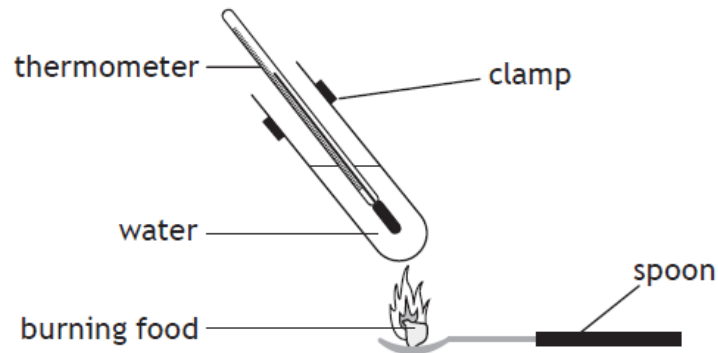


Unit 1 Cell Biology Revision Questions

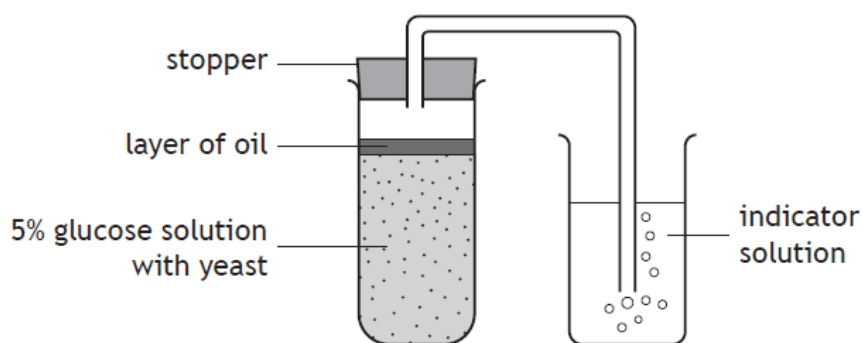
Key Area 6 Respiration

1. The diagram shows an experiment which can be used to find the energy content of different foods. Each food was completely burned and the energy content was estimated by the rise in temperature of the water.



The reliability of this experiment could be improved by

- A burning each food for the same length of time
 - B repeating the experiment with each food several times
 - C removing the thermometer from the tube to read it accurately
 - D repeating the experiment using a different food each time.
2. The apparatus shown was used to investigate the rate of respiration in yeast at 20 °C.



Which of the following changes would cause a decrease in the rate of respiration of the yeast?

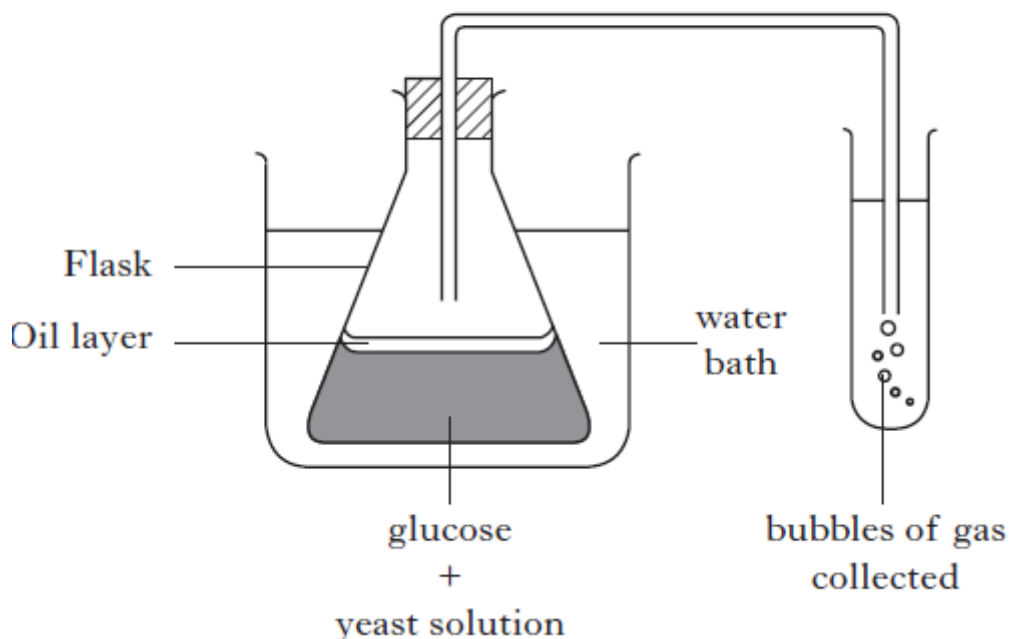
- A Increase the thickness of the layer of oil by 1 mm.
- B Increase the temperature of the glucose solution by 1 °C.
- C Decrease the concentration of the glucose solution by 1%.
- D Decrease the volume of indicator solution by 1 cm³.

