Topical Past Paper Questions Worksheets

Edexcel IGCSE (4BI1) Paper 1B

Exam Series: Jan 2017 – Jan 2023

Format Type B:
Each question is followed by its answer scheme

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Introduction

Each Topical Past Paper Questions Workbook contains a comprehensive collection of hundreds of questions and corresponding answer schemes, presented in worksheet format. The questions are carefully arranged according to their respective chapters and topics, which align with the latest Edexcel IGCSE or AS/A Level subject content. Here are the key features of these resources:

1. The workbook covers a wide range of topics, which are organized according to the latest syllabus content for Edexcel IGCSE or AS/A Level exams.
2. Each topic includes numerous questions, allowing students to practice and reinforce their understanding of key concepts and skills.
3. The questions are accompanied by detailed answer schemes, which provide clear explanations and guidance for students to improve their performance.
4. The workbook's format is user-friendly, with worksheets that are easy to read and navigate.
5. This workbook is an ideal resource for students who want to familiarize themselves with the types of questions that may appear in their exams and to develop their problem-solving and analytical skills.

Overall, Topical Past Paper Questions Workbooks are a valuable tool for students preparing for Edexcel IGCSE or AS/A Level exams, providing them with the opportunity to practice and refine their knowledge and skills in a structured and comprehensive manner. To provide a clearer description of this book's specifications, here are some key details:

- Title: Edexcel IGCSE (4BI1) Paper 1B Topical Past Papers
- Subtitle: Exam Practice Worksheets With Answer Scheme
- Examination board: Pearson Edexcel
- Subject code: 4BI1
- Years covered: Jan 2017 – Jan 2023
- Paper: 1B
- Number of pages: 937
- Number of questions: 229

Contents

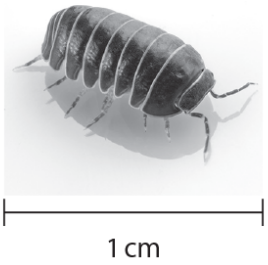
Chapter 1

The nature and variety of living organisms

1.1 Characteristics of living organisms

1. 4BI1_1BR_que_20220111 Q: 11

The photograph shows a small animal called a woodlouse.



(Source: paulrommer. Shutterstock/PAL)

Woodlice often live under pieces of dead wood in dark, humid conditions.

Design an investigation to find out if light intensity affects the speed at which woodlice move.

Include experimental details in your answer and write in full sentences.

(6)

.....

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(Total for Question 11 = 6 marks)

TOTAL FOR PAPER = 110 MARKS

Answer:

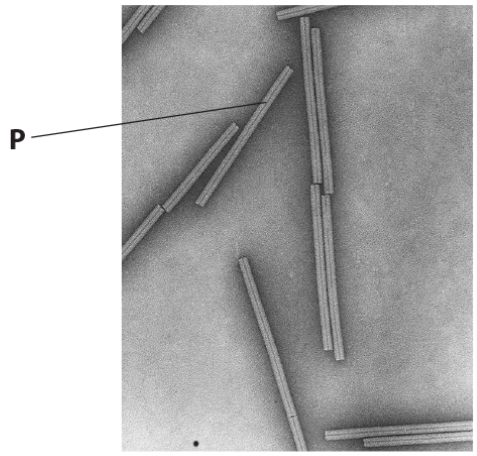
Question Number	Answer	Additional guidance	Mark
	An answer that makes reference to six of the following: C: range of different light intensities / dark and light (1) O: same species / age of wood lice / eq (1) R: repeats / groups of woodlice (1) M1: measure distance moved (1) M2: over a set / stated time (1) S1 and S2: same humidity / temperature / oxygen / carbon dioxide / food / size of container / wood types / eq (2)	**Accept** for M1 and M2, time how long takes to move set distance	**6**

1.2 Variety of living organisms

2. 4BI1_1BR_que_20230110 Q: 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 μm.

Calculate the magnification of this virus particle.

[1 mm = 1000 μm]

(3)

magnification = × .....

(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)

(Total for Question 2 = 7 marks)

Answer:

Question Number	Answer	Additional guidance	Mark
(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
(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
(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**

3. 4BI0_1B_que_20170516 Q: 10

The passage describes how different organisms are classified into groups.

Complete the passage by writing a suitable word or words in each of the spaces.

