Cell level systems – 2021/20 GCSE Gateway Biology Combined Science A

1. Nov 2021/Paper_J250/01/No.1

Which term describes a microscope with a higher resolution than a light microscope?

A Digital microscope

B Electron microscope

C Neutron microscope

D Proton microscope

Your answer ☐ **[1]**

2. Nov 2021/Paper_J250/01/No.2

The model represents a polymer found inside human cells.

What is the name of this polymer?

A ATP

B Carbohydrate

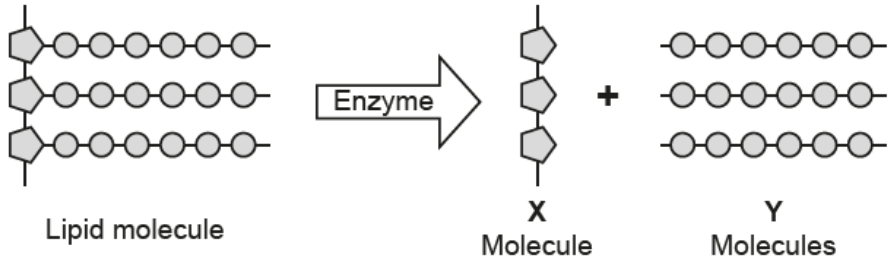
C DNA

D Protein

Your answer ☐ **[1]**

3. Nov 2021/Paper_J250/01/No.3

The diagram represents the digestion of lipids by an enzyme.



What names describe the **X** and **Y** molecules?

A Glucose and amino acids

B Glucose and fatty acids

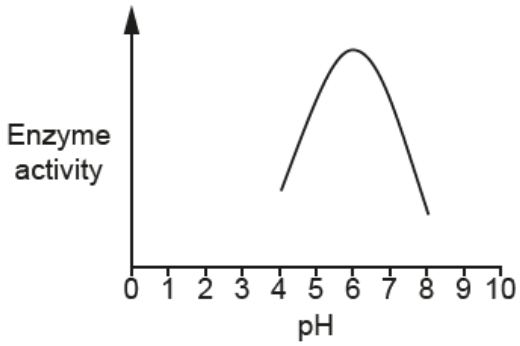
C Glycerol and amino acids

D Glycerol and fatty acids

Your answer ☐ **[1]**

4. Nov 2021/Paper_J247/01/No.4

The graph shows the effect of pH on the activity of an enzyme.



What is the optimum pH of this enzyme?

A pH2

B pH4

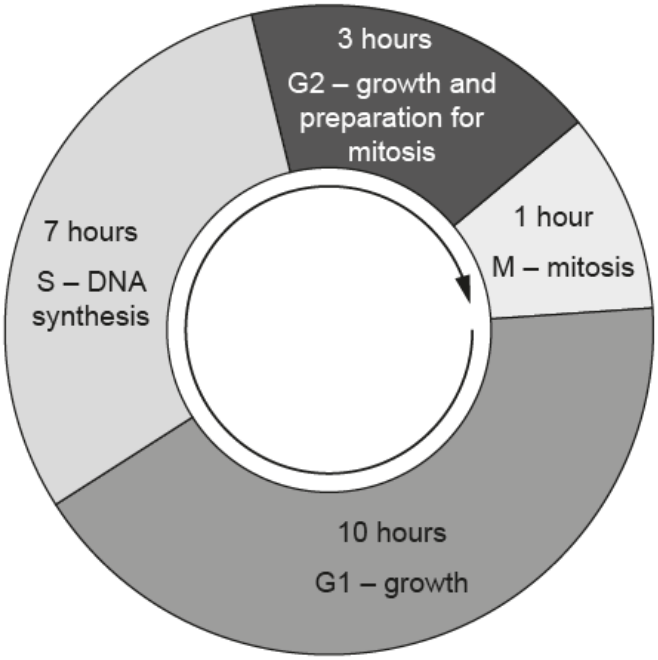
C pH6

D pH8

Your answer ☐ **[1]**

5. Nov 2021/Paper_J250/01/No.8

The diagram represents the cell cycle showing the hours spent in each part of the cycle.



The total time for the cell cycle is 21 hours.

What is the total time spent in cell division for this cell?

A 1

B 3

C 4

D 11

Your answer ☐ **[1]**

6. Nov 2021/Paper_J250/01/No.9

A student uses a light microscope to observe onion cells.

They magnify the cells 400×. The magnification of the eyepiece is 20×.