3. Which of the following processes releases energy used to form ATP?
- A Muscle cell contraction
 - B Breakdown of glucose
 - C Protein synthesis
 - D Nerve impulse transmission

4. Which of the following statements is not true of aerobic respiration?
- A Produces carbon dioxide and water
 - B Begins in the cytoplasm
 - C Controlled by enzymes
 - D Requires light energy

Questions 5 & 6 are based on the following information.

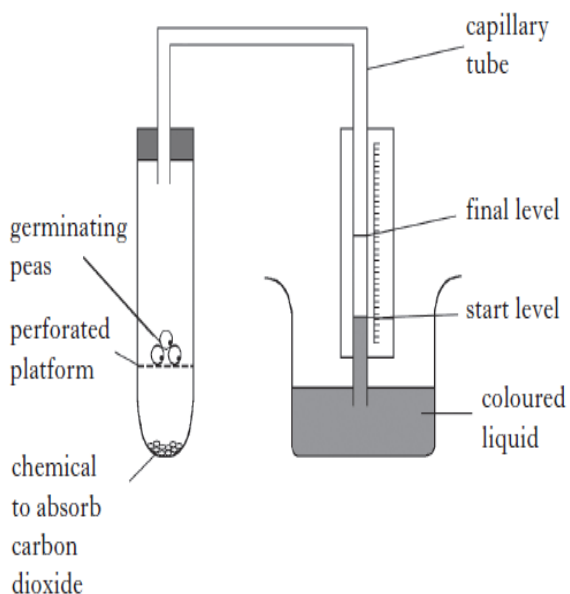
An investigation into anaerobic respiration in yeast was carried out.



5. The purpose of the oil layer in the flask is to ensure that
- A oxygen from the solution is not released into the flask
 - B carbon dioxide from the flask does not enter the solution
 - C oxygen from the air does not enter the solution
 - D carbon dioxide from the solution is not released into the flask.

6. A control flask was set up to show that anaerobic respiration is due to the activity of yeast. The solution in the control flask was
- A yeast and glucose
 - B dead yeast and glucose
 - C yeast and water
 - D dead yeast and water.

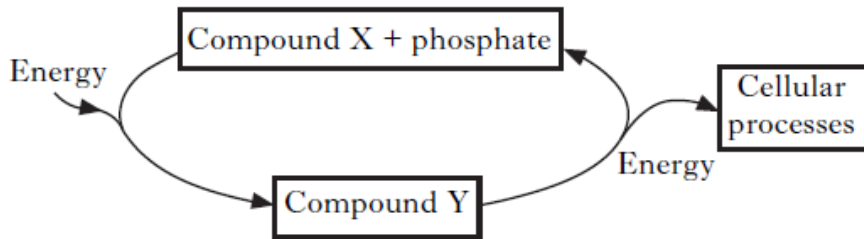
7. The apparatus below was used to investigate gas exchange in germinating peas.