(10)

Plants are multicellular organisms. They have chloroplasts to carry out photosynthesis and cell walls made of ..... . They store carbohydrate as ..... or as sucrose.

Animals are also multicellular but do not carry out photosynthesis. They are able to move from place to place and are always described as ..... in food chains. They store carbohydrate as ..... .

Bacteria are single-celled organisms. They do not have a nucleus. Instead, they contain a circular ..... and smaller circles of DNA called ..... . Most bacteria feed off other living or dead organisms but some bacteria can make their own food by ..... .

Examples of bacteria include *Lactobacillus*, used in the production of ..... from milk, and *Pneumococcus*, that acts as a ..... causing the disease ..... .

(Total for Question 10 = 10 marks)

Answer:

Question number	Answer	Notes	Marks
	1. cellulose; 2. starch; 3. consumers; 4. glycogen; 5. chromosome / nucleiod; 6. plasmids / plasmid; 7. photosynthesis / photosynthesising; 8. yoghurt / cheese; 9. pathogen; 10. pneumonia;	Mp 5 must be singular not chromosomes	10

4. 4BI1_1B_que_20200305 Q: 2

Organisms can be classified into groups based on their features.

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

(3)

1 .....

.....

2 .....

.....

3 .....

.....

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

(2)

name of protoctist .....

name of disease .....

(Total for Question 2 = 5 marks)

Answer:

Question Number	Answer	Additional guidance	Mark
(a)	An answer that makes reference to three of the following: • have nucleus (1) • have organelles / mitochondria / chloroplasts eq (1) • have chromosome**s** / 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
(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**

Chapter 2

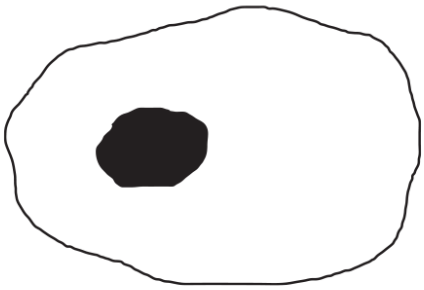
Structure and functions in living organisms

2.1 Level of organisation

5. 4BI1_1B_que_20201107 Q: 3

(a) A student uses a light microscope to look at a human cheek cell.

The student makes this drawing of the cell.



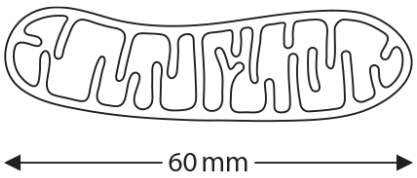
Name the organelle shown in the drawing.

(1)

.....

(b) Mitochondria are organelles that are too small to be seen using a light microscope.

The drawing shows a mitochondrion that has been magnified.



The actual length of this mitochondrion is 6 µm.

[1 µm = 0.001 mm]

Calculate the magnification of this drawing.

(2)

magnification = ...

(c) The table gives information about mitochondria in different human cells.

Cell	Mean number of mitochondria per cell	Mean volume of cell in μm^3	Mean number of mitochondria per μm^3
heart muscle	5000	15000	
sperm	75	30	2.50
egg	600000	4000000	0.15

(i) What is the mean number of mitochondria per μm^3 in a heart muscle cell?

(1)

☒ **A** 0.33

☒ **B** 3

☒ **C** 10000

☒ **D** 75000000

(ii) Comment on the differences in the data for the sperm and for the egg.

(3)

(Total for Question 3 = 7 marks)

Answer:

Question Number	Answer	Mark
(a)	• nucleus	**1 cler**

Question Number	Answer	Additional guidance	Mark
(b)	convert length into µm 60 mm = 60 000 µm (1) division 60 000 ÷ 6 = ×10 000 (1)	award full marks for correct numerical answer without working 1 mark for 60 000 or dividing by 6	**2 exp**

Question Number	Answer	Mark
(c)(i)	A 0.33 *B is not correct as 3 is not the mean* *C is not correct as 10 000 is not the mean* *D is not correct as 75 000 000 is not the mean*	**1 comp**

