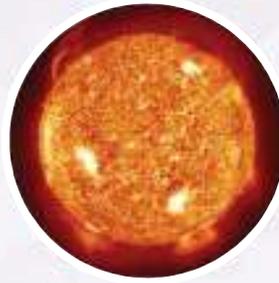


UNIT 1

Life processes are performed at the cellular level

TOPIC 1.1

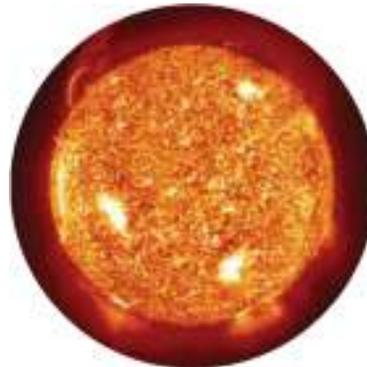
What are the characteristics of living things?



TOPIC 1.1 What are the characteristics of living things?

Topic 1.1: What are the characteristics of living things?

- What is a living thing?
 - What characteristics separate living things from non-living things?
 - Is the sun a living thing?



TOPIC 1.1 What are the characteristics of living things?

Concept 1: Living things are made of cells, take in nutrients, use energy, and produce waste.

- Living things are:
 - Made of cells
 - Take in nutrients
 - Use energy
 - Produce waste



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TOPIC 1.1 What are the characteristics of living things?

Living Things Are Made of Cells

- **Cell:** The basic structural and functional unit of life
 - Carries out life processes:
 - Obtaining and using energy
 - Breaking down nutrients
 - Copying genetic material
 - Excreting waste



Animal cell

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TOPIC 1.1 What are the characteristics of living things?

Living Things Are Made of Cells

- Living things are made of:
 - **One cell** (unicellular or single-celled organisms) or
 - **Multiple cells** (multicellular organisms)



Paramecium



Pacific Dogwood



Spirit Bear

Figure 1.1: The cells of all organisms carry out life processes.

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TOPIC 1.1 What are the characteristics of living things?

Living Things Take In Nutrients

- Most organisms get nutrients by eating food
 - **Consumers:** Eat (consume) other organisms for food
 - **Producers:** Can produce their own food using the Sun's energy and nutrients from their surroundings



Figure 1.2: Squirrels, sea otters, and humans are all consumers. The grass the squirrel is eating is an example of a producer.

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TOPIC 1.1 What are the characteristics of living things?

Living Things Use Energy

- Living things use energy for life processes (growth, movement, sleep)
 - **Consumers:** Get energy from the food they eat
 - **Producers:** Use food they make as a source of energy



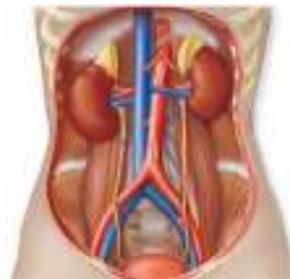
Figure 1.3: The snowy owl visits southern parts of B.C. from the Arctic in late fall and winter. Mice are among its sources of food energy.

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TOPIC 1.1 What are the characteristics of living things?

Living Things Produce Waste That Must Be Removed

- Living things produce waste that is harmful if not removed
 - **Unicellular organisms:**
 - Waste passes across the membrane of a cell into the environment, or is excreted by a vesicle
 - **Multicellular organisms:**
 - Have structures and systems that collect and remove waste
 - Humans have kidneys that filter waste from blood



Human excretory system

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TOPIC 1.1 What are the characteristics of living things?

Discussion Questions

- How are unicellular and multicellular living things similar and different?
- Why do living things need energy, and where do they get it?



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TOPIC 1.1 What are the characteristics of living things?

Concept 2: Living things respond to stimuli, grow, and reproduce.

- Living things:
 - Respond to stimuli
 - Grow
 - Reproduce



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TOPIC 1.1 What are the characteristics of living things?

Living Things Respond to Stimuli

- **Stimulus** (plural: stimuli): anything that causes a living thing to respond in a certain way

Type of stimuli	Definition	Example of stimulus	Response to stimulus
Internal stimuli	Things that occur inside a living thing's body that cause a response	Stomach growling	Eat food
External stimuli	Things that occur outside a living thing's body in their surroundings that cause a response	Light	Plant: grow towards the light

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TOPIC 1.1 What are the characteristics of living things?

Living Things Respond to Stimuli

Figure 1.4



The caribou drinks in response to an internal stimulus (thirst).



A plant growing toward the light is responding to an external stimulus.



Euglena have an eyespot that allows them to sense the external stimulus of light.

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TOPIC 1.1 What are the characteristics of living things?

Living Things Grow

- Living things grow by increasing in size, or in the number of cells, or both
 - **Unicellular organisms:** Grow by increasing in cell size up to a certain point
 - **Multicellular organisms:** Grow by increasing the number of cells in their body



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TOPIC 1.1 What are the characteristics of living things?

Living Things Reproduce

- Living things reproduce using different methods
 - **Cell division:** Bacteria divide into two cells
 - Each new cell is genetically the same as the original cell
 - **Mating:** Many organisms mate to reproduce
 - Offspring are genetically different from parents

Figure 1.5: Bacteria reproduce by dividing into two cells that are identical. Other organisms produce offspring with a mate.



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TOPIC 1.1 What are the characteristics of living things?

Discussion Questions

- Name two internal stimuli and two external stimuli that you respond to. How would your body respond to each of the stimuli?
- How is growing different from reproducing?



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TOPIC 1.1 What are the characteristics of living things?

Summary: Characteristics of Living Things

- Living things:
 - Made of cells
 - Take in nutrients
 - Use energy
 - Produce waste that must be removed
 - Respond to stimuli
 - Grow
 - Reproduce



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