Cell level systems – 2022 GCSE Gateway Biology A

1. June/2022/Paper_J247/03/No.1

Which row shows the correct type of reaction for photosynthesis and for respiration?

		Photosynthesis	Respiration
Type of Reaction	**A**	endothermic	endothermic
	B	exothermic	exothermic
	C	endothermic	exothermic
	D	exothermic	endothermic

Your answer ☐ **[1]**

2. June/2022/Paper_J247/03/No.12

In a sample of DNA, 37% of the bases are thymine (T).

What will be the percentage of the other bases in this sample?

A Adenine (A) 13%, Cytosine (C) 13%, Guanine (G) 37%

B Adenine (A) 37%, Cytosine (C) 13%, Guanine (G) 13%

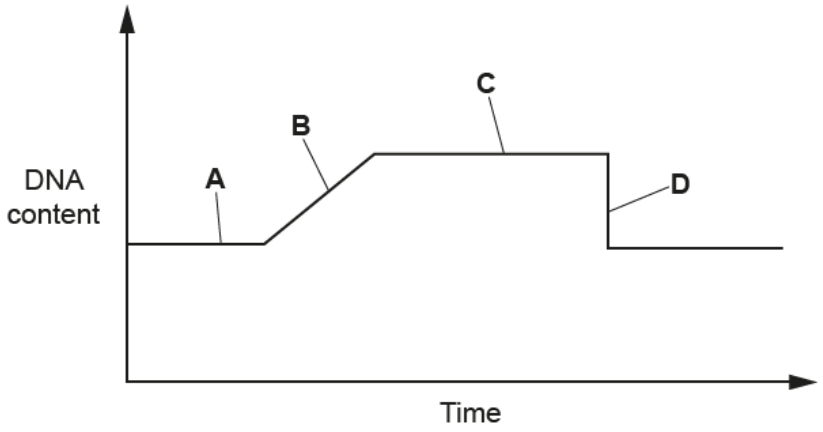
C Adenine (A) 0%, Cytosine (C) 37%, Guanine (G) 26%

D Adenine (A) 21%, Cytosine (C) 21%, Guanine (G) 21%

Your answer ☐ **[1]**

3. June/2022/Paper_J247/03/No.13

The graph shows how the DNA content of a cell changes during the cell cycle.



Which part of the graph **A**, **B**, **C** or **D** represents DNA replication?

Your answer ☐ **[1]**

4. June/2022/Paper_J247/03/No.14

The cell cycle consists of the following stages:

1. Cell growth
2. Movement of chromosomes
3. DNA replication

Which is the correct order of the stages in one cell cycle?

