OCR GCSE 21ST CENTURY BIOLOGY B · J257

BIOLOGY



EXAM QUESTION PACK

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

SCORE	PERCENTAGE
/40	%

STEMUP

These questions belong to OCR, not to us.

The examination questions, mark schemes and examiner comments in this pack were written and published by OCR. They are past assessment materials, reproduced here so that students can revise from them.

What we do not own

STEMUP is not affiliated with OCR and does not own, and makes no claim to own, any of the question, mark scheme or examiner report material in this pack. OCR has not endorsed, approved or been involved in the production of it. OCR and the qualification titles used here belong to their respective owners and appear for identification only.

Where to find the originals

OCR publishes its past papers, mark schemes and examiner reports. Always check the current specification at ocr.org.uk before you revise, because content and wording can change between series.

If you hold the rights to any material in this pack and would like it amended or removed, contact admin@stemup.co.uk and we will act on it.

1. All cells respire.

(i) Name **two** parts of animal cells that are involved in the process of respiration. Describe the function of each part.

Part 1 _____

Function _____

Part 2 _____

Function _____

---

[4]

(ii) Methanol is a type of alcohol.

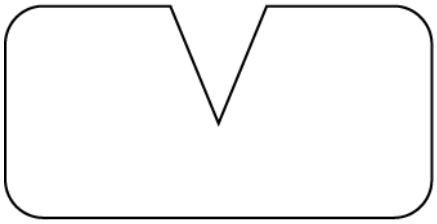
In the body, methanol is broken down by an enzyme.

The products of this process are poisonous.

Ethanol is a different type of alcohol. It can be used to treat methanol poisoning.

© OCR 2019.

STEMUP.CO.UK



Enzyme



Ethanol



Methanol

The diagrams show the shapes of the molecules of enzyme, ethanol and methanol.

Use your knowledge of enzymes to explain why ethanol is used to treat methanol poisoning.

---

[3]

(iii) During beer and wine making, yeast cells respire anaerobically to produce ethanol.
Write down one other useful application of anaerobic respiration in microorganisms.

---

[1]

© OCR 2019.

STEMUP.CO.UK

2(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

Calculate the ratio:

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

Show your working.

ratio = _____

[2]

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

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

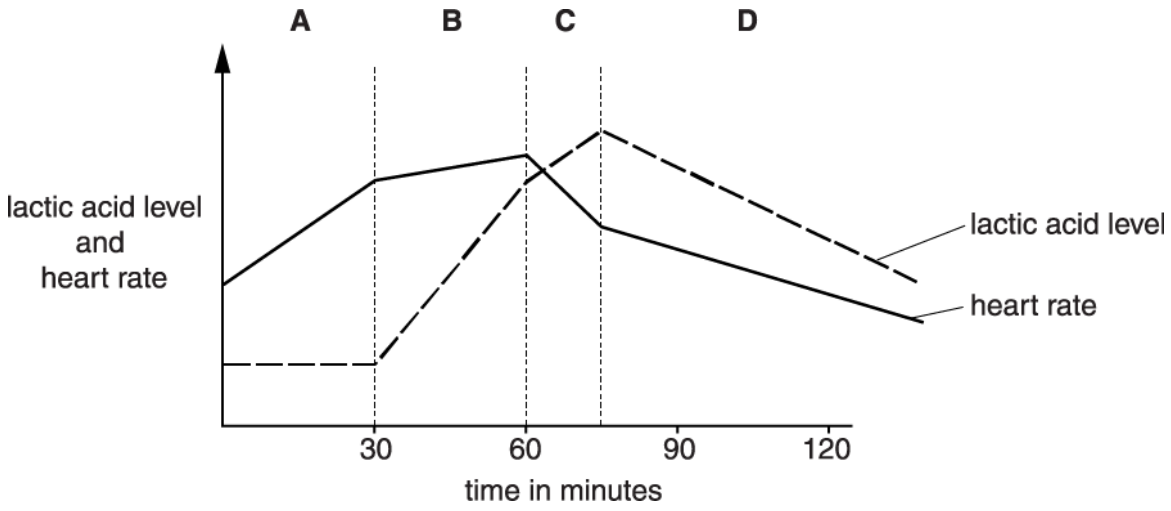
Suggest reasons why this is important.