What is the magnification of the objective lens?

A 20×

B 200×

C 420×

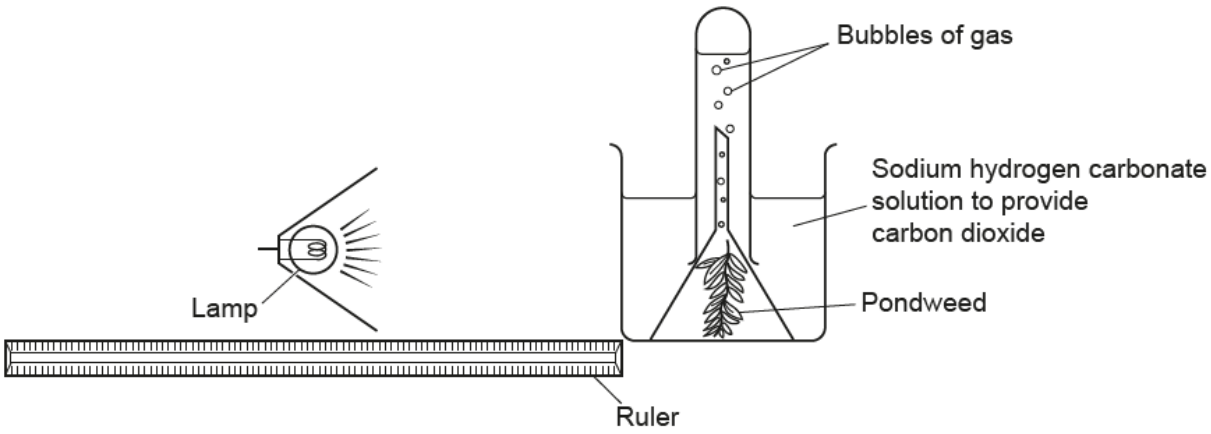
D 8000×

Your answer ☐ **[1]**

7. Nov 2021/Paper_J250/01/No.12

A student investigates the rate of photosynthesis.

The diagram shows the apparatus they use.



(a) The bubbles of gas are made during photosynthesis.

Which is the main gas in the bubbles?

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

(b) The student counts the number of bubbles made by the pondweed for 5 minutes.

They repeat this three more times.

The table shows their results.

Attempt	Number of bubbles	Mean number of bubbles
1	19	
2	16	
3	6	.....
4	22	

(i) Calculate the mean number of bubbles.

Give your answer to the **nearest whole number**.

Write your answer in the table.

[2]

(ii) There is **one** anomaly in the results.

Identify the anomaly and suggest **one** reason **other** than human error that may have caused it.

Anomaly .....

Reason .....

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[2]

***(c)** Describe how the student could develop their investigation to show how light intensity affects the number of bubbles made.

In your answer include ideas about variables, what the student should measure and the expected results.

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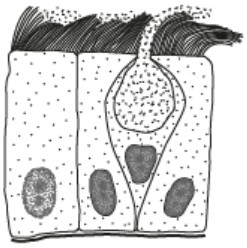
8. Nov 2021/Paper_J250/02/No.9

The cells in the diagram are important for defence from pathogens in the air.



Which organ of the body are the cells found in?

A Arteries

B Brain

C Lungs

D Small intestine

Your answer ☐ **[1]**

9. Nov 2020/Paper_J250/01/No.1

A student uses a light microscope to look at cells.

The magnification of the eyepiece lens is ×10.

The magnification of the objective lens is ×20.

Calculate the magnification of the image they see.

A ×10

B ×20

C ×100

D ×200

Your answer ☐ **[1]**

10. Nov 2020/Paper_J250/01/No.3

Scars are formed when skin is damaged. Which word describes the type of cell division used when scar tissue forms?

A Differentiation

B Mitosis

C Replication

D Specialised

Your answer ☐ **[1]**

11. Nov 2020/Paper_J250/01/No.5

The diagram shows cells from a plant.

Where in the plant would these cells be found?

A Leaf

B Flower

C Root

D Stem

Your answer ☐ **[1]**

12. Nov 2020/Paper_J250/01/No.13

(a) **Fig. 13.1** shows a single-celled organism called an alga.