The movement of the coloured liquid in the capillary tube can be used to measure the volume of

- A oxygen produced by respiration
- B carbon dioxide used up by respiration
- C oxygen used up by respiration
- D carbon dioxide produced by respiration.

8. The diagram below shows energy transfer within a cell.

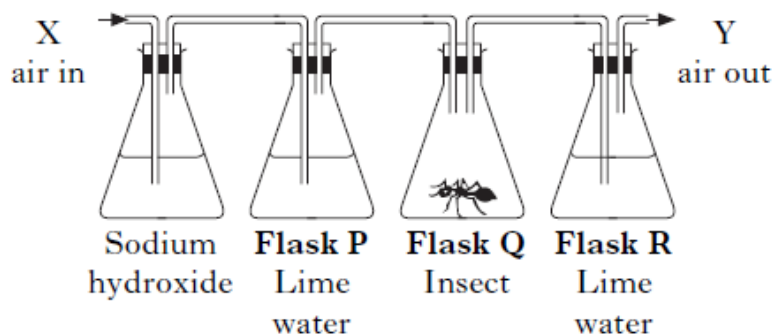


Which line in the table identifies correctly compounds X and Y?

	<i>X</i>	<i>Y</i>
A	glucose	CO ₂
B	CO ₂	ADP
C	ADP	ATP
D	ATP	glucose

9. Which of the following stages in respiration would result in the production of the largest quantity of ATP production?
- A Glucose to Pyruvate
 - B Pyruvate to Lactate
 - C Pyruvate to carbon dioxide and water
 - D Glucose to carbon dioxide and water

10. The following experiment was set up.



Sodium hydroxide solution absorbs carbon dioxide from air.

Lime water turns from clear to cloudy in the presence of carbon dioxide.

Air is drawn through the apparatus from X to Y, passing through each flask in turn.

Predict what would happen to the results if two insects were used in flask Q. The lime water in

- A Flask P turns cloudy more slowly
- B Flask P turns cloudy more quickly
- C Flask R turns cloudy more slowly
- D Flask R turns cloudy more quickly.

11. An investigation was carried out to measure the rate of carbon dioxide production in bread dough.

Carbon dioxide production was measured by recording the change in volume of a sample of bread dough over a 50 minute period.

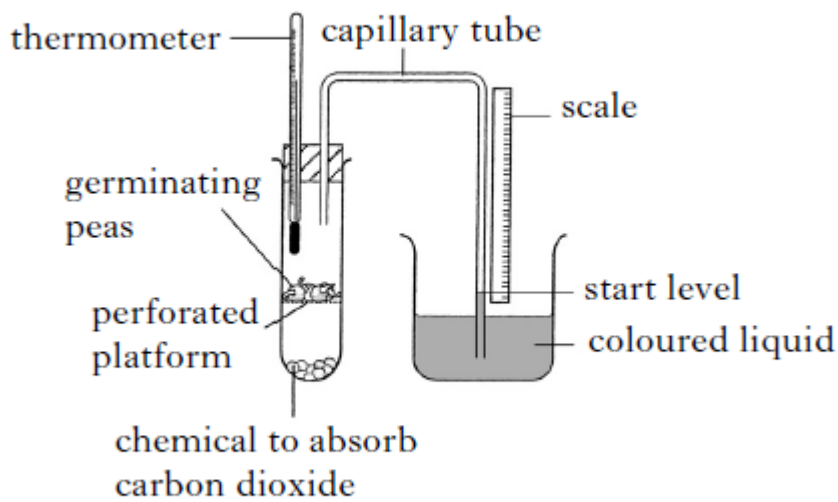
The results are shown in the table below.