A 1, 2, 3, 2

B 1, 3, 1, 2

C 2, 1, 3, 1

D 2, 3, 1, 3

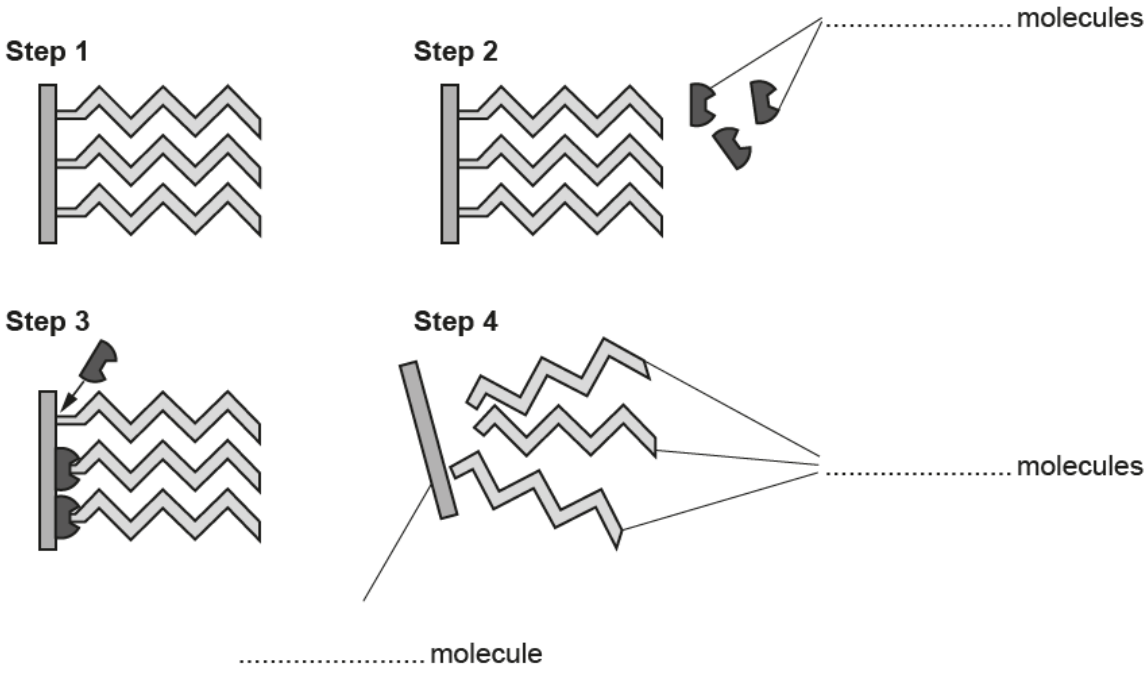
Your answer ☐ **[1]**

5. June/2022/Paper_J247/03/No.16

Lipase is an enzyme produced in the human digestive system. It breaks down lipids.

(a) **Fig. 16.1** shows the steps in lipid digestion.

Fig. 16.1

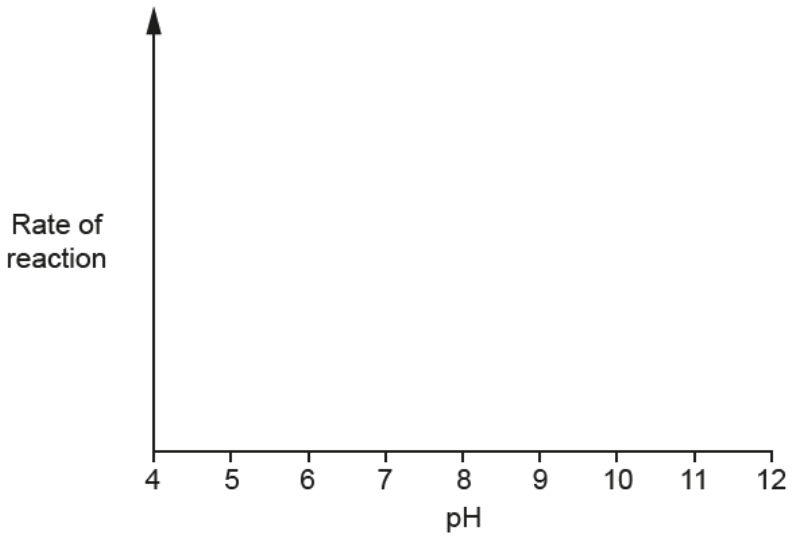


(i) Complete the labels in **Fig. 16.1**. **[3]**

(ii) Lipase is found in the small intestine where the pH is alkaline.

Draw a curve on **Fig. 16.2** to show the effect the pH will have on the rate of reaction for the digestion of lipids by lipase.

Fig. 16.2



[2]

(b) Phenolphthalein is an indicator that turns pink in an alkaline solution of pH 10.

When lipase breaks down lipids, the indicator goes colourless.

A group of students investigate how temperature affects the enzymes that break down lipids found in milk.

Describe an experiment that the students could use to investigate the effect of temperature on the breakdown of the lipids found in milk.

In your description include:

- how the independent variable could be changed
- the observations that should be made
- **two** variables that need to be controlled.

To change the independent variable, I will .....

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The observations I make will be to .....

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I will need to control .....

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[5]

6. June/2022/Paper_J247/03/No.21

(a) (i) Cellular respiration is an important biological process.

Describe what is meant by the term cellular respiration.

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.....

.....

..... **[2]**

(ii) Cells can use glucose, lipid or protein as respiratory substrates.

The respiratory substrates being used can be found using this ratio:

$$\frac{\text{volume of carbon dioxide produced}}{\text{volume of oxygen consumed}}$$

The table gives the ratio for three single respiratory substrates.

Substrate	Ratio
Glucose	1.0
Lipid	0.7
Protein	0.8

The ratio calculated from investigations often indicates that more than one respiratory substrate is being used at the same time.

In an investigation, these measurements were recorded.

