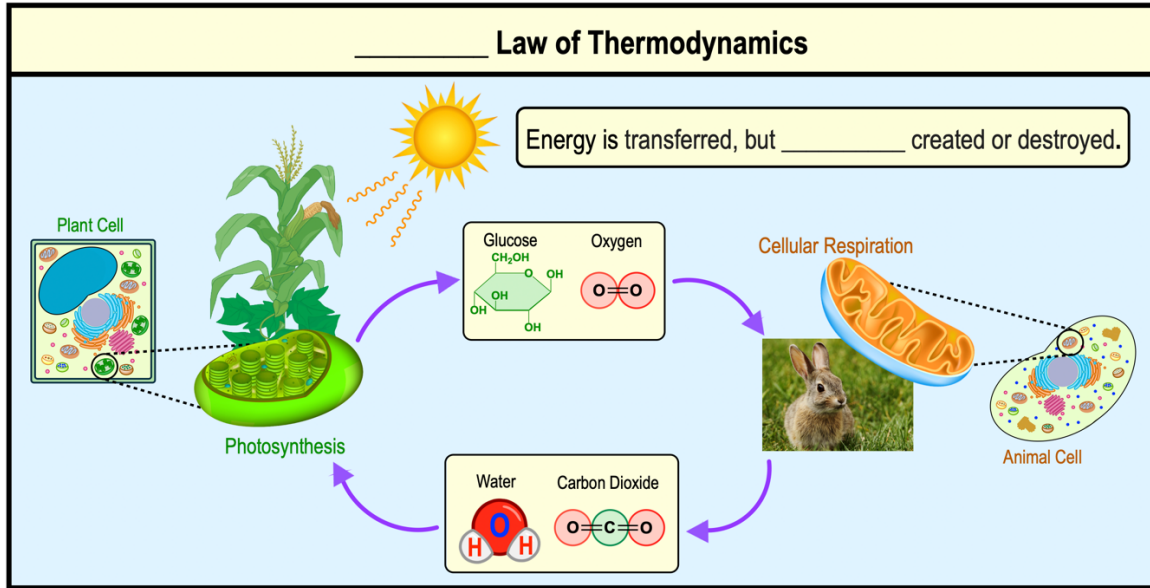


CONCEPT: LAWS OF THERMODYNAMICS

First Law of Thermodynamics

- “Energy _____ be transferred and transformed, but it _____ be created or destroyed.”
 - AKA: The Principle of _____ of Energy.
 - The TOTAL amount of energy in the universe does _____ change.

EXAMPLE: First Law of Thermodynamics.



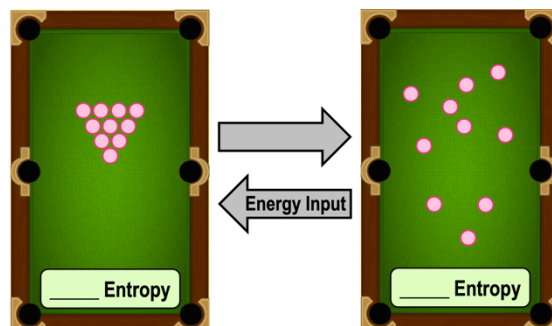
PRACTICE: Which of the following statements describes the first law of thermodynamics?

- a) Energy cannot be created or destroyed.
- b) Energy cannot be transferred or transformed.
- c) Also called The Principle of Creation of Energy.
- d) Energy can be destroyed.

Entropy

- A measure of _____, or randomness; the greater the disorder, the _____ the entropy.
- The “natural tendency” of reactions is to move the Universe toward a state of _____ entropy (disorder).
 - Reactions can decrease entropy of a system with an _____ input.

EXAMPLE: Low vs High Entropy Systems.



CONCEPT: LAWS OF THERMODYNAMICS

PRACTICE: Which of the following images has less entropy?

- a) Image A has less entropy.
- b) Image B has less entropy.

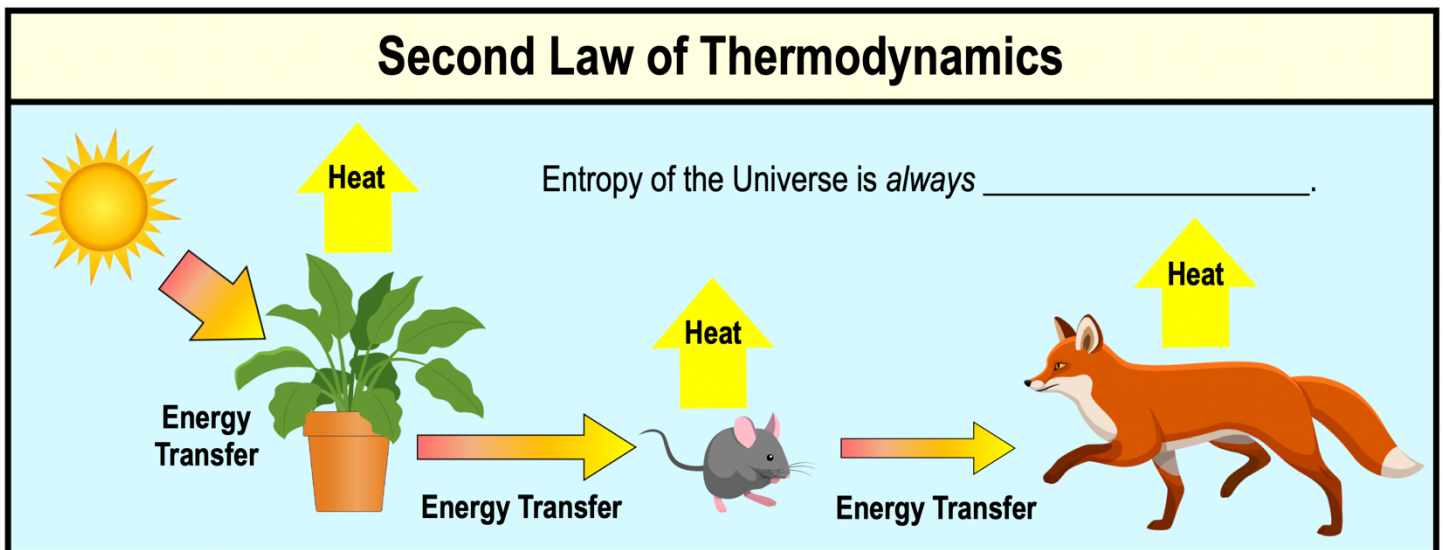


Second Law of Thermodynamics

● 2nd law: 100% efficient energy conversion is *impossible* since _____ energy is lost, increasing *universal entropy*.

□ **Heat:** form of _____ energy that is transferred between two objects with different *temperatures*.

EXAMPLE: Second Law of Thermodynamics.



PRACTICE: When chemical, transport, or mechanical work is done by an organism, what happens to the heat generated?

- a) It is used to power yet more cellular work in the surroundings.
- b) It is captured to store energy as more heat in the system.
- c) It is used to generate ADP.
- d) It is lost to the environment.

PRACTICE: Which of the following statements is true regarding how energy moves up the food chain?

- a) All of the energy is not transferred from producer to consumer because some of the energy is destroyed.
- b) All of the energy is transfer from producer to consumer.
- c) All of the energy is not transferred from producer to consume because some of the energy is lost as heat.
- d) None of the above.