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EDEXCEL INTERNATIONAL GCSE BIOLOGY: QUESTIONS BY TOPIC

The Nature and Variety of Living Organisms (1)

International GCSE Biology Section 1

9 questions · 74 marks · Mark schemes included

Pearson Edexcel International GCSE (9–1) Biology 4BI1, Papers 1B, 1BR, 2B & 2BR, June 2019 - June 2025

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HOW TO USE THIS BOOKLET

Questions are grouped by specification sub-topic; within each sub-topic they run from the lowest mark tariff to the highest.

Click any sub-topic heading or question row below to jump straight to it.

On every question page, click ANSWER in the top-right corner to jump to its mark scheme.

Diagrams, graphs, tables and data are printed exactly as they appeared in the original papers.

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QUESTIONS

9 questions · 74 marks · grouped by sub-topic



SUB-TOPIC 1(b)

VARIETY OF LIVING ORGANISMS

9 questions in this sub-topic · 74 marks · lowest tariff first



2 Organisms can be classified into groups based on their features.

(a) State three differences between eukaryotic and prokaryotic organisms.

(3)

1

2

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(b) Give an example of a disease caused by a protoctist.

(2)

name of protoctist

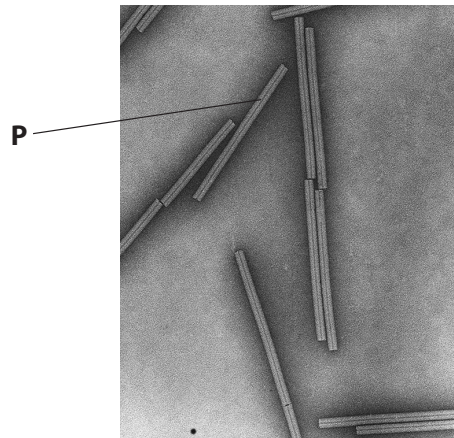
name of disease

(Total for Question 2 = 5 marks)



2 Tobacco mosaic virus infects plant cells.

The photograph shows some of the virus particles.



(Source: © DR. JOHN FINCH/SCIENCE PHOTO LIBRARY)

- (a) (i) Tobacco mosaic virus particles consist of a molecule of RNA surrounded by a coat.

Which substance is the coat made from?

(1)

- ☐ **A** cellulose
- ☐ **B** chitin
- ☐ **C** protein
- ☐ **D** starch

- (ii) The virus particle labelled **P** has an actual length of $0.3\text{ }\mu\text{m}$.

Calculate the magnification of this virus particle.

[1 mm = $1000\text{ }\mu\text{m}$]

(3)

magnification = $\times$

(b) The photograph shows the leaves of a plant infected by tobacco mosaic virus.



(Source: © PAL)

Plants cells infected with the virus stop making chloroplasts.

Explain why plants that are infected with the virus grow more slowly than uninfected plants.

(3)

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(Total for Question 2 = 7 marks)

2 Food items can often be spoiled if saprotrophic microorganisms such as mould fungi grow on them.

(a) Describe how a saprotrophic fungus such as mould obtains its food.

(3)

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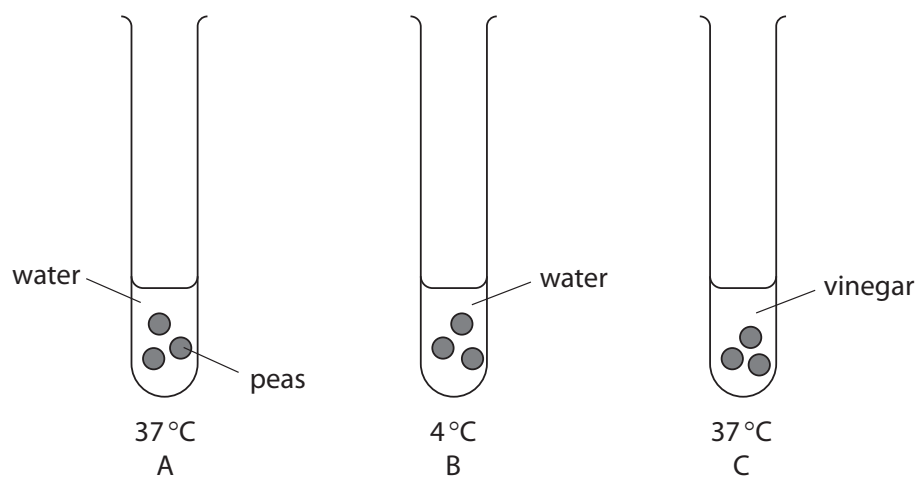
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(b) A student uses this method to investigate ways of preventing peas from being spoiled.

