OCR GCSE 21ST CENTURY BIOLOGY B · J257

BIOLOGY



EXAM QUESTION PACK

B4.1 WHAT HAPPENS DURING CELLULAR RESPIRATION? (FOUNDATION)

SCORE	PERCENTAGE
/31	%

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1(a). Cells contain many different organelles, one of them is mitochondria.

What is the function of the mitochondria in the cell?

Put a tick (✓) in the correct box.

Controls entry and exit of substances into the cell	☐
Is responsible for photosynthesis	☐
Makes ATP	☐
Stores the genetic information	☐

[1]

(b). Mitochondria contain enzymes.

A student investigates the effect of temperature on the rate of a reaction involving an enzyme in the mitochondria.

Their results are shown below.

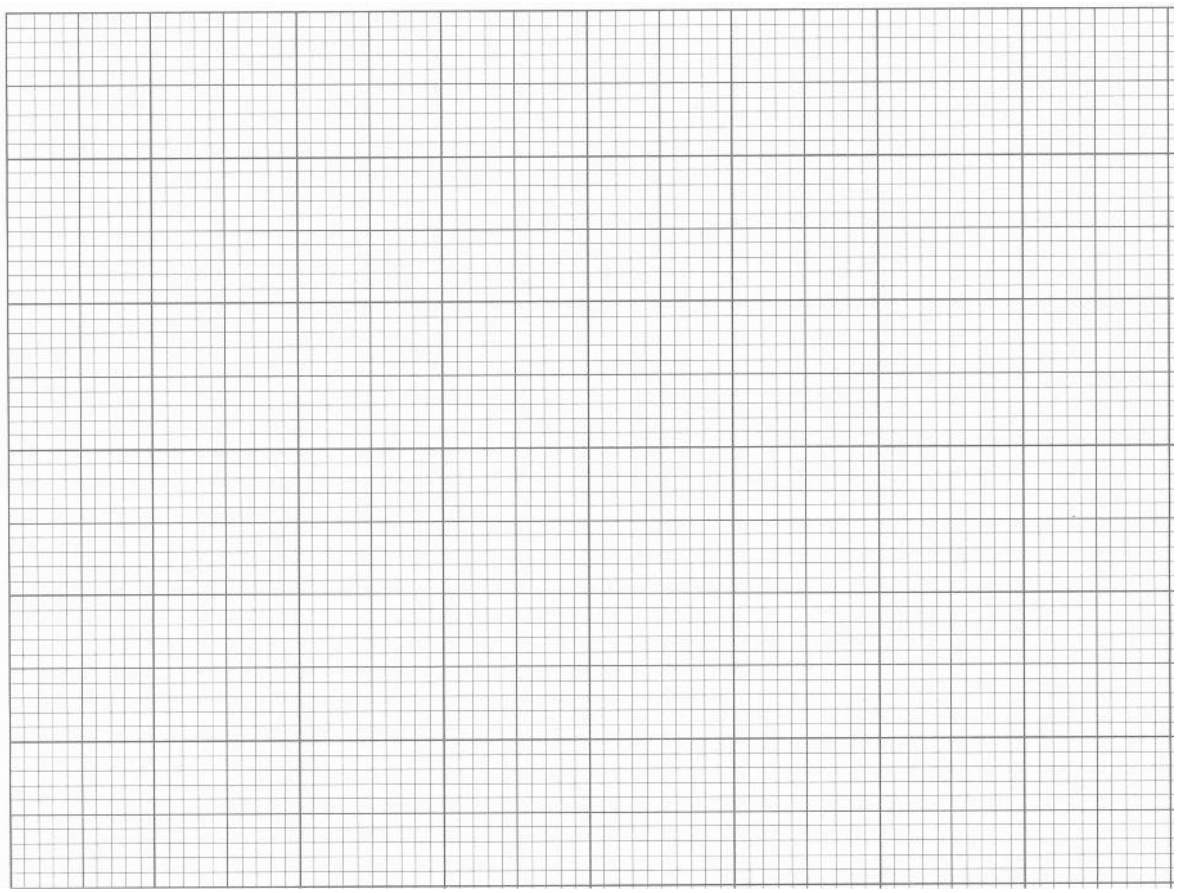
Temperature (°C)	Rate of reaction (arbitrary units)
0	0
20	10
30	20
40	40
50	10
60	0

(i) Plot the data given in the table on the grid below.

[3]

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(ii) Use the points to draw a curve through all the plots.

[1]

(iii) Use the graph to determine the rate of the reaction at 10°C.

Rate of reaction _____ arbitrary units **[1]**

(iv) The student does not think that the data gives an accurate measurement for the optimum temperature.

Suggest further investigation that the student could do to increase the accuracy of the data.

_____

_____ **[1]**

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2. This question is about respiration in yeast.

Complete the sentences by choosing words from this list.

aerobic anaerobic energy enzymes
glucose hormones lactic acid

Yeast contain _____ which are needed for the stages in respiration.

Yeast can be used to make alcohol in the process of fermentation.

Fermentation involves _____ respiration.

All types of respiration release _____ from _____ .

[4]

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3(a). Paul's cat has injured its leg.

He takes the cat to the vet.

The vet explains that the cat has an infected leg, probably caused by a puncture wound.

The bacteria in the wound are respiring anaerobically.

Under what conditions will the bacteria respire anaerobically and **not** aerobically?

[1]

(b). Anaerobic respiration releases less energy than aerobic respiration.

The energy from respiration is used to make molecules of a substance called ATP.