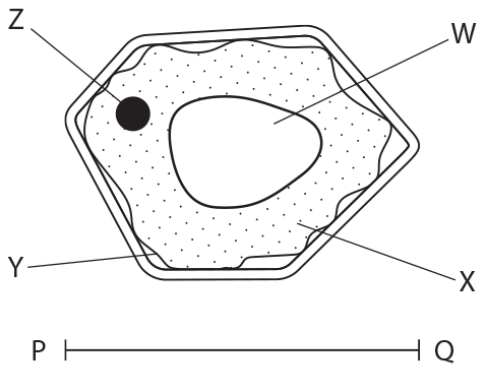
Question Number	Answer	additional guidance	Mark
(c)(ii)	An answer that makes reference to the following: • sperm smaller / sperm is small cell / eq (1) • fewer (total) mitochondria (per cell) (1) • more mitochondria per volume / per μm^3 (1) • uses <u>energy</u> to swim / move / get to /eq (1) • fertilise egg (1)	**allow converse for egg** larger more fewer does not move egg is fertilised	**3 exp**

2.2 Cell structure

6. 4BI1_1BR_que_20220518 Q: 1

Some questions must be answered with a cross in a box ☒. If you change your mind about an answer, put a line through the box ☒ and then mark your new answer with a cross ☒.

The diagram shows a root cell from a plant with structures labelled W, X, Y and Z.



(a) (i) Which structure is the nucleus?

(1)

☒ **A** W

☒ **B** X

☒ **C** Y

☒ **D** Z

(ii) Which structure is **not** found in human white blood cells?

(1)

☒ **A** W

☒ **B** X

☒ **C** Y

☒ **D** Z

(iii) Which molecule is the storage carbohydrate in the root cell?

(1)

- ☒ **A** glucose
- ☒ **B** glycerol
- ☒ **C** glycogen
- ☒ **D** starch

(b) The actual width of the cell from P to Q is 125 μm.

Determine the magnification of the diagram.

[1 mm = 1000 μm]

(3)

magnification = ...

(Total for Question 1 = 6 marks)

Answer:

Question Number	Answer	Additional guidance	Mark
(a)(i)	D is the only correct answer A is incorrect as it is the vacuole B is incorrect as it is cytoplasm C is incorrect as it is the cell membrane		**1**

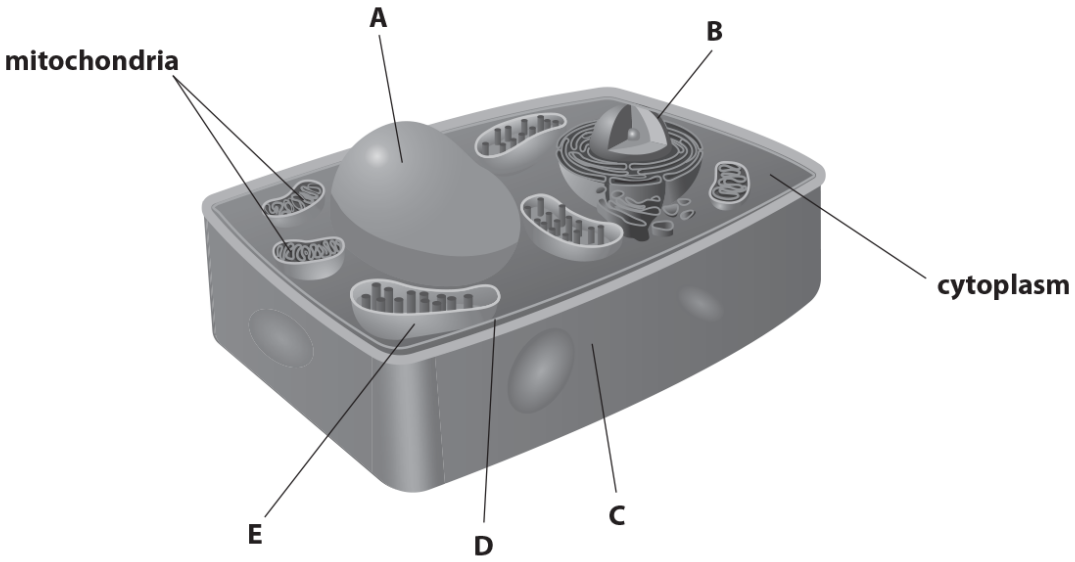
Question Number	Answer	Additional guidance	Mark
(a)(ii)	A is the only correct answer B is incorrect as animal cells have cytoplasm C is incorrect as animal cells have a cell membrane D is incorrect as animal cells have a nucleus		**1**