- place three peas in each of three test tubes as shown in the diagram
- cover the peas in test tube A with water and keep at 37 °C
- cover the peas in test tube B with water and keep at 4 °C
- cover the peas in test tube C with vinegar, which is a weak acid, and keep at 37 °C
- leave the peas for 24 hours



The student observes the level of cloudiness of the solution to determine how spoiled the peas have become.

The level of cloudiness can be used as a measure of fungal growth.

The table shows the student's results.

Test tube	Conditions peas are kept in	Level of cloudiness
A	water at 37 °C	very cloudy
B	water at 4 °C	slightly cloudy
C	vinegar at 37 °C	no cloudiness

- (i) Suggest a problem with using the level of cloudiness of the solution to determine how spoiled the peas have become.

(1)

- (ii) Explain the appearance of the peas in water at 4 °C.

(2)

- (iii) Explain the appearance of the peas in vinegar at 37 °C.

(2)

(Total for Question 2 = 8 marks)



1 (a) All living organisms share characteristics.

(i) State two characteristics that all living organisms share.

(2)

1

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2

(ii) Some organisms are pathogens.

Which of these organisms can cause a bacterial disease in humans?

(1)

☐ A *Chlorella*

☐ B *Lactobacillus bulgaricus*

☐ C *Mucor*

☐ D *Pneumococcus*

(b) Viruses are pathogens but not living organisms.

(i) Describe the effect of a named virus that infects plants.

(2)

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(ii) Give three differences between the structure of viruses and bacteria.

(3)

1

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2

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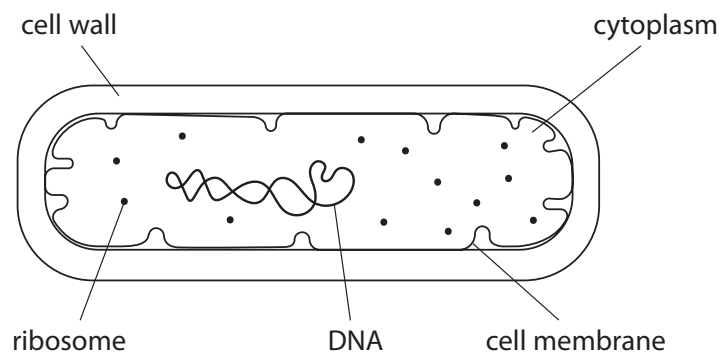
3

(Total for Question 1 = 8 marks)



1 *Lactobacillus* is a type of bacterium used to make yoghurt.

The diagram shows a single *Lactobacillus* bacterium.



(a) (i) What is the function of ribosomes?

(1)

- ☐ A photosynthesis
- ☐ B protein synthesis
- ☐ C respiration
- ☐ D storage of cell sap

- (ii) Which row of the table gives the components that are found in all bacteria and in all eukaryotic cells?

(1)

		Cytoplasm	Cell surface membrane	Cell wall
☐	A	✓	✓	✓
☐	B	✓	✓	✗
☐	C	✗	✓	✗
☐	D	✗	✓	✓

- (iii) *Lactobacillus* cells do not burst when placed in distilled water.

Red blood cells burst when placed in distilled water.

Explain why the *Lactobacillus* cells do not burst but the red blood cells do burst.

(3)

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- (b) Describe how *Lactobacillus* bacteria produce yoghurt from milk.

(3)

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(Total for Question 1 = 8 marks)



- 1 The photograph shows a fungus called *Mucor* growing on an agar plate.

Cells within *Mucor* contain nuclei and mitochondria.



(Source: © Dr_Microbe/Alamy Stock Photo)

- (a) (i) Which of these is a correct statement about the fungus, *Mucor*?

(1)

- ☐ A *Mucor* is a eukaryotic organism with cell walls made of chitin
- ☐ B *Mucor* is a eukaryotic organism with cell walls made of cellulose
- ☐ C *Mucor* is a prokaryotic organism with cell walls made of chitin
- ☐ D *Mucor* is a prokaryotic organism with cell walls made of cellulose

- (ii) Plant cells contain chloroplasts, cytoplasm and starch.