---

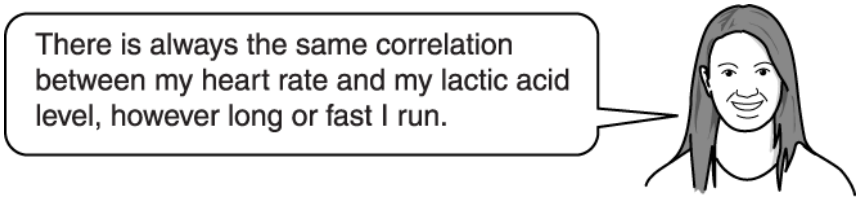
[2]

STEMUP.CO.UK

(c). 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.

---

[4]

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

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

© OCR 2019.

STEMUP.CO.UK

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]

© OCR 2019.

STEMUP.CO.UK

3(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.

Complete the **word** equation for **anaerobic** respiration in yeast.

glucose ⟶ ..... + ... (+ energy released)

[1]

(b). How is anaerobic respiration in **animal** cells different from that in yeast?

---

[1]

STEMUP.CO.UK

(c). Some yeast cells are put into a solution into 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
total **% increase** in yeast cells in 1 mm^3	290	_____

(i) Complete the table to show the % increase in yeast cells in 1 mm^3 in fermenter **B**.

[1]

(ii) The results show that the yeast reproduces faster in fermenter **B** than in fermenter **A**.

Explain why this happens.

_____

_____

_____

_____ **[2]**

(iii) The scientist adds a chemical called adriamycin to the yeast culture in fermenter **B** after the first 4 hours of the study.

© OCR 2019.

STEMUP.CO.UK

Adriamycin is quick-acting and prevents the copying of chromosomes.

The scientist continues to count the number of yeast cells in samples from this fermenter for a further two hours.

Describe and explain how this chemical will affect the yeast cells during the next two hours of the study.

Use your knowledge of the **cell cycle** in your answer.



The quality of written communication will be assessed in your answer.

---

[6]

STEMUP.CO.UK

4(a).

Aerobic and anaerobic respiration are two types of respiration used in human cells.

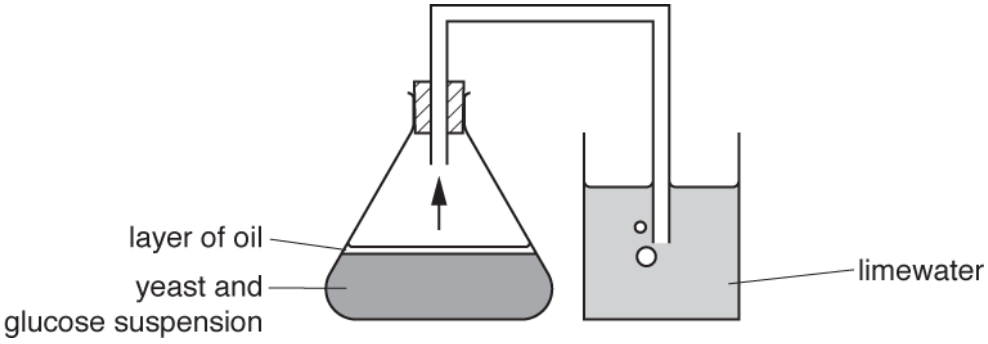
Put ticks (✓) in the boxes to show which type of respiration each statement describes.

Statement	Aerobic respiration	Anaerobic respiration	Both types of respiration
Uses oxygen			
Produces lactic acid			
Uses glucose			
Produces carbon dioxide			
Occurs in the mitochondria			

[3]

(b). A student investigates the effect of temperature on fermentation.

She uses this apparatus.



The student puts a layer of oil over the glucose and yeast suspension.

Explain why.

---

[2]

STEMUP.CO.UK

(c). The student does the experiment at three different temperatures.

Every 30 minutes, she counts the number of bubbles of carbon dioxide produced in one minute.

Her results are shown in the table.

Temperature (°C)	Number of bubbles of carbon dioxide produced in one minute after …				
	30 minutes	60 minutes	90 minutes	120 minutes	150 minutes
15	22	24	23	26	24
30	32	36	37	36	32
45	44	48	44	32	12

(i) Write down **two** conclusions that the student can make from this data **and** use your knowledge of respiration to explain each conclusion.

Conclusion 1 and explanation

Conclusion 2 and explanation

---

[4]

STEMUP.CO.UK

(ii) Counting bubbles may not be the best way to estimate the volume of carbon dioxide produced.

Suggest why.

---

[1]

(iii) Suggest an alternative way to measure the volume of carbon dioxide produced.

---

[1]

(d). Fermentation by yeast cells is an example of anaerobic respiration.

When oxygen is in short supply animal cells can also respire anaerobically.

Give an example of when animal cells would respire anaerobically.

---

[1]

[Total: 12]

END OF QUESTION PAPER

STEMUP.CO.UK