Themes in the Study of Life 1.1

KEY QUESTIONS

1. What are the characteristics of life?
2. What are the levels of biological organization?
3. What are the 7 themes of life?

What is Biology?

- biology is the scientific study of life
- revolves around asking questions

What makes something living?

- distinct properties that classify something as living/non-living

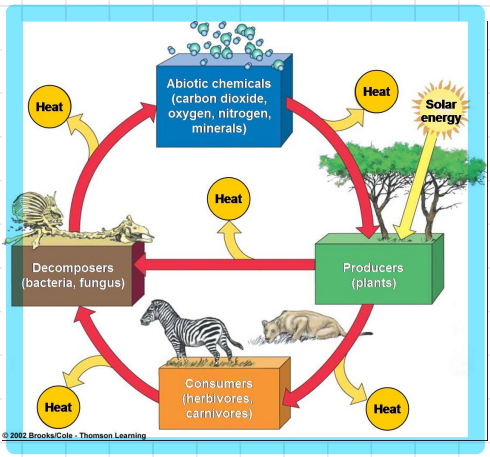
7 PROPERTIES

Order	Structured pattern that characterizes life
Regulation	Maintain stable body temperature, aka homeostasis
Evolutionary adaptation	Adaptation to fit in environment
Reproduction	Living things produce their own kind
Energy processing	Obtain fuel to power the organism
Growth & Development	Inherited genes control growth and development
Response to the Environment	Response to stimulus

THEMES

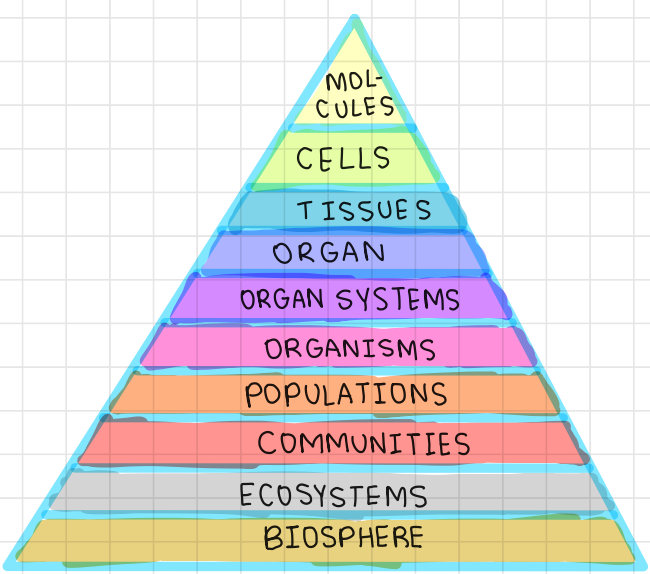
Theme 1 : organisms interact with other organisms + environment

- in an ecosystem organisms will interact with each other and the environment in order to survive
- Ex. Plants obtain water + minerals through roots and roots form soil by breaking rocks



Theme 2 : New properties emerge at each level in the biological hierarchy

- Emergent properties
- Reductionism does not always work
  - You can see new properties as you zoom out