<i>Time</i> (minutes)	0	10	20	30	40	50
<i>Volume of dough</i> (cm ³)	10	14	18	21	23	25

The conclusion for this investigation was

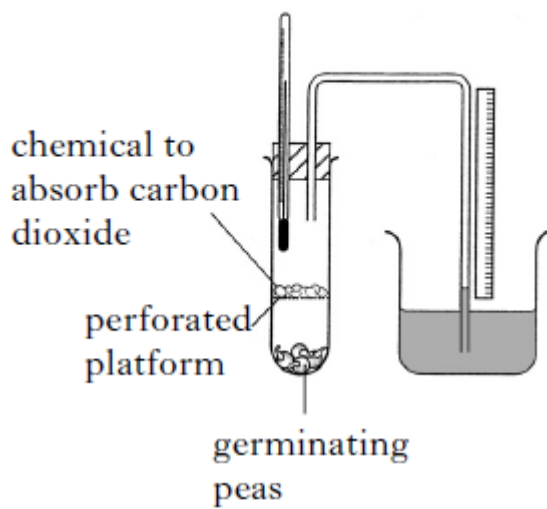
- A 0.3 cm³ of carbon dioxide was produced per minute
- B 0.5 cm³ of carbon dioxide was produced per minute
- C 15 cm³ of carbon dioxide was produced per minute
- D 25 cm³ of carbon dioxide was produced per minute.

12. The apparatus below was used to investigate respiration in germinating peas.

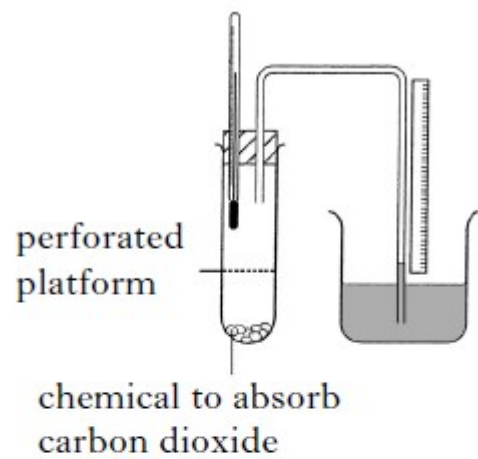


A suitable control for this investigation would be

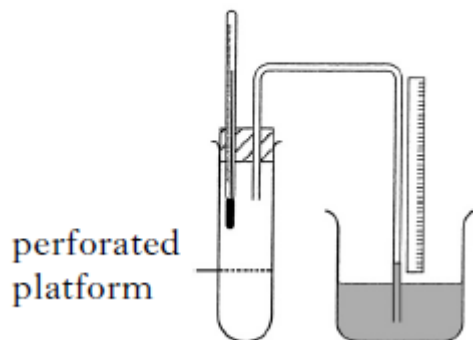
A



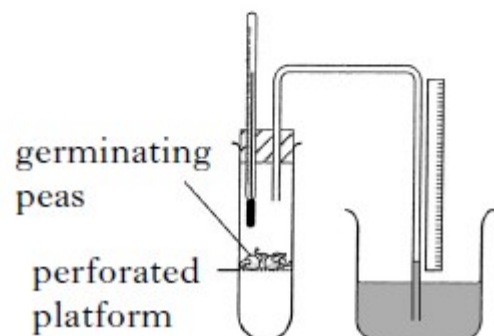
C



B



D



13. The following are statements about respiration.

- 1 ATP is produced
- 2 Lactate is produced
- 3 Carbon dioxide is produced
- 4 Ethanol is produced

Which of the statements are true of anaerobic respiration in human muscle tissue?

- A 2 only
- B 2 and 3 only
- C 1 and 2 only
- D 1, 3 and 4 only

14.

(a) The table shows information about two types of respiration in animal cells.

Tick the boxes in the table to indicate whether the statements apply to aerobic respiration, fermentation or both.