For every molecule of glucose respired during aerobic respiration, the energy released produces **36** molecules of ATP.

For every molecule of glucose respired during anaerobic respiration, the energy released produces only **2** molecules of ATP.

How many molecules of glucose need to be respired **anaerobically** to produce 36 molecules of ATP?

Put a

ring around the correct answer.

2 **18** **34** **38** **72**

[1]

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4(a). Yeast is a single-celled microorganism.

Yeast can be grown in a fermenter.

The yeast cells are grown in a liquid containing nutrients.

The nutrients are needed for them to grow and reproduce.

Yeast can carry out both aerobic and anaerobic respiration.

What does yeast produce during **anaerobic** respiration?

Put a ring around the **two** correct answers.

carbon dioxide **ethanol** **glucose** **light** **oxygen** **starch**

[2]

(b). Some yeast cells are put into a solution in two fermenters, **A** and **B**.

The lid is closed tight so that no air can get in or out of fermenter **A**.

Air containing oxygen is bubbled through fermenter **B**.

A scientist counts the number of yeast cells in samples taken from both fermenters.

She records her results in a table.

Time when samples were taken (hours)	Number of yeast cells in 1 mm^3	
	Fermenter A	Fermenter B
0	100	100
1	200	200
2	300	400
3	350	800
4	390	1600

(i) Describe the results.

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[3]

(ii) Cell production needs energy.

The scientist concludes that

"In fermenter **A**, the yeast cells started to carry out more anaerobic than aerobic respiration."

Use the data in the table and your understanding of the release of energy in respiration to support this conclusion.

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[3]

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5(a). Living organisms obtain energy using respiration.

Look at the equations for the two different types of respiration.

They show the energy released from the same amount of glucose.

Type A glucose + oxygen $\longrightarrow$ carbon dioxide + water + 2880 kJ

Type B glucose $\longrightarrow$ lactic acid + 150 kJ

Write down the names of **Type A** and **Type B** respiration.

Type A _____

Type B_____

[1]

(b). Calculate the ratio:

$$\frac{\text{energy released in Type A}}{\text{energy released in Type B}}$$

Show your working.

ratio = _____

[2]

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(c). Jenny is running in a 26 mile marathon race.

For **most** of the race Jenny respires using **Type A** respiration.

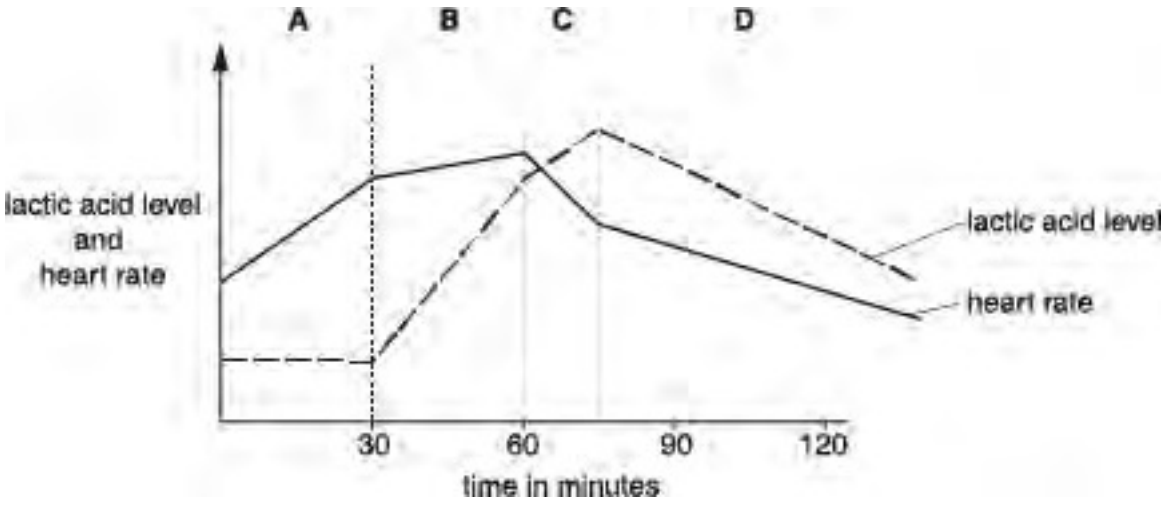
Suggest reasons why this is important.

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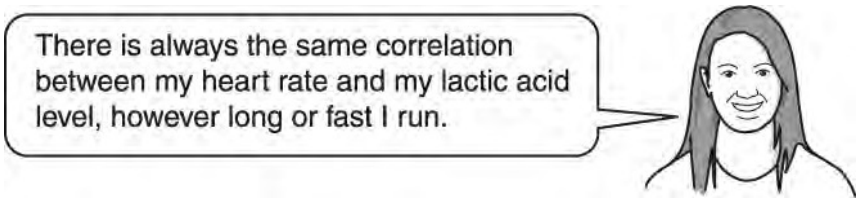
[2]

(d).

The graph shows Jenny's heart rate and the lactic acid level in her blood during a training session.



(i) Jenny makes this conclusion.



Discuss how well her conclusion fits the data in the graph.

Use information from sections **A, B, C** and **D** in your answer.

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[4]

(ii) Jenny thinks that some of her data is incorrect.

What should she do to become more confident in her conclusion?

Put a tick (?) in the box next to the correct answer.

Repeat the same training a number of times. ☐

Repeat her training but only run for 60 minutes. ☐

Run more slowly so that her heart rate does not rise too much. ☐

Repeat the same experiment on other runners. ☐

[1]

END OF QUESTION PAPER

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