- volume of oxygen consumed = 120 cm^3
- volume of carbon dioxide produced = 108 cm^3

Calculate the ratio and suggest which respiratory substrates were being used.

Ratio = ...

Respiratory substrates used ..... **[2]**

(b) (i) Describe **one** biochemical test that can be used to test for the presence of glucose.

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.....

.....

..... **[2]**

(ii) Suggest how this test could be used to compare how much glucose is present in two different tissues.

.....

.....

..... **[1]**

7. June/2022/Paper_J247/04/No.2

What is the definition of a genome?

A All the genes present in a community of organisms.

B All the genes present in a gamete.

C The entire genetic material of an organism.

D The genes inherited by an offspring from their mother.

Your answer ☐ **[1]**

8. June/2022/Paper_J247/04/No.4

Which of these is a use of monoclonal antibodies?

A Detecting antigens in pregnancy testing.

B Removing cholesterol from blocked arteries.

C Sterilising instruments used in operations.

D Vaccinating people against type 2 diabetes.

Your answer ☐ **[1]**

9. June/2022/Paper_J247/04/No.14

Genetic engineering involves the use of vectors.

Which is an example of a vector?

A A set of unpaired bases on the end of a DNA molecule.

B A small ring of DNA present in a bacterium.

C An enzyme that joins together two pieces of DNA at specific sites.

D An organism that has undergone genetic modification.

Your answer ☐ **[1]**

10. June/2022/Paper_J247/01/No.1

What does one DNA nucleotide consist of?

A A phosphate and sugar backbone

B A sugar, a phosphate and a base

C Four bases, A, C, T and G

D Two different sugars and a base

Your answer ☐ **[1]**

11. June/2022/Paper_J247/01/No.3

What do electron microscopes have that allow scientists to see cells in greater detail?

A A high magnification and a high resolution

B A high magnification and a low resolution

C A low magnification and a high resolution

D A low magnification and a low resolution

Your answer ☐ **[1]**

12. June/2022/Paper_J247/01/No.2

Which molecule is produced in **both** aerobic and anaerobic respiration in animals?

A ATP

B Glucose

C Lactic acid

D Oxygen

Your answer ☐ **[1]**

13. June/2022/Paper_J247/01/No.5

When one cell divides by mitosis, how many new cells are produced?

A 1

B 2

C 4

D 8

Your answer ☐ **[1]**

14. June/2022/Paper_J247/01/No.7

A student investigates the effect of light intensity on the rate of photosynthesis.

They count the number of gas bubbles released by a plant under water.
The table shows their results.

Light intensity	Number of gas bubbles		
	Repeat 1	Repeat 2	Repeat 3
Low	6	7	8
Medium	10	10	11
High	13	19	14

Which number could be classed as anomalous (an outlier)?

A 6

B 8

C 11

D 19

Your answer ☐ **[1]**

15. June/2022/Paper_J247/01/No.8

DNA consists of two strands.
This is the base sequence found in one strand:

ATT

Which is the complementary base sequence of the second strand?

A ATT

B CAG

C CGG

D TAA

Your answer ☐ **[1]**

16. June/2022/Paper_J247/01/No.9

One symptom of diabetes is glucose in the urine.
Which biochemical test is used to confirm the presence of glucose in the urine?

A Benedict's

B Biuret

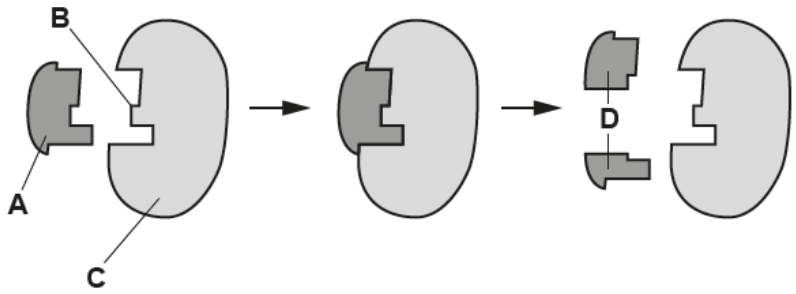
C Ethanol (emulsion)

D Iodine

Your answer ☐ **[1]**

17. June/2022/Paper_J247/01/No.13

The diagram shows the lock and key hypothesis of how enzymes work.