How many of these are also present in a fungus such as *Mucor*?

(1)

- ☐ A 0
- ☐ B 1
- ☐ C 2
- ☐ D 3

(iii) The fungus in the diagram is circular with a radius of 45 mm.

Calculate the area, in mm^2 , of this circle.

Give your answer to 2 significant figures.

[area = πr^2 $\pi = 3.14$]

(2)

area of circle = ... mm^2

(b) *Mucor* can reproduce using asexual or sexual reproduction.

(i) State two differences between asexual and sexual reproduction.

(2)

1

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2

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(ii) Explain why it is an advantage for *Mucor* to be able to reproduce using sexual reproduction.

(2)

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(Total for Question 1 = 8 marks)



5 Human populations are at risk from infectious disease.

(a) Describe the different types of pathogen.

Refer to a disease that each type of pathogen causes in your answer.

(6)

[illegible]

(b) Explain how vaccination protects humans from pathogens.

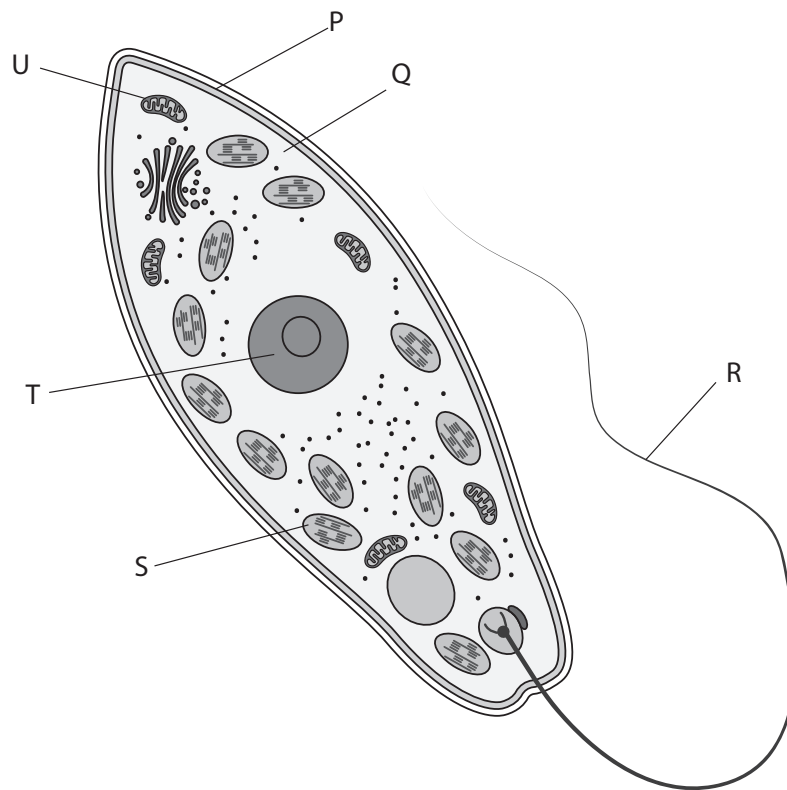
(3)

(Total for Question 5 = 9 marks)



1 *Euglena* is a microorganism that lives in water.

The diagram shows *Euglena* with some structures labelled.



(a) (i) Which group contains *Euglena*?

(1)

- ☐ A bacteria
- ☐ B fungi
- ☐ C protocists
- ☐ D viruses

(ii) Which structure is the site of respiration?

(1)

☐ **A** P

☐ **B** R

☐ **C** T

☐ **D** U

(iii) Which structure contains chromosomes?

(1)

☐ **A** P

☐ **B** Q

☐ **C** R

☐ **D** T

(iv) Which structure is the cell membrane?

(1)

☐ **A** P

☐ **B** Q

☐ **C** R

☐ **D** U

(b) *Euglena* has some structures that are found in plant cells but not in animal cells.

Which labelled structure is found in plant cells but not in animal cells?

(1)

☐ **A** P

☐ **B** Q

☐ **C** S

☐ **D** T

(c) Some of the labelled structures are known as organelles.

State what is meant by the term **organelle**.

(1)

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(d) Explain which two labelled structures allow *Euglena* to move through water.

Refer to the diagram and your own knowledge in your answer.

