

Interactive E-learning for Metabolic Pathways

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Problem:

How to make learning metabolism interesting so that its relevance can be applied to real world problems.

- How fast can you run?
- Why is diabetes such a problem?
- Where is obesity coming from?

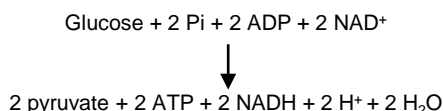


Need a basic understanding of metabolic pathways before applying concepts of regulated control and these questions can be answered

What do we want the students to learn:

- Glycolysis is the initial pathway for glucose metabolism
- Essential pathway for aerobic and anaerobic production of energy
- Overall and complete pathway needed to be able to understand the control and energy production

Overall reaction:



Digital Goal:

- A learning task for students to engage with glycolysis so that teaching can be about control and application
- Drag and drop system where answers can be marked as correct/incorrect and allocated a score
- Part of Digital Innovation Partnership, student input to the usability, language and information required
- Student feedback to be used to improve activity and version released before exam revision period

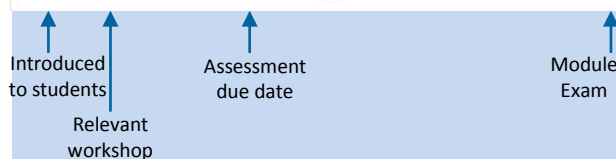
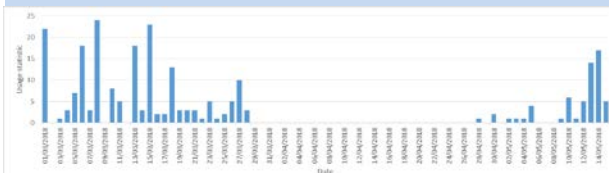
Student Usage:

Introduced to the students 1st March.

Relevant to questions to be answered for workshop 9th March

Part of assessment presented as a poster on 28th March

Module Exam 15th May



Cellular Respiration Exercises

Glycolysis is the first stage of glucose metabolism. It is a multi-stage process that converts large glucose molecules into smaller pyruvate molecules and provides a small amount of energy. These exercises aim to teach you this pathway through the process of an interactive activity.

The instructions on each slide will tell you how to complete the activity.

This is a learning tool and not a graded exercise, no marks will be recorded.

NEXT >

Drag objects from the grey area below onto the formula. Select the correct number for each compound in each blue box. If you want to check your answer press check button, if you need help click the Hints button.

Check Hints

H⁺ H₂O ADP ATP Glucose Pi Pyruvate NAD⁺ NADH

7 + 7 + 7

+ 7

7 + 7 + 7

7 + 7

SUBMIT

Drag objects from the grey area below onto the formula. Select the correct number for each compound in each blue box. If you want to check your answer press check button, if you need help click the Hints button.

Check Hints

1 Glucose + 2 NAD⁺ + 2 ATP

+ 2 Pi

2 Pyruvate + 2 NADH + 2 ADP

2 H⁺ + 2 H₂O

Close

SUBMIT

Drag objects from the grey area below onto the formula. Select the correct number for each compound in each blue box. If you want to check your answer press check button, if you need help click the Hints button.

Check Hints

1 Glucose + 2 NAD⁺ + 2 ATP

+ 2 Pi

2 Pyruvate + 2 NADH + 2 ADP

2 H⁺ + 2 H₂O

Incorrect

You scored 7 out of a total 9 points. The number and compound both need to be correct to get a point.

Try again **Continue**

Close

SUBMIT

Construct the first half of glycolysis by dragging objects from the grey area into the pathway. If you need help, click the Hints button on the right.

Check Hints

Dihydroxyacetone phosphate

Phosphofructokinase-1

Fructose 6-phosphate

Triose phosphate isomerase

Hexokinase

Glucose 6-phosphate

Phosphoglucose isomerase

Fructose 1,6-bisphosphate

Aldolase

Glyceraldehyde 3-phosphate

Glucose

Glyceraldehyde 3-phosphate

SUBMIT

Construct the first half of glycolysis by dragging objects from the grey area into the pathway. If you need help, click the Hints button on the right.

Check Hints

Glucose

Hexokinase

Glucose 6-phosphate

Phosphofructokinase-1

Fructose 6-phosphate

Phosphoglucose isomerase

Fructose 1,6-bisphosphate

Aldolase

Glyceraldehyde 3-phosphate

Dihydroxyacetone phosphate

Triose phosphate isomerase

Close

SUBMIT

Construct the first half of glycolysis by dragging objects from the grey area into the pathway. If you need help, click the Hints button on the right.

Check Hints

Dihydroxyacetone phosphate

Fructose 1,6-bisphosphate

Fructose 6-phosphate

Glucose

Glucose 6-phosphate

Glyceraldehyde 3-phosphate

ADP ADP

ATP ATP

SUBMIT

Hints Page

Reactants and products go in the blue boxes. Here are their chemical structures to help you work out the order:

Glucose

Glyceraldehyde 3-phosphate

Fructose 1,6-bisphosphate

Dihydroxyacetone phosphate

Fructose 6-phosphate

Glucose 6-phosphate

The first half of glycolysis requires energy in the form of the high energy phosphate bond in ATP (adenosine triphosphate).

Close

SUBMIT

Congratulations

You have completed the Glycolysis pathway activity

Your final score was 50 out of a total 54 points.

Exit

SUBMIT

Acknowledgments

LLI: Catherine Leyland, Caroline Smith, Digital Innovations Partnership Team. Natural Science second year students