Which letter, **A**, **B**, **C** or **D** represents the active site of the enzyme?

Your answer ☐ **[1]**

18. June/2022/Paper_J247/01/No.14

Which row shows the correct type of reaction for photosynthesis and for respiration?

		Photosynthesis	Respiration
Type of Reaction	**A**	endothermic	endothermic
	B	exothermic	exothermic
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	D	exothermic	endothermic

Your answer ☐ **[1]**

19. June/2022/Paper_J247/01/No.16

A student observes the stages of cell division in cells taken from the root tips of garlic.

They cut a small amount of root tip and squash it onto a microscope slide.

(a) Complete each sentence to describe what they do next. Use words from the list.

coverslip	**eyepiece**	**focus**	**light**
objective	**stage**	**stain**	**water**

To make the chromosomes more visible, the student adds a few drops of ..... .

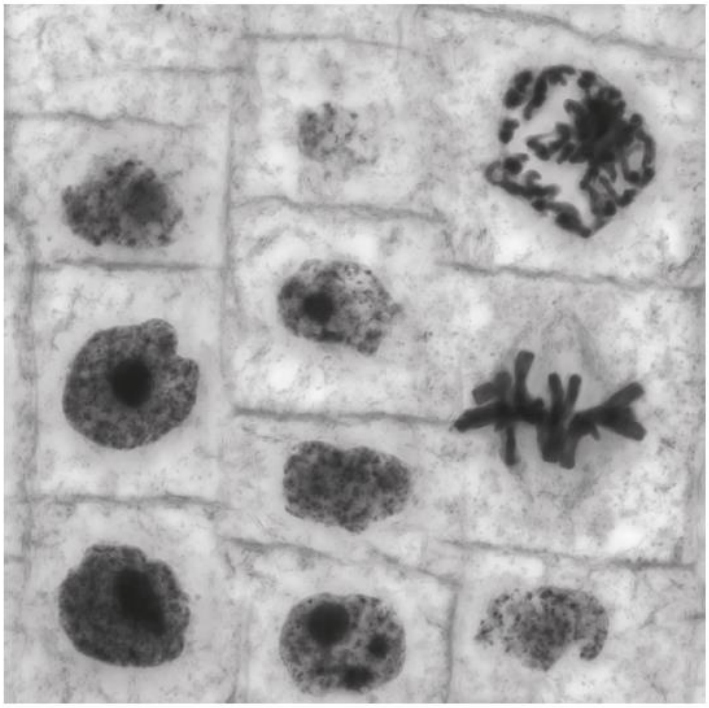
The slide is then placed on the microscope ..... .

The student first chooses the low power ..... lens.

The student twists a knob on the side of the microscope to bring the image into ..... .

[4]

(b) The image shows some of the cells observed by the student.



(i) Identify one cell in the image that shows the chromosomes starting to move apart.

Draw an arrow to this cell on the image. Label the arrow **A**. **[1]**

(ii) Draw a second arrow to identify one nucleus in the image. Label this arrow **N**. **[1]**

(c) Give **one** reason why the tissue for the sample was taken from root tips.

.....

..... **[1]**

20. June/2022/Paper_J247/01/No.18

Photosynthesis, transpiration and translocation are three processes occurring in plants.

(a) Draw **three** lines to connect each **description** to its correct **process**.

Then draw **three** lines to connect each **process** to the **structure** where that process takes place.

Description	Process	Structure
sunlight is used to make food for the plant	photosynthesis	xylem and stomata
the method of moving sugars around the plant	transpiration	phloem
the loss of water from the leaves of a plant	translocation	chloroplasts

[4]

(b) Complete the word equation for photosynthesis.

carbon dioxide + ... ⟶ glucose + ... **[2]**

(c) Plant cells are eukaryotic cells and bacteria are prokaryotic cells.

Plant cells and bacterial cells have similarities and differences between their structures.

Give **one** similarity and **one** difference.

Similarity .....

Difference .....