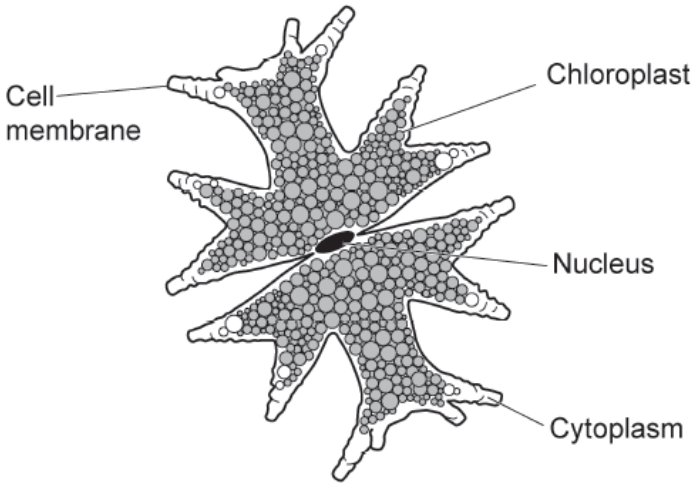


Fig. 13.1

(i) The cell in **Fig. 13.1** is a eukaryotic cell.

Use the diagram in **Fig. 13.1** to explain why the cell is a eukaryotic cell.

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

(ii) Chlorophyll is used in photosynthesis.

What are the **two** raw materials needed for photosynthesis?

1 .....

2 .....

[2]

(b) **Fig. 13.2** shows algae growing on the surface of a lake.

Fig. 13.2

In summer the area covered by algae increases.

Explain why more algae grow in the summer than in the winter.

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13. Nov 2021/Paper_J250/07/No.1

A student uses a light microscope to observe onion cells.

It magnifies the cells 400×. The magnification of the eyepiece is 20×.

What is the magnification of the objective lens?

A 20×

B 200×

C 420×

D 8000×

Your answer ☐ **[1]**

14. Nov 2021/Paper_J250/07/No.3

What advantage does a light microscope have compared to an electron microscope?

A Complex preparation of sample

B Greater magnification

C Greater resolution

D Live specimens can be observed

Your answer ☐ **[1]**

15. Nov 2021/Paper_J250/07/No.4

The model represents a molecule found inside human cells.

Which term describes this molecule?

A Double helix-shaped monomer

B Double helix-shaped polymer

C Triple helix-shaped monomer

D Triple helix-shaped polymer

Your answer ☐ **[1]**

16. Nov 2021/Paper_J250/07/No.5

Which statement is a correct description of a prokaryotic cell?

A The cell contains chloroplasts and plasmids.

B The cell has mitochondria in the cytoplasm but no cell wall.

C The cell has a nucleus and a cell wall.

D The genetic material is a single circular molecule of DNA.

Your answer ☐ **[1]**

17. Nov 2021/Paper_J250/07/No.6

Look at the table.

	Substrate(s)	Product(s)	Relative yield of ATP	Endothermic or exothermic
A	glucose + oxygen	lactic acid + carbon dioxide	less than aerobic respiration	exothermic
B	glucose	lactic acid	less than aerobic respiration	exothermic
C	glucose	lactic acid	greater than aerobic respiration	endothermic
D	glucose + oxygen	lactic acid + carbon dioxide	greater than aerobic respiration	endothermic

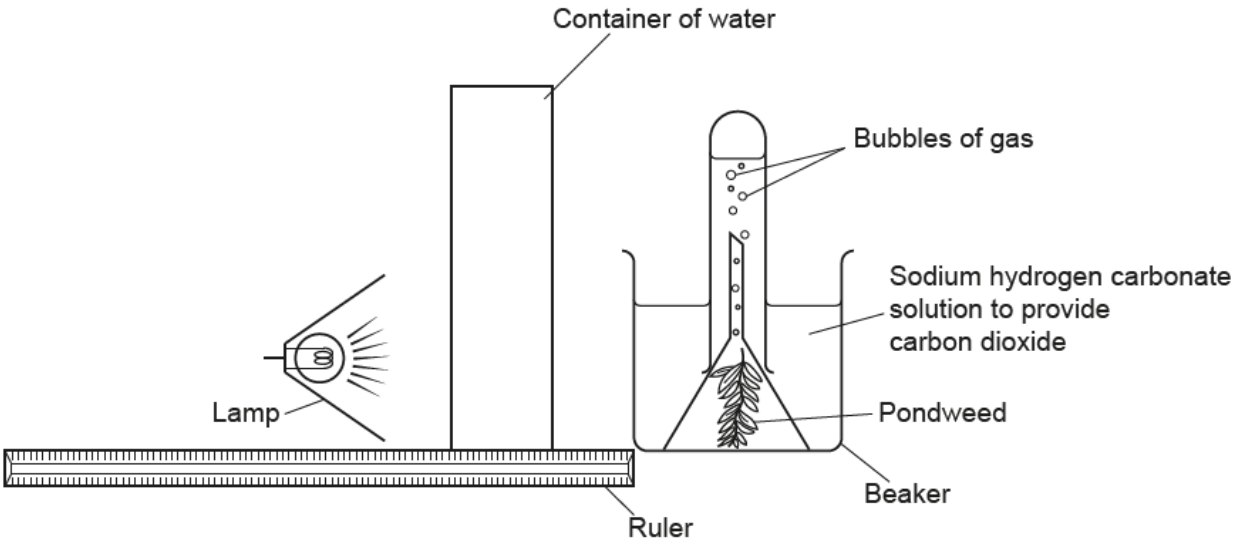
Which row describes **anaerobic** respiration in humans?