Question Number	Answer	Additional guidance	Mark
(a)(iii)	D (starch) is the only correct answer A is incorrect as glucose is not a storage molecule B is incorrect as glycerol is not a carbohydrate C is incorrect as plant cells do not have glycogen		**1**

Question Number	Answer	Additional guidance	Mark
(b)	These are calculation steps • correct measurement of line as 50 mm	**one** mark for correct measurement of line +/- 1 mm i.e. **one mark** for 50 (mm) or 5 cm	**3**
	• correct conversion of micrometres to millimetres or millimetres to micrometres	**one mark** for length × 1000 OR 0.125 (mm)	
	• correct division of 50 000 µm by 125 **or** correct division of 50 mm by 0.125	**one mark** for dividing by 125	
		two marks for 50 000 (µm) (measurement and conversion) OR **two marks** for (X) 0.4 or (x) 4 or (x) 40 or (x) 40 000	
	(×) 400 (3)	**Allow answer in the range of (x) 392 to (x) 408 for three marks** **Ignore** other units	

7. 4BI1_1B_que_20190515 Q: 1

This is a three-dimensional diagram of a plant cell.



(a) Name the structures labelled A, B, C, and D.

(4)

A .....

B .....

C .....

D .....

(b) Structure E is a chloroplast.

Chloroplasts are not found in animal cells.

(i) Give the letter of another structure shown in the diagram but not found in animal cells.

(1)

.....

(ii) Explain why some plant cells contain many chloroplasts, some plant cells contain few chloroplasts and some plant cells contain no chloroplasts.

(3)

(c) Ribosomes are found in plant cells and in animal cells.

Name the process that occurs at the ribosomes.

(1)

(Total for Question 1 = 9 marks)

Answer:

Question Number	Answer	Mark
(a)	<table><tr><th>Letter</th><th>Name</th></tr><tr><td>A</td><td>vacuole (1)</td></tr><tr><td>B</td><td>nucleus (1)</td></tr><tr><td>C</td><td>cell wall (1)</td></tr><tr><td>D</td><td>cell membrane (1)</td></tr></table>	**4**

Question Number	Answer	Additional guidance	Mark
(b) (i)	C / A	C A C and A A and C	**1**

Question Number	Answer	Additional guidance	Mark
(b)(ii)	An explanation that makes reference to three of the following: • photosynthesis (1) • (sun)light (1) • many in palisade (1) • few in spongy / few in guard (cells) (1) • none in upper epidermis / root (cells) (1)		**3**

Question Number	Answer	Additional guidance	Mark
(c)	An answer that makes reference to one of the following: • protein synthesis (1) • translation (1)	Ignore makes protein / produces protein	**1**

2.3 Biological molecules

8. 4BI0_1BR_que_20170516 Q: 12

Biological washing powder contains enzymes to remove stains from clothes.

Describe an investigation to find the temperature at which biological washing powder is most effective at removing stains.

Your answer should include experimental details and be written in full sentences.

(6)

(Total for Question 12 = 6 marks)

TOTAL FOR PAPER = 120 MARKS

Answer:

Question number	Answer	Notes	Marks
	C different/range of temperatures; O same type of powder / same mass of powder / same concentration of powder / same enzymes; R repeat for each temperatures / repeat same experiment / eq; M1 measure (change in) mass of stain / colour / area / disappearance of stain / eq; M2 time stated / time taken (to disappear) / eq; S1 same mass of stain / same source of stain / same area of stain / same type of stain / same colour of stain / eq; or S2 same water / same volume of water / same washing machine / washing action / same pH / eq; or S3 same material / same shirt / same position on shirt / eq;	M1 Allow amount S marks Max 2	6 max

9. 4BI0_1B_que_20180515 Q: 7

All living cells contain enzymes.

(a) Describe the role of enzymes in cells.

(2)

.....

.....

.....

.....

(b) The table lists some enzymes, where they are produced and their function.

Complete the table by giving the missing information.

(5)

Enzyme	Where produced	Function
amylase	salivary gland	
protease		
	bacteria	cutting DNA at certain points
ligase	cell nucleus	

(c) Explain how changes in temperature affect the activity of an enzyme.