THEMES

Theme 3 : Life requires energy transfer

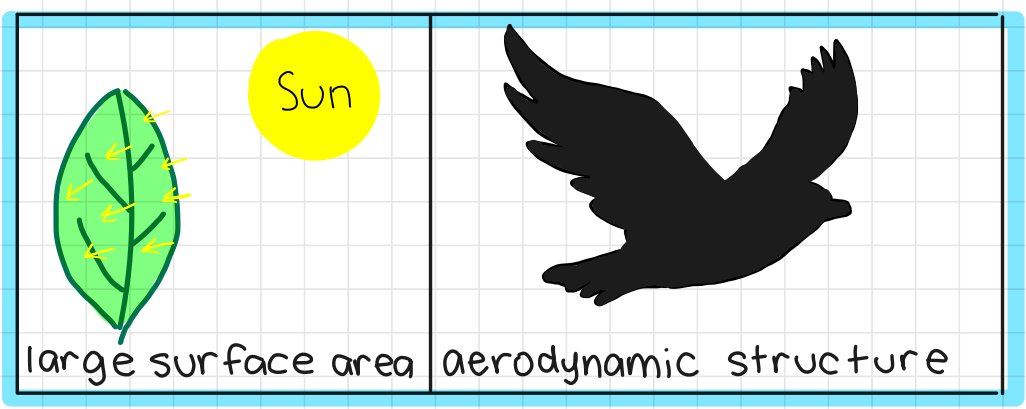
- organisms obtain and use energy to execute life's functions
  - Ex. Growing, reproducing, etc
- transform one form of energy to another
  - light energy ⟶ chemical energy (photosynthesis)

$$6CO_2 + 6H_2O \xrightarrow{\text{light}} \boxed{C_6H_{12}O_6} + 6O_2$$

glucose

Theme 4: Structure & Function are correlated at all levels of biological organization

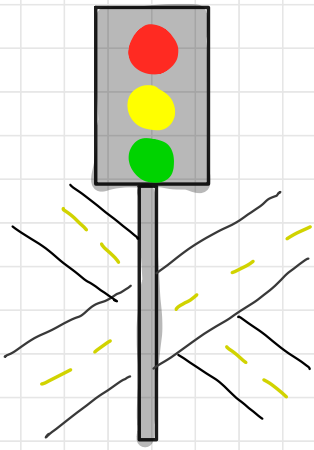
- Form fits Function
- Structures in life are built to do a function
- Systems have components that function together

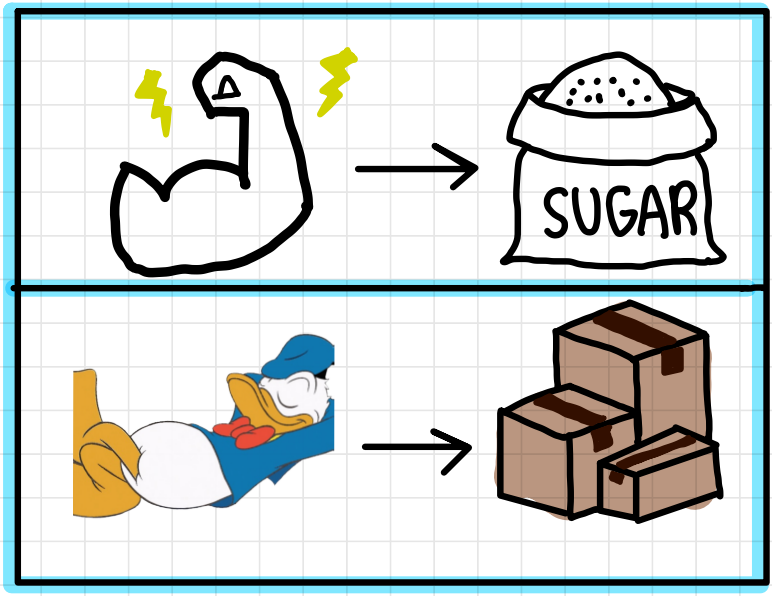


THEMES

Theme 7: Feedback mechanisms regulate biological systems

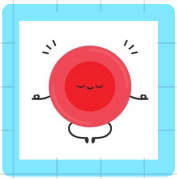
- similar to how traffic is controlled to allow the city to properly function, biological process must also be regulated
- feedback is a mechanism, that allows organism to self-regulate bio-processes
  - negative feedback : accumulation of end product of process, slows down that process
  - positive feedback : end product speeds up it's own production



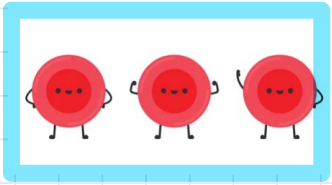


+ FEEDBACK

normal :



wound :



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