

B.Sc., PHYSICIAN ASSISTANT

FIRST YEAR

SUBJECT CODE & NAME – 1601 - BIOCHEMISTRY

PUZZLES - TOPIC – GLYCOLYSIS

1. Reasoning Puzzle: "Decoding the Glycolytic Pathway Mystery"

Objectives:

- To logically sequence and deduce the steps of glycolysis using deductive reasoning.
- To identify relationships between enzymes, substrates, and products in the pathway.
- To enhance understanding of energy investment and payoff in metabolic processes.

Tasks and Clues:

- **Task:** The glycolytic pathway has been jumbled. Using logic, rearrange the 10 steps into the correct order, identify the two phases, and explain why the preparatory phase is called "energy investment." Deduce which step produces NADH and how the net ATP gain is calculated.
- **Clues:**
 - Starts with glucose phosphorylation; ends with pyruvate formation.
 - Involves two ATP investments early on; four ATP produced later.
 - Enzymes: Hexokinase first, pyruvate kinase last; aldolase cleaves into trioses.
 - Phases: First 5 steps (preparatory/energy investment), next 5 (payoff/energy generating).
 - Hint: One step involves isomerization of triose phosphates; dehydration occurs near the end.
 - Net reaction is $\text{Glucose} + 2 \text{NAD}^+ + 2 \text{ADP} + 2 \text{Pi} \rightarrow 2 \text{Pyruvate} + 2 \text{NADH} + 2 \text{H}^+ + 2 \text{ATP} + 2 \text{H}_2\text{O}$.

Rubrics:

Criterion	Description	Marks Allotted (out of 10)
Correct Sequencing	Accurately orders all 10 steps with enzyme mentions.	4
Phase Identification	Correctly divides into preparatory and payoff, explains energy investment.	2
Deduction of Key Elements	Identifies NADH production and net ATP calculation logically.	3
Logical Reasoning	Uses clues and document evidence without errors.	1