(3)

1

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2

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(Total for Question 1 = 9 marks)



- 7 Biologists classify organisms into different groups. Two of these groups are bacteria and fungi.

- (a) Complete the passage about bacteria by writing a suitable word or words in each blank space.

(8)

Bacteria are small celled organisms. They have a cell membrane and a cell, made of peptidoglycan.

Some bacteria are able to use the energy from the Sun to carry out but other bacteria are and feed on dead and decaying organisms.

Bacterial cells do not have a nucleus but most of their genetic material is contained in a circular of DNA. They also have small circles of DNA called in their cytoplasm.

Some bacteria are used by humans in food production. An example is using to make yoghurt.

Other bacteria, such as *Pneumococcus*, cause disease and so are called



(b) A microscopic single-celled fungus, yeast, is used in the production of bread.

Describe how yeast is used to produce bread.

(4)

(Total for Question 7 = 12 marks)



MARK SCHEMES

official Pearson Edexcel mark schemes



Question Number	Answer	Additional guidance	Mark
2(a)	An answer that makes reference to three of the following: • have nucleus (1) • have organelles / mitochondria / chloroplasts eq (1) • have chromosomes / more than one chromosome (1) • lack plasmids (1)	allow converse for prokaryotes prokaryotes have a nucleoid prokaryotes have circular chromosome / loop of DNA	3

Question Number	Answer	Additional guidance	Mark
2(b)	An answer that makes reference to suitable organism and matched disease: • plasmodium (1) • malaria (1)	allow other examples e.g. amoeba and dysentery Trypanosoma and sleeping sickness must be matched so amoeba with malaria scores 1 malaria plasmodium wrong way round scores 1	2

Total = 5 marks

Question Number	Answer	Additional guidance	Mark
2(a)(i)	The only correct answer is C (protein) A is incorrect because viruses do not contain cellulose B is incorrect because viruses do not contain chitin D is incorrect because viruses do not contain starch		1

Question Number	Answer	Additional guidance	Mark
2 (a)(ii)	• x 76, 700 or 77000 (3) Allow range between 73 000 up to 80 000 (3 marks)	One mark for correct measurement of length (between 22 and 24 mm) OR One mark for correct conversion of mm (or cm) to μm / or reverse for 0.3 OR One mark for correct division by 0.3 (1) Two marks for 23 000 (allow range between 22 000 and 24 000) Two marks for 76.667 (and allow range between 73.33 to 80) Allow two marks for correct method from wrong initial measurement Correct answer with no working gains full marks	3

Question Number	Answer	Additional guidance	Mark
2 (b)	An explanation that makes reference to three of the following: • less / no light (energy) absorbed / taken in / eq (1) • (less) photosynthesis (1) • (less) glucose (1) • (less) starch / cellulose / less energy (for growth) / less ATP made / less active transport / (less glucose so) less respiration / eq (1)	Allow chlorophyll / chloroplasts absorb light Ignore energy produced Allow less protein synthesis / fewer amino acids made	3

(Total for Question 2 = 7 marks)

Question Number	Answer	Additional guidance	Mark
2 (a)	A description that makes reference to three of the following: - enzymes (1) (feed on) dead / decaying organisms (1) - for <u>extracellular digestion</u> (1) - absorb the digested food / nutrients (1)	Accept named nutrients Accept broken down food	3

Question Number	Answer	Additional guidance	Mark
2 (b)(i)	A description that makes reference to one of the following: judgement of cloudiness is subjective / is qualitative / not quantitative / cloudiness cannot be accurately measured / cannot be repeated by other people / eq (1)	Accept cloudiness is judged by eye Accept cannot see small differences / it is imprecise Accept cannot measure difference in cloudiness	1

Question Number	Answer	Additional guidance	Mark
2 (b)(ii)	An explanation that makes reference to two of: - less kinetic energy / lower collision frequency / not at optimal temperature for enzymes / eq (1) - less fungal growth / less mould / only slight fungal growth (1) - less respiration (1)	Accept fewer E-S complexes formed Accept microbes / bacteria for fungi Accept less decay / less spoilage / less digestion	2

Question Number	Answer	Additional guidance	Mark
2 (b)(iii)	An explanation that makes reference to two of: - enzymes denature (in acid / low pH / vinegar) (1) - active site shape changes / enzymes do not bind with substrate / eq (1) - fungal growth decreases (1)	Reject enzymes denature due to high temperature Accept fungi killed / less spoilage / less decomposition / less respiration Accept bacteria / microbes for fungi	2

