8.1 Metabolism

Question Paper

Course	DP IB Biology
Section	8. Metabolism, Cell Respiration & Photosynthesis (HL Only)
Topic	8.1 Metabolism
Difficulty	Medium

Time allowed: 20

Score: /10

Percentage: /100

Question 1

Which of the following statements about metabolism are correct?

I. Metabolism involves chemicals called metabolites.
II. Metabolism involves reactions in a linear chain.
III. Metabolism involves reactions in a cycle.
IV. Metabolism involves only the breakdown of molecules.

A. I and IV only

B. II and III

C. All of the statements

D. I, II and III

[1 mark]

Question 2

Which of the following is **not** a correct description of the "transition state" in enzyme-controlled reactions?

A. The enzyme-substrate complex, prior to the products being formed, can be said to be in the transition state.

B. The enzyme-product complex, prior to the products being released, can be said to be in the transition state.

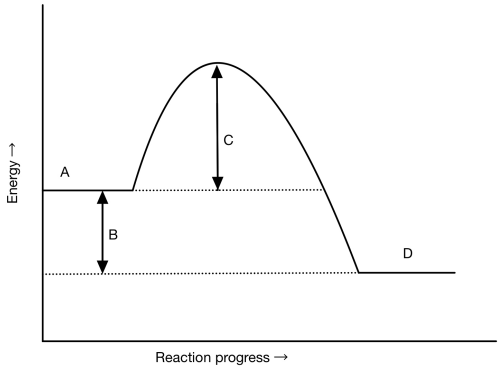
C. The transition state occurs when a substrate binds to the enzyme's active site.

D. Transition state is a temporary state

[1 mark]

Question 3

The graph below shows the energy changes during a reaction.



What effect would adding an enzyme have on the energy changes of the reaction?

A. Reduction in energy at A

B. Reduction in energy at B

C. Reduction in energy at C

D. Reduction in energy at D

[1 mark]

Question 4

What is the difference between a competitive and non-competitive inhibitor?

	Competitive inhibitor	Non-competitive inhibitor
A	Interferes with active site	Interferes with an alternative site
B	Interferes with an alternative site	Interferes with the active site
C	Changes the active site	Changes the substrate
D	Changes the substrate	Changes the active site

[1 mark]

Question 5

Cyanide ions are an example of an allosteric inhibitor that targets the enzyme cytochrome c oxidase in aerobic respiration.

Which row best describes the action of cyanide ions?

	Can bind to an alternative site	Can bind to the active site
A	Yes	Yes
B	Yes	No
C	No	Yes
D	No	No

[1 mark]

Question 6

Isoleucine can be described as an end-product inhibitor.

Which statement best describes the action of isoleucine?

A. It acts as a competitive inhibitor to threonine and it binds to an allosteric site on threonine deaminase.

B. It acts as a competitive inhibitor to threonine and it binds to the active site on threonine deaminase.

C. It acts as a non-competitive inhibitor to threonine and it binds to an active site on threonine deaminase.

D. It acts as a non-competitive inhibitor to threonine and it binds to an allosteric site on threonine deaminase.

[1 mark]

Question 7

The protein sequence of an enzyme involved in the *Plasmodium* parasite's metabolism has been identified in order to support research into anti-malarial drugs.

Which terms best fill the gaps in the sentence about *Plasmodium* parasite research below?

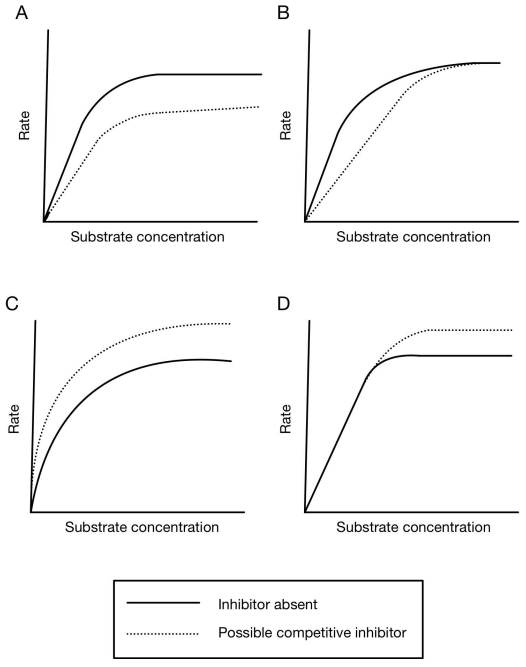
Bioinformatics can be used to screen ……I…….. against a database of chemicals to identify potential ……II……..

	I	II
A	Enzymes	Enzyme inhibitors
B	Proteomes	Products
C	Enzymes	Active sites
D	Proteomes	Substrates

[1 mark]

Question 8

Which graph shows the rate of a reaction taking place in the presence of a competitive inhibitor compared to the rate of a reaction in the absence of an inhibitor?



[1 mark]

Question 9

The table below gives information on the rates of several enzyme-catalysed reactions.

Rate of reaction / product formed sec^{-1}	Enzyme
1.0×10^6	Citrate synthase
5.2×10^3	Aconitase
9.2×10^4	Fumarase
3.7×10^7	Malate dehydrogenase

Which enzyme catalyses the reaction with the fastest rate of product formation?

A. Citrate synthase

B. Aconitase

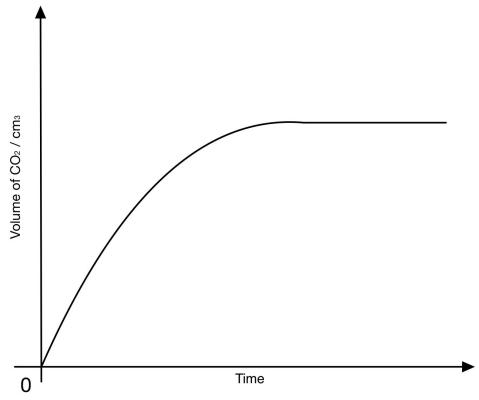
C. Fumarase

D. Malate dehydrogenase

[1 mark]

Question 10

Which statement best describes how to calculate the initial rate of a reaction from a graph such as the one below?



A. Draw a tangent that crosses the origin and that corresponds to the first part of the curve, calculate the rate by dividing change in volume by change in time.

B. Draw a tangent that corresponds to an area part way along the curve, calculate the rate by dividing change in volume by change in time.

C. Draw a tangent that crosses the origin and that corresponds to the first part of the curve, calculate the rate by dividing change in time by change in volume.

D. Draw a tangent that corresponds to an area part way along the curve, calculate the rate by dividing change in time by change in volume

[1 mark]