2

<i>Statement</i>	<i>Type of respiration</i>	
	<i>Aerobic</i>	<i>Fermentation</i>
Oxygen is required		
Pyruvate is formed		
Lactate is formed		
Carbon dioxide is formed		

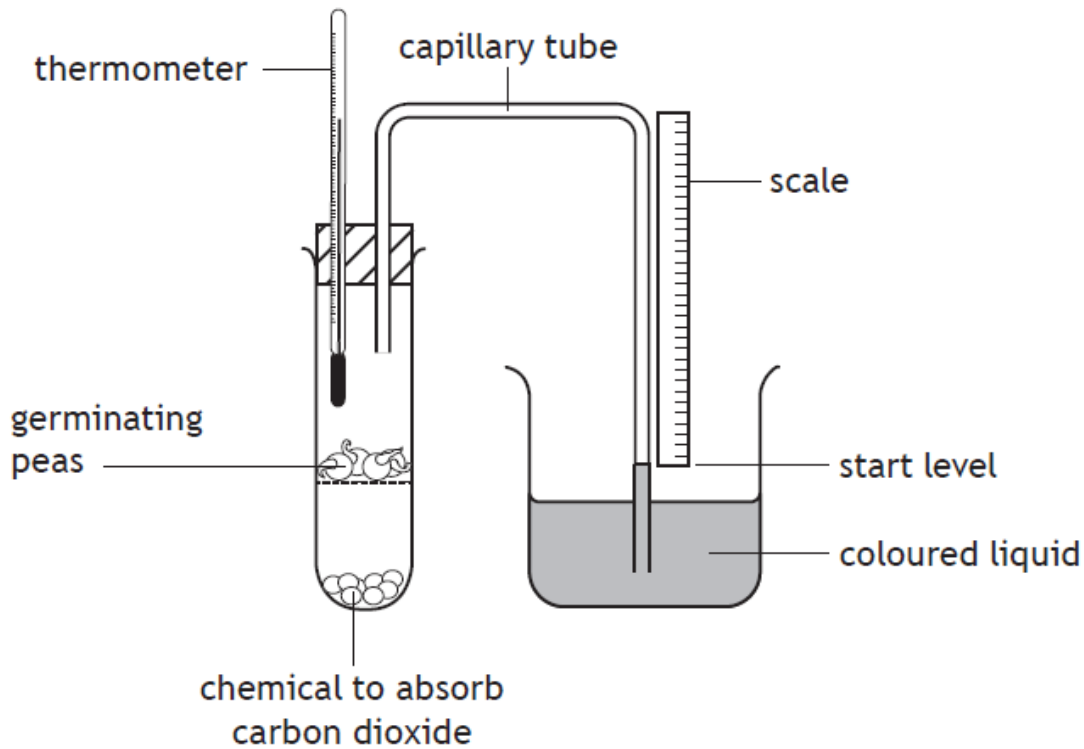
(b) ATP is an energy-rich molecule formed by respiration.

Name a cellular process which requires energy from ATP.

1

15.

A student investigated the effect of temperature on the rate of respiration in germinating (growing) peas. Using the arrangement shown, four respirometers labelled A–D were set up at the temperatures shown in the table below.



The level of the coloured liquid was measured on the scale at the start of the investigation and again after 20 minutes. The rise in liquid level was due to oxygen uptake by the germinating peas. The results are shown in the table.

<i>Respirometer</i>	<i>Temperature (°C)</i>	<i>Contents</i>	<i>Rise in liquid level (mm)</i>	<i>Rate of oxygen uptake (mm per minute)</i>
A	15	Germinating peas	14	0.7
B	15	Dead peas	0	0
C	25	Germinating peas	26	
D	25	Dead peas	0	0

- (a) (i) Complete the table above by calculating the rate of oxygen uptake per minute by the peas in respirometer C.

1

Space for calculation

- (ii) Using the results from the table complete the following conclusion by underlining one option in the bracket.

1

Increasing the $\left\{ \begin{array}{l} \text{temperature} \\ \text{liquid level} \\ \text{oxygen uptake} \end{array} \right\}$ increases the rate of respiration in germinating peas.

