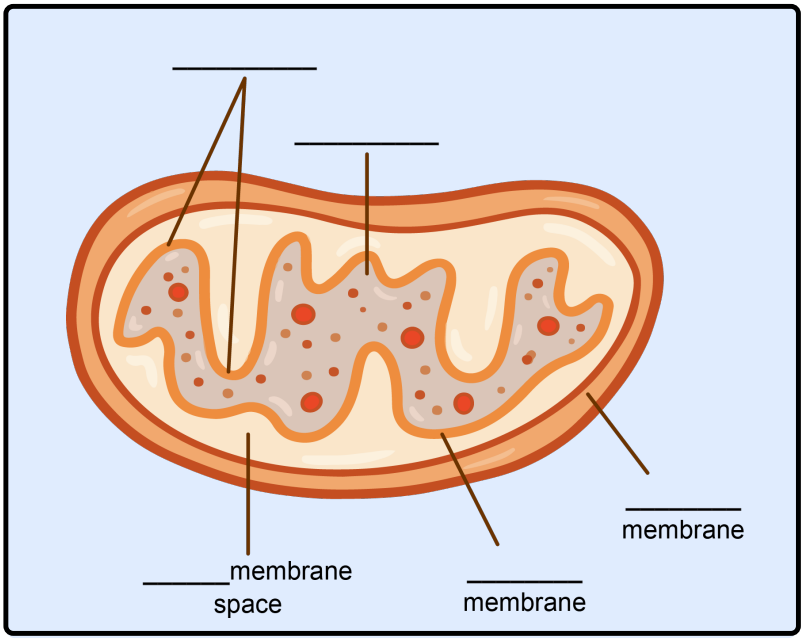
CONCEPT: ATP AND ENERGY

Structure of Mitochondria

- **Mitochondria**: _____ producing organelles where majority of _____ is produced.
  - □ Site of _____ metabolic pathway.
    - **Cristae:** _____ inner membranes, provides _____ surface area for production of ATP.



EXAMPLE: Which structure in the mitochondrion contributes significantly to ATP synthesis?

a) Matrix

b) Cristae

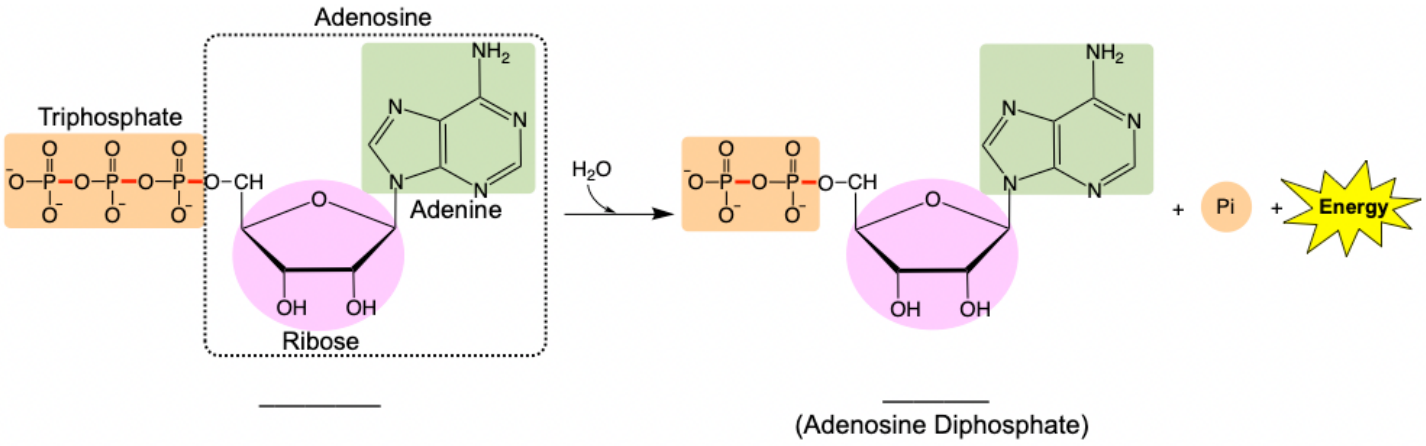
c) Intermembrane space

d) Outer membrane

CONCEPT: ATP AND ENERGY

Adenosine Triphosphate (ATP)

- Energy obtained from food catabolism is stored in _____ molecules.
- **ATP** is a _____ - _____ compound, stores and transports energy.
  - □ Has high-energy _____ bonds.
  - □ Hydrolysis of ATP yields **Energy**.