[2]

21. June/2022/Paper_J247/01/No.23

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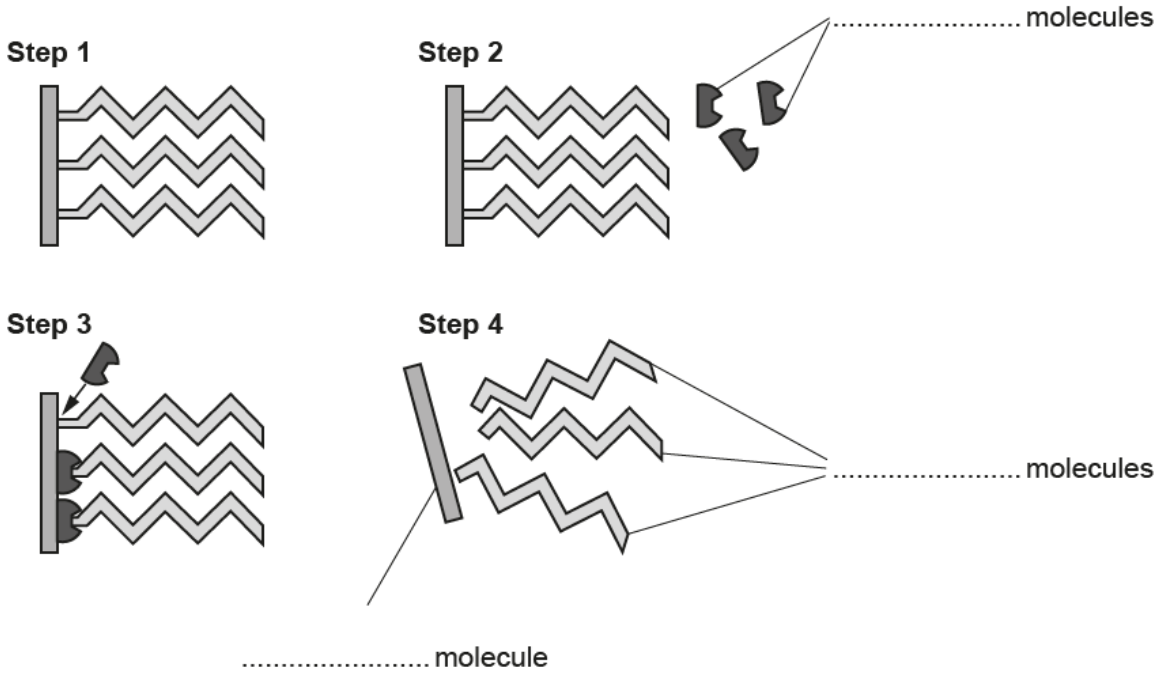
Fig. 23.1



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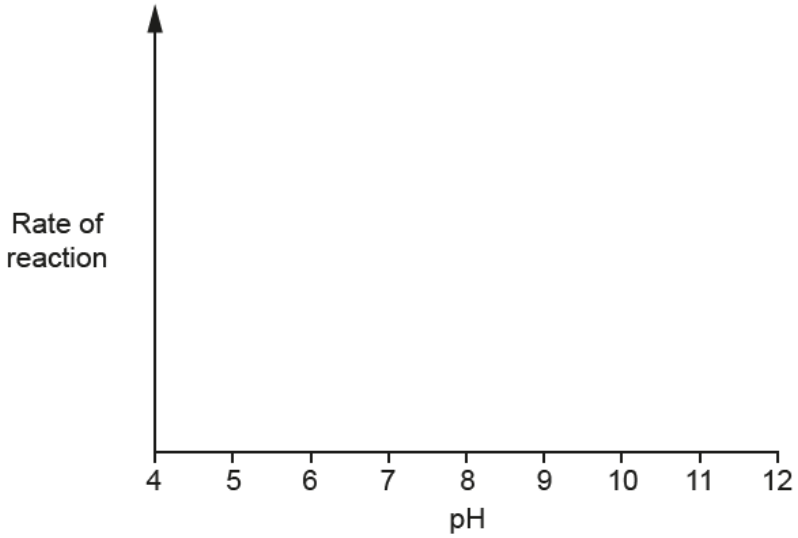

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I will need to control .....

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[5]

22. June/2022/Paper_J247/02/No.3

Which row in the table gives correct descriptions of physical and chemical plant defence responses to disease?

	Description of a physical response	Description of a chemical response
A	thickened leaf cuticle	thickened cell wall
B	thickened cell wall	thickened leaf cuticle
C	production of antimicrobial substances	thickened leaf cuticle
D	thickened cell wall	production of antimicrobial substances

Your answer ☐ **[1]**