- (iii) Another respirometer was set up at 60°C with germinating peas and the coloured liquid did not rise. The student concluded that the peas were not respiring.

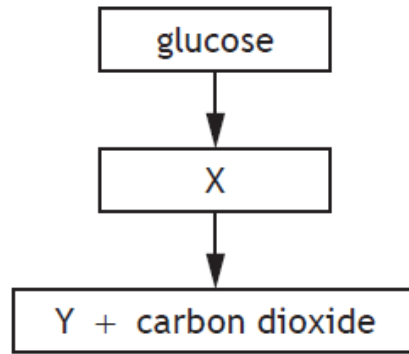
Explain why this temperature prevented the peas from carrying out respiration.

2

- (iv) Respirometers B and D were set up as control experiments. Describe the purpose of the controls in this investigation.

1

(b) The diagram below represents the fermentation pathway in a plant cell.



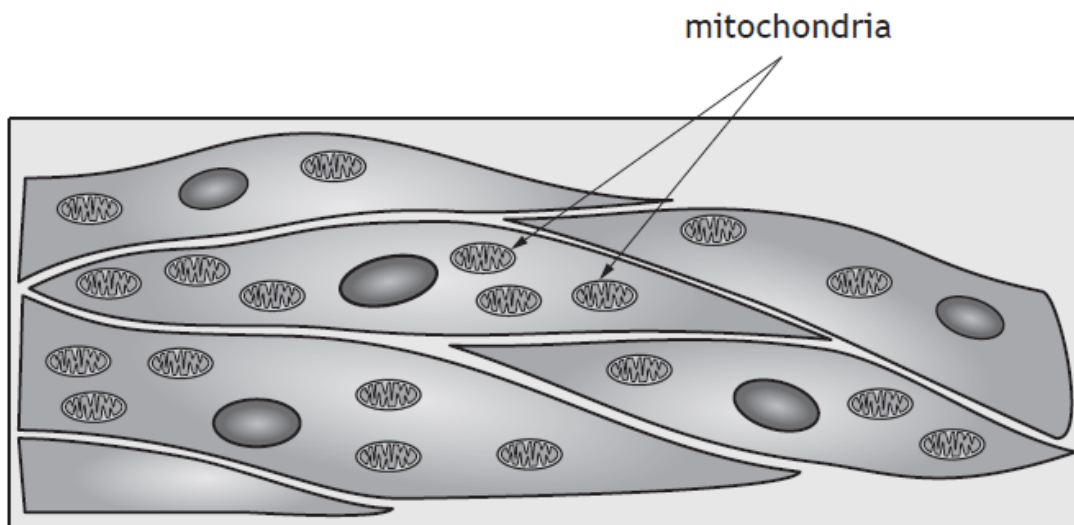
Choose either molecule X or Y and state its name.

1

Molecule _____

Name _____

16. The diagram below shows muscle cells.



(a) (i) Explain why muscle cells require many mitochondria.

1

(ii) Name one substance produced by a cell carrying out aerobic respiration.