Your answer ☐ **[1]**

18. Nov 2021/Paper_J250/07/No.12

A student investigates the rate of photosynthesis.

The diagram shows the apparatus they use.



(a) Suggest why the student places a container of water between the lamp and the beaker.

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

(b) The student counts the number of bubbles made by the pondweed for 5 minutes.

They repeat this, setting the lamp at different distances from the beaker each time.

The table shows their results.

Lamp distance from beaker (m)	Number of bubbles
0.1	41
0.2	41
0.3	34
0.4	24
0.5	10

(i) The relative light intensity when the lamp distance is 0.1 m is 100.

Use the inverse square law to calculate the relative light intensity for 0.4 m.

Give your answer to **1** decimal place.

Relative light intensity = ... **[2]**

(ii) Explain the patterns shown in the data.

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***(c)** Evaluate the student's investigation and describe improvements to the equipment and method to increase the accuracy and precision.

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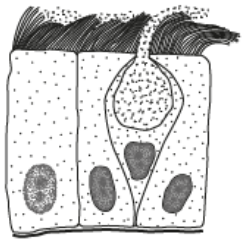
19. Nov 2021/Paper_J250/08/No.1

The cells in the diagram are important for defence from pathogens in the air.



Which organ of the body are the cells found in?

A Arteries

B Brain

C Lungs

D Small intestine

Your answer ☐ **[1]**

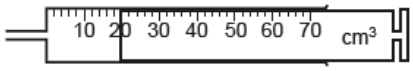
20. Nov 2020/Paper_J250/07/No.3

A student investigates the rate of photosynthesis.

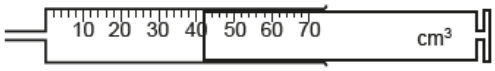
They collect the gas produced during the reaction in a gas syringe.

The diagrams show the volume of gas in the syringe at the **start** and after **30 minutes**.

Volume of gas at start



Volume of gas after 30 minutes



What is the rate of reaction?

A 0.7 cm^3/min

B 0.9 cm^3/min

C 1.4 cm^3/min

D 2.1 cm^3/min

Your answer ☐ **[1]**

21. Nov 2020/Paper_J250/07/No.4

The diagram shows cells from a plant.

What is the function of these cells?

A Produce sucrose

B Take in water from the soil

C Transport sucrose to the roots

D Transport water up the stem

Your answer ☐ **[1]**

22. Nov 2020/Paper_J250/07/No.6

What are the product(s) of anaerobic respiration in animals?

A Alcohol

B Alcohol and carbon dioxide

C Lactic acid

D Lactic acid and carbon dioxide

Your answer ☐ **[1]**

23. Nov 2020/Paper_J250/07/No.9

Which term describes the ability to see two points as separate points and not merged into one?

A Depth of field

B Magnification

C Power

D Resolution

Your answer ☐ **[1]**

24. Nov 2020/Paper_J250/07/No.16

(a) **Fig. 16.1** shows a single-celled organism called an alga.

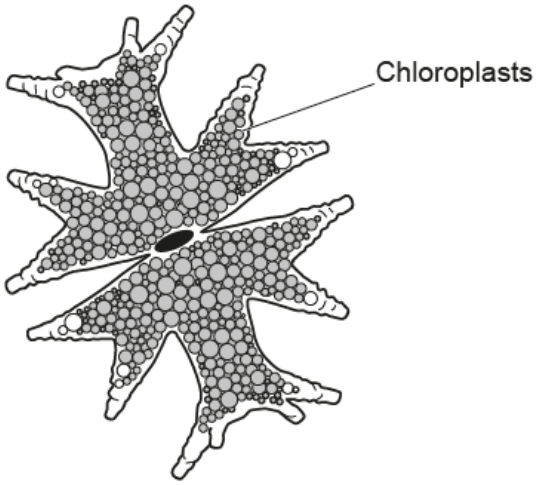


Fig. 16.1

(i) The alga cell is a eukaryotic cell.

