# Why?

**Glycolysis**

What reactions occur in the cell to turn glucose into carbon dioxide?

Glucose is a high potential energy molecule. Carbon dioxide on the other hand is a very stable, low poten- tial energy molecule. When a glucose molecule is converted to carbon dioxide and water during cellular respiration, energy is released and stored in high potential energy ATP molecules. The three phases of cellular respiration that oxidize the glucose molecule to carbon dioxide are **glycolysis**, the **Link reaction** and the **Krebs cycle**.

# Model 1 – Glycolysis

O**–**

O

H C CH

OH

O**–**

CH2 O P

O

O**–**

Phosphoglyceraldehyde

(PGAL) PGAL × 2

O**–** P O

O

O

C CH CH2 OH

O**–**

O P O**–** O

1,3-Bisphosphoglycerate

(1,3-BPG)

Potential Energy

2 ADP

2 ATP

2 NAD+ + 2 H+ + 2 Pi

2 NADH

OH

Glucose

O

OH

OH

1, 3 BPG × 2

4 ADP

4 ATP

O

O**–** C C CH3

O

Pyruvate

OH

Pyruvate × 2

OH

Glucose

1. Refer to Model 1.
   1. What molecule from food is the primary reactant for glycolysis?
   2. How many carbon atoms are in that reactant molecule?
2. The carbon atoms from glucose end up in pyruvate molecules as a product of glycolysis.
   1. How many carbon atoms are in a pyruvate molecule?
   2. How many pyruvate molecules are made from each glucose molecule?
3. Does the process of glycolysis require an input of energy? Provide specific evidence from Model 1 to support your answer.
4. Refer to Model 1. Propose an explanation for why the author of this activity put PGAL at the highest point in the Model 1 diagram.



1. Does pyruvate have more or less potential energy than glucose? Provide specific evidence from Model 1 to support your answer.
2. What is the net production of ATP by glycolysis?
3. What molecule acts as an electron acceptor in glycolysis?
4. In the last steps of glycolysis 4 ATP molecules are produced. Analyze Model 1 to find the source of the four inorganic phosphates (Pi) that are added to the ADP molecules to make the four ATP molecules. Describe the origins of the four inorganic phosphates here.