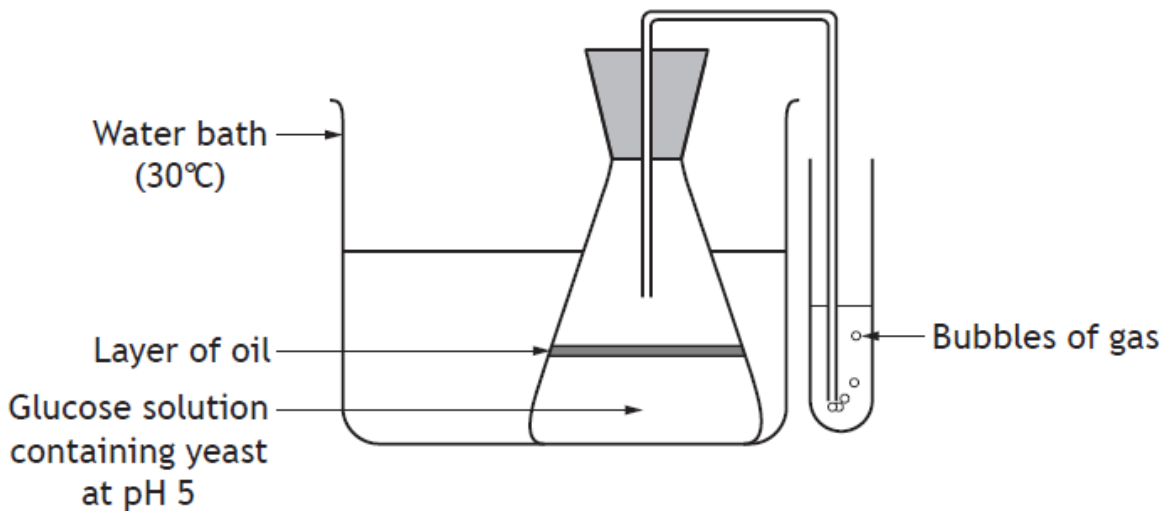
1

(b) A muscle cell will carry out fermentation when oxygen is not available.
Describe the fermentation pathway in muscle cells.

3

17.

An investigation was carried out to find the effect of pH on fermentation by yeast, using the apparatus shown.



The investigation was repeated at pH 3, pH 7 and pH 9.

The number of bubbles produced per minute was counted.

Six groups carried out the investigation several times and calculated average values for their results, as shown in the table.

17 (continued)

Group	Average number of bubbles produced per minute			
	pH 3	pH 5	pH 7	pH 9
1	8	25	17	0
2	10	21	13	3
3	15	23	14	0
4	17	22	16	0
5	19	24	12	1
6	22	17	18	9

(a) Name the gas produced during fermentation in yeast. 1

(b) From the table, identify the optimum pH for fermentation by yeast and give a reason for your choice.

pH _____ 1

Reason _____ 1

(c) This investigation could be adapted to find the effect of a variable other than pH.

Choose one variable from the list.

Describe two ways that the apparatus would be adapted to demonstrate the effect of this variable. 2

List

Type of yeast

Temperature

Concentration of glucose solution

Variable _____

Adaptation 1 _____

Adaptation 2 _____

18.

(a) Cellular processes occur in different parts of the cell.

Name the energy producing process which starts in the cytoplasm and is completed in the mitochondria.

1

(b)

Explain why a sperm cell contains more mitochondria than a skin cell.

1

19.

Muscle tissue can be dark or light in colour.

Dark tissue cells use oxygen to release energy.

Light tissue cells do not use oxygen to release energy.

(a) Name the process by which energy is released in the dark tissue cells.

1

(b) (i) Name the substance which muscle cells break down to produce pyruvate.

1

(ii) When pyruvate is being formed, enough energy is released to form two molecules of a high energy compound.

Complete the word equation below to show how this compound is generated.

1

_____ + _____ → _____

19 (continued)

- (c) The table below shows the average percentage of dark and light tissue cells. These cells were found in the muscles of athletes training for different events at the 2014 Commonwealth games in Scotland.

<i>Type of Athlete</i>	<i>Average percentage of dark tissue cells (%)</i>	<i>Average percentage of light tissue cells (%)</i>
cyclist	60	40
swimmer	75	25
shot putter	40	60
marathon runner	82	18
sprinter	38	62

- (i) Using information in the table, identify which type of athlete would be likely to produce the most lactic acid in their muscle cells. Justify your answer. 2

Type of athlete _____

Justification _____

- (ii) A sample of muscle tissue from an athlete was examined and found to contain a total of 360 cells.

90 of these cells were light tissue cells.

Identify which type of athlete the sample was taken from. 1

Space for calculation

Type of athlete _____