Describe **two** differences in structure between eukaryotic and prokaryotic cells.

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2 .....

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[2]

(ii) Explain why chloroplasts are needed for photosynthesis.

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(b) **Fig. 16.2** shows algae growing on the surface of a lake.

Fig. 16.2

In the summer the area covered by the algae increases.

Other plants growing at the bottom of the lake receive less light.

Explain how this could affect the growth of the plants at the bottom of the lake.

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(c) Compare the process of photosynthesis with the process of aerobic respiration.

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25. Nov 2020/Paper_J250/08/No.13

Algae can photosynthesise and grow rapidly in lakes during the summer.

The growth of algae is affected by abiotic factors.

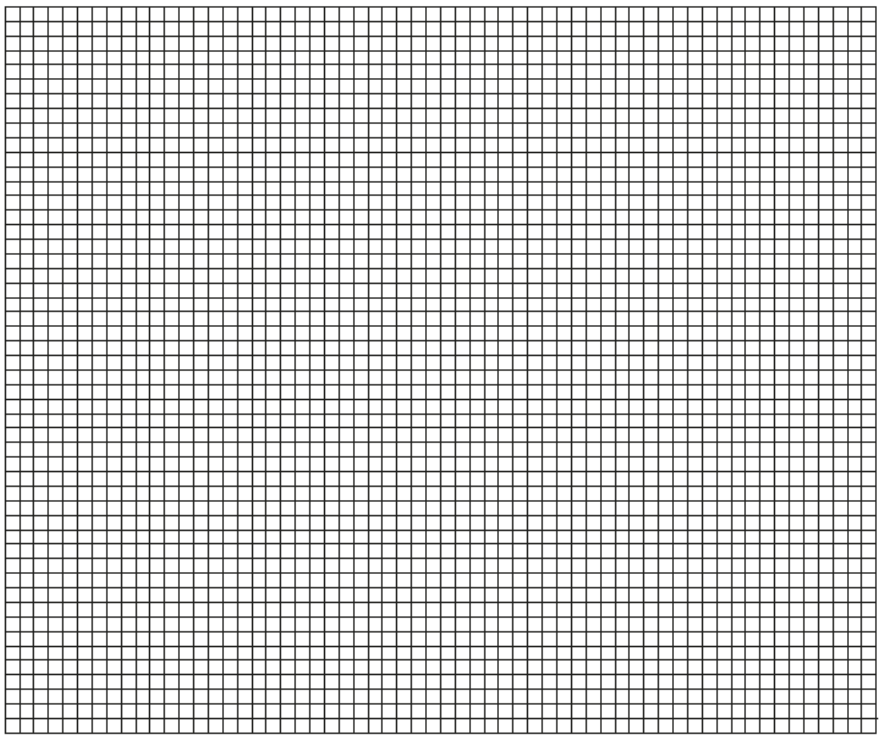
An experiment measured the dry mass of algae at different temperatures for 25 days. Light intensity was kept constant.

Table 13.1 shows the results for 25 °C and 35 °C.

Time (days)	Dry mass at different temperatures (g / litre)	
	25 (°C)	35 (°C)
0	0.15	0.15
5	0.21	0.28
10	0.30	0.42
15	0.36	0.52
20	0.45	0.63
25	0.50	0.74

Table 13.1

(a) (i) Plot the results for 25 °C and 35 °C on the grid, and draw **two** lines of best fit.



[5]

(ii) Describe the trends shown in the graph.

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(b) **Table 13.2** shows the dry mass of algae on day 25 for all the temperatures measured in the experiment.

Temperature (°C)	Dry mass (g / litre)
10	0.12
20	0.25
25	0.50
30	0.62
35	0.74

Table 13.2

In some lakes, algae are the main producers.

One year, water temperatures in a lake did not rise above 20 °C.

Use data from **Table 13.2** to explain how this might affect the community of organisms living in the lake.

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(c) The algae produce a toxin. High levels of toxins can kill fish in the water.

Suggest why scientists are concerned about the effects of global warming on algae growth.

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