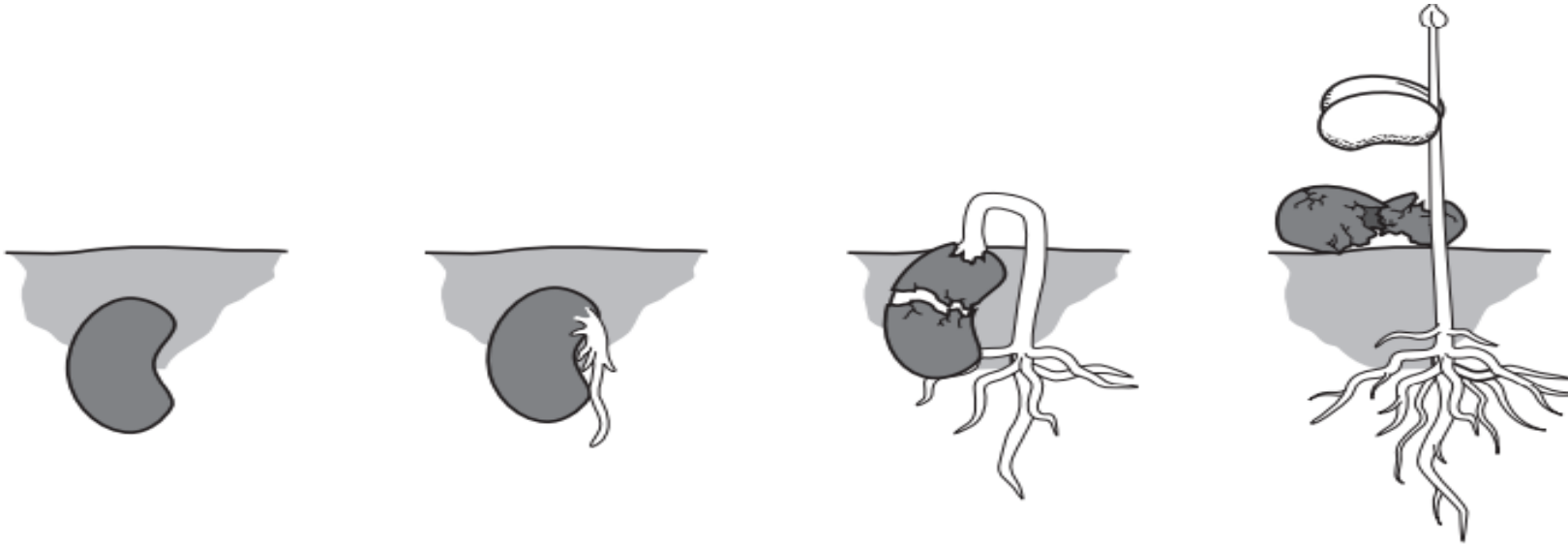
3. The diagram illustrates some of the processes carried out by living organisms.



Which characteristic of living organisms is represented by arrow X?

- A excretion
- B nutrition
- C respiration
- D sensitivity

4.



Which characteristics of living things are demonstrated by this sequence?

- A** growth and reproduction
- B** growth and sensitivity
- C** nutrition and reproduction
- D** nutrition and sensitivity

5. Growth is a characteristic feature of living organisms.

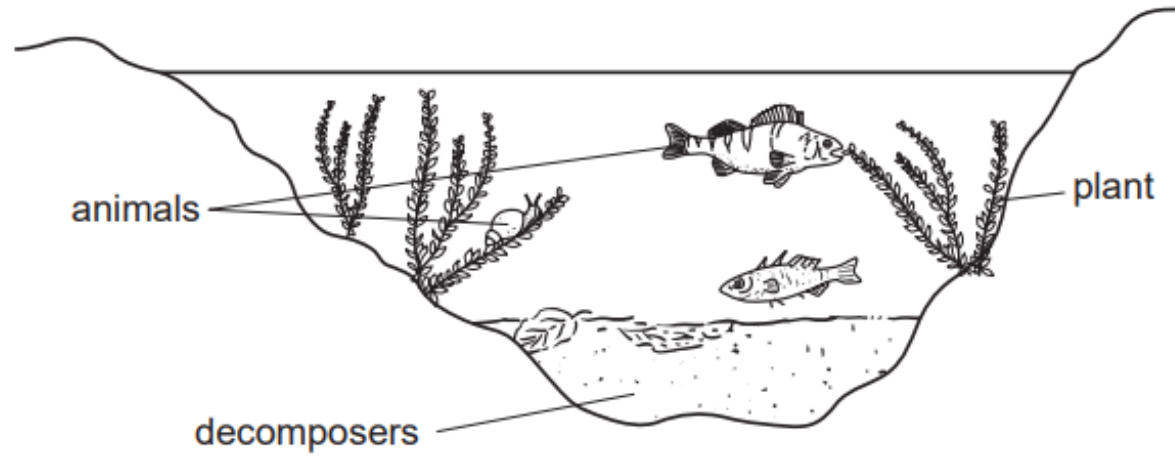
Which process provides the energy for growth?

- A excretion
- B movement
- C respiration
- D sensitivity

Which process removes the waste products of metabolism from the body?

- A** excretion
- B** nutrition
- C** reproduction
- D** respiration

The diagram shows some organisms living in water.



Which process is carried out by all the living organisms shown?

- A photosynthesis
- B pollination
- C respiration
- D transpiration

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Thank you