- □ **Note:** Hydrolysis of ADP produces _____ (Adenosine Monophosphate) + **Energy**.

EXAMPLE: Which components make up the structure of ATP?

a) Adenine, ribose sugar, and one phosphate group.

b) Adenosine, ribose sugar, and two phosphate groups.

c) Adenine, ribose sugar, and three phosphate groups.

d) Adenosine, ribose sugar, and three phosphate groups.

PRACTICE: Hydrolysis of Adenosine Diphosphate yields:

a) Ribose, inorganic phosphate, and energy.

b) Adenosine Monophosphate, one inorganic phosphate, and chemical (potential) energy.

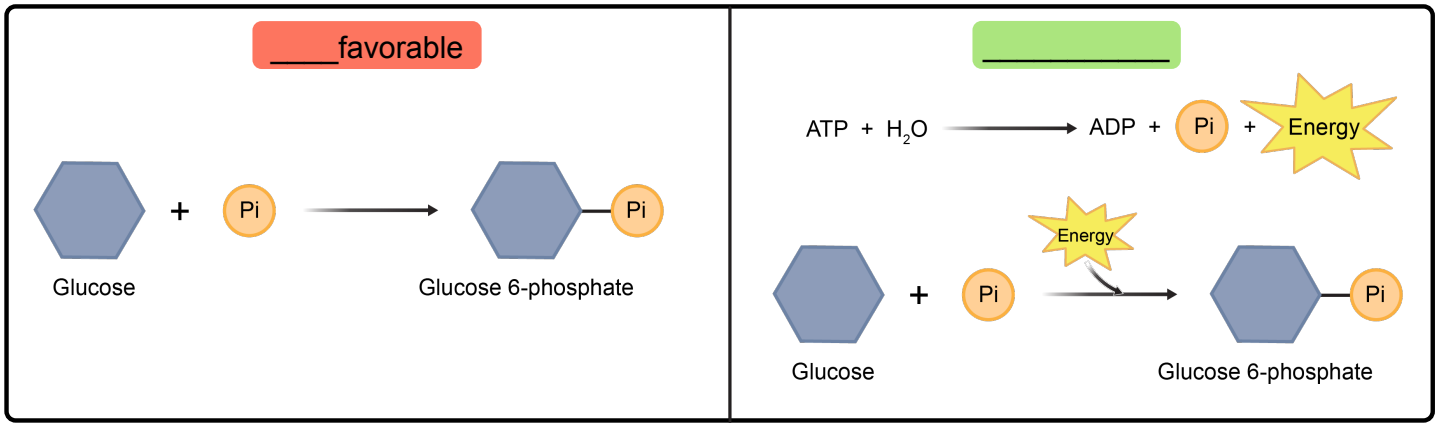
c) Adenosine Monophosphate, three inorganic phosphates, and energy.

d) Adenosine Monophosphate, one inorganic phosphate, and kinetic energy.

CONCEPT: ATP AND ENERGY

Coupled Reactions

- Not every reaction in metabolic pathways is _____.
  - □ Need to _____ with favorable (exothermic) reactions, such as ATP hydrolysis.
    - Serves as energy source to _____ unfavorable reactions.



EXAMPLE: Formation of sucrose from glucose and fructose is coupled with ATP hydrolysis. What role does ATP play?

a) Transfer energy to drive endothermic reaction.

b) To act as a catalyst.

c) Speed up the rate of the reaction.

d) Absorb energy from the surroundings.

PRACTICE: An athlete is training for a marathon. Every mile that the athlete runs, an average of 117.5 kcal of energy is expanded. How many moles of ATP would the athlete burn during a full marathon (26.2 mi)?

Use conversion factor: 1 mole ATP = 7.3 kcal.