(4)

(Total for Question 7 = 11 marks)

Answer:

<table>
<tr><th>Question number</th><th>Answer</th><th>Notes</th><th>Marks</th></tr>
<tr><td>(a)</td><td>1. catalyse / speed up / increase rate / lower activation energy / eq;

2. (chemical) reactions / (metabolic) reactions;</td><td>allows reactions at lower temperature = 2

2. Ignore examples e.g, respiration / breakdown of large molecules into small molecules</td><td>2</td></tr>
<tr><td>(b)</td><td><table><tr><th>Enzyme</th><th>Where produced</th><th>Function</th></tr><tr><td>amylase</td><td>salivary gland</td><td>digest / breakdown <u>starch</u>;</td></tr><tr><td>protease</td><td>stomach / pancreas;
allow small intestine</td><td>digest / breakdown <u>proteins</u> / <u>peptides</u>;</td></tr><tr><td>restriction;</td><td>bacteria</td><td>cutting DNA at certain points</td></tr><tr><td>ligase</td><td>cell nucleus</td><td>joining DNA / genes /eq;</td></tr></table></td><td>Turns starch into maltose = 0</td><td>5</td></tr>
</table>

<table>
<tr><th>Question number</th><th>Answer</th><th>Notes</th><th>Marks</th></tr>
<tr><td>(c)</td><td>1. less (kinetic) energy at low temperatures;

2. fewer collisions / less movement at low temperatures / eq;

3. enzyme <u>denatures</u>;

4. changes <u>active site</u> / <u>eq</u>;

5. substrate can no longer bind / eq;</td><td>Allow converse for Mps 1 and 2

3. Reject denature if enzyme dies or killed

3.Ignore if linked to low temperature</td><td>max 4</td></tr>
</table>

10. 4BI0_1B_que_20190109 Q: 12

The passage describes carbohydrates used in different organisms.

Complete the passage by writing a suitable word in each blank space.

(10)

Carbohydrates contain the elements carbon, hydrogen and ..... .

Plant cell walls are made of the carbohydrate, ...

Plants store carbohydrate as starch. The starch in plant cells is ..... ,

so it has no osmotic effect on the cell. The simple test for starch is to add a few drops

of ..... solution to a sample. If the test is positive, the solution

changes colour from ..... to ..... .

The storage carbohydrate in animals is ....., which is found

mainly in the muscles and in the ..... . If the blood glucose

concentration increases then the hormone, ... , is released

by the ..... . This causes the conversion of blood glucose

into the storage carbohydrate.

(Total for Question 12 = 10 marks)

Answer:

	Answer	Notes	Marks
	1. oxygen / O_2; 2. cellulose; 3. insoluble / does not dissolve; 4. iodine / I_2 / KI / iodide; 5. brown / reddish brown / yellow / orange; 6. blue / black / blue black; 7. glycogen; 8. liver; 9. insulin; 10. pancreas;	5. Ignore red alone / brick red	10

11. 4BI1_1B_que_20190515 Q: 7

(a) A student investigates the sugar content of four different fruit juices.

This is the student's method.

- add 5 cm^3 of fruit juice to a boiling tube
- add 5 cm^3 of Benedict's solution to the boiling tube
- place the boiling tube in a water bath at 70 °C for three minutes
- remove the boiling tube and record the colour of the solution

The student uses this method for each of the four fruit juices.

The table shows the student's results.

Fruit juice	Colour of solution after heating for three minutes
A	blue
B	brick red
C	yellow
D	green

(i) Give two variables that the student controls in his investigation.

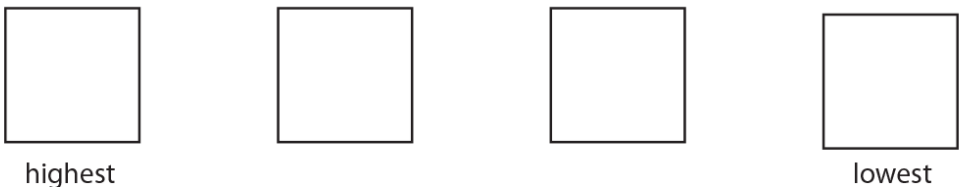
(2)

1 .....

2 .....

(ii) Give the juices A, B, C and D in order of sugar content, from highest to lowest.

(2)



(iii) The student is now given sugar solutions with concentrations of 1%, 5%, 10% and 20%.

Explain how the student could use these solutions to estimate the concentration of sugar in the four fruit juices.

(3)

(b) Some fruit juices contain high concentrations of sugar.

