What is Glycolysis?

Worksheet

Glycolysis is a 10-step enzymatic pathway that splits one glucose molecule into two pyruvate molecules, yielding a net gain of 2 ATP and 2 NADH per glucose.

$$C_6H_{12}O_6 + 2\ NAD^+ + 2\ ADP + 2\ P_i \rightarrow 2\ C_3H_6O_3 +$$

Questions

1. What is the net ATP yield from one glucose molecule in glycolysis?

A) 4 ATP
B) 2 ATP
C) 6 ATP
D) 0 ATP

2. Where in the cell does glycolysis take place?

A) Mitochondrial matrix
B) Nucleus
C) Cytoplasm
D) Endoplasmic reticulum

3. How many pyruvate molecules result from one glucose molecule?

A) 1
B) 2
C) 3
D) 4

4. How many NADH molecules are produced per glucose in glycolysis?

A) 1
B) 2
C) 4
D) 6

5. In glycolysis, a cell invests 2 ATP in the investment phase and produces 4 ATP in the payoff phase. What is the net ATP yield per glucose?

6. If a cell runs glycolysis on 5 glucose molecules, how many net ATP and NADH molecules are produced in total?

7. A muscle cell processes 3 glucose molecules through glycolysis. How many pyruvate molecules result, and how many total ATP are consumed in the investment phase?

8. Define: What is glycolysis?

9. Define: Where does glycolysis occur?

10. Define: What is the net ATP yield of glycolysis?

Answer Key

1. B) 2 ATP - 4 ATP are produced but 2 were invested, giving a net of 2 ATP.
2. C) Cytoplasm - Glycolysis occurs in the cytoplasm and doesn't need mitochondria or oxygen.
3. B) 2 - Glucose (6 carbons) splits into two 3-carbon pyruvate molecules.
4. B) 2 - The payoff phase produces 2 NADH molecules per glucose.
5. ATP produced = 4 ATP invested = 2 Net ATP = ATP_produced ATP_invested = 4 2 = 2 ATP
6. Net ATP per glucose = 2, NADH per glucose = 2 Total net ATP = 5 2 = 10 ATP Total NADH = 5 2 = 10 NADH
7. Pyruvate per glucose = 2 Total pyruvate = 3 2 = 6 pyruvate molecules ATP invested per glucose = 2 Total ATP invested = 3 2 = 6 ATP
8. The pathway that splits one glucose molecule into two pyruvate molecules in the cytoplasm, yielding net 2 ATP and 2 NADH.
9. In the cytoplasm of the cell, and it doesn't require oxygen.
10. 2 ATP per glucose molecule (4 produced minus 2 invested).