Total: 8 marks

Question Number	Answer	Mark
1 (a)(i)	An answer that makes reference to two of the following: • (require) nutrition / food / eq (1) • respire /eq (1) • excrete (waste) /eq (1) • respond to surroundings / sensitivity / eq (1) • move /eq (1) • control their internal conditions / homeostasis /eq (1) • reproduce /eq (1) • grow / develop /eq (1)	2

Question Number	Answer	Mark
1(a)(ii)	The only correct answer is D <i>Pneumococcus</i> A is not the answer as <i>Chlorella</i> does not cause bacterial disease in humans B is not the answer as <i>Lactobacillus bulgaricus</i> does not cause bacterial disease in humans C is not the answer as <i>Mucor</i> does not cause bacterial disease in humans	1

Question Number	Answer	Additional guidance	Mark
1 (b) (i)	• Tobacco mosaic virus/ TMV (1) • discoloured leaves / yellow leaves / yellow spots / white leaves / white spots / no chlorophyll/ no chloroplasts / less chlorophyll / no photosynthesis / less photosynthesis /eq (1)	Allow other correctly named plant virus and effect not just less growth effect without correct virus scores zero	2

Question Number	Answer	Additional guidance	Mark
1 (b) (ii)	An answer that makes reference to three of the following: Virus • smaller / eq (1) • protein coat (1) • no cell wall (1) • no cell membrane / eq (1) • no cytoplasm / organelles / ribosomes / no vacuole / eq (1) • no plasmids (1) • no flagella (1)	Mark first 3 answers allow converse ignore nucleus mitochondria Golgi ignore chloroplasts loop or circles of DNA	3

Total 8 marks

Question Number	Answer	Mark
1(a)(i)	The only correct answer is B (protein synthesis) <i>A is incorrect as chloroplasts perform photosynthesis</i> <i>C is incorrect as mitochondria perform respiration</i> <i>D is incorrect as vacuoles store cell sap</i>	1

Question Number	Answer	Mark
1(a)(ii)	The only correct answer is B <i>A is incorrect as animal cells do not have cell walls</i> <i>C is incorrect as eukaryotic cells have cytoplasm</i> <i>D is incorrect as animal cells do not have cell walls</i>	1

Question Number	Answer	Additional Guidance	Mark
1(a)(iii)	An explanation that makes reference to three of the following. <i>Lactobacillus</i> / they, have cell walls / red blood cells do not have a cell wall / eq (1) - water enters (cells) / eq (1) - by osmosis (1) (because) water potential inside the cells is low(er) / eq (1)	Ignore refs to water not entering <i>Lactobacillus</i> Allow from a high concentration (of water) to a low concentration (of water) / from a dilute to a concentrated solution / eq	3

Question Number	Answer		Mark
1(b)	A description that makes reference to three of the following. • respiration / fermentation / ferment (1) • lactose (1) • lactic acid / lactate, produced (1) • (protein) clots / milk thickens / milk coagulates / goes solid / eq (1)	Ignore aerobic / anaerobic Allow milk becomes acid(ic) / low pH occurs Allow protein denatures	3

(Total for Question 1 = 8 marks)



Question Number	Answer	Mark
1(a)(i)	A (<i>Mucor</i> is a eukaryotic organism with cell walls made of chitin) <i>B is incorrect Mucor does not have cellulose</i> <i>C is incorrect as Mucor is not a prokaryote</i> <i>D is incorrect as Mucor is not a prokaryote</i>	1

Question Number	Answer	Mark
1(a)(ii)	B (1) <i>A is incorrect Mucor has cytoplasm</i> <i>C is incorrect as Mucor does not have chloroplasts or starch</i> <i>D is incorrect as Mucor does not have chloroplasts or starch</i>	1

Question Number	Answer	Additional guidance	Mark
1(a)(iii)	• $3.14 \times 45^2 = 6358.5$ • to two sig figs = 6400 (2)	One mark for answer between 6358 and 6362 that is not to two sig figs Correct answer gains both marks	2

Question Number	Answer	Additional guidance	Mark
1(b)(i)	An answer that makes reference to two of the following: - asexual produces <u>genetically</u> identical offspring / clones (1) - asexual has no fertilisation / no gametes / eq (1) - asexual only has one parent <u>cell</u> (1) - asexual uses (only) mitosis / asexual does not use meiosis / asexual does not use haploid cells (1)	Accept converse for all mark points Accept asexual results in same genes / alleles / DNA Accept asexual does not produce a zygote Ignore one parent alone / no need for mate	2

Question Number	Answer	Additional guidance	Mark
1(b)(ii)	An explanation that makes reference to the following: - sexual reproduction produces (genetic) variation / eq (1) - some may survive environmental changes / not all killed by disease / are more adaptable / natural selection can occur / survive change in climate / eq (1)	Accept converse for all points Ignore mutation Accept allow survival of fittest idea Accept idea of survival advantage Accept more disease resistant Ignore immune	2

(Total for Question 1 = 8 mark)



Question Number	Answer	additional guidance	Mark
5(a)	A description that makes reference to six of the following points: • virus non-living organisms / small particles / protein coat / capsid / relies on other organisms for reproduction/ eq (1) • AIDS / eq (1) • bacteria microscopic single-celled / prokaryotic / no nucleus / have nucleoid / plasmids (1) • pneumonia / eq (1) • fungus not able to carry out photosynthesis / saprotrophic / single-celled / hyphae / cell wall chitin/eq (1) • athlete's foot / eq (1) • protocist / protozoa <i>Plasmodium</i> / microscopic single-celled (1) • malaria / eq (1)	pathogen and description for first mark disease mark must match pathogen type allow plant disease eg TMV HIV / AIDS scores disease mark but not pathogen description mark Virus non-living causing cholera scores pathogen description but not disease mark	6 exp

Question Number	Answer	additional guidance	Mark
5(b)	An explanation that makes reference to three of the following points: • dead / weakened / harmless / attenuated pathogen / eq (1) • produce memory cells / lymphocytes (1) • (secondary) immune response (1) • faster / more antibodies production (1)	allow weakened strain	3 exp

Total 9 marks



Question Number	Answer	Mark
1(a)(i)	C (protocists) A is not the answer as <i>Euglena</i> is not in bacteria B is not the answer as <i>Euglena</i> is not in fungi D is not the answer as <i>Euglena</i> is not in viruses	1

Question Number	Answer	Mark
1(a)(ii)	D (U) A is not the answer as P is the membrane B is not the answer as R is the flagellum D is not the answer as T is the nucleus	1

Question Number	Answer	Mark
1(a)(iii)	D (T) A is not the answer as P is the membrane B is not the answer as Q is the cytoplasm C is not the answer as R is the flagellum	1

Question Number	Answer	Mark
1(a)(iv)	A (P) B is not the answer as Q is the cytoplasm C is not the answer as R is the flagellum D is not the answer as U is the mitochondrion	1



Question Number	Answer	Mark
1(b)	C (S) A is not the answer as P is the cell membrane B is not the answer as Q is the cytoplasm D is not the answer as T is the nucleus	1

Question Number	Answer	Mark
1(c)	structure / part of a cell with particular function / purpose / role (s) / eq (1)	1

Question Number	Answer	Additional guidance	Mark
1 (d)	An explanation that that makes reference to three of the following: - mitochondrion / U (1) (mitochondrion) respiration / releases energy / provides ATP / eq (1) - flagellum / R / tail / eq (1)	No credit if U called cytoplasm/chloroplast P/Q/ R/ S/ T for respiration = no credit for mp 2 Ignore produces energy	3

Question Number	Answer	Mark
7(a)	• single / one / unicellular (1) • wall (1) • photosynthesis (1) • decomposers / saprophytic / saprophytes/ saprotrophic (1) • chromosome / nucleoid (1) • plasmids (1) • <i>Lactobacillus</i> / <i>Streptococcus</i> (1) • pathogens / pathogenic (1)	8

Question Number	Answer	additional guidance	Mark
7(b)	A description that makes reference to four of the following points • yeast respire (aerobically) / eq (1) • yeast (then) <u>respires anaerobically</u> / eq (1) • converts starch to maltose / maltose to glucose / starch to glucose / eq (1) • using amylase / maltase /eq (1) • releases carbon dioxide /eq(1) • causes (dough / bread) to rise / bubbles trapped / volume increases /eq (1)	allow fermentation allow gets bigger	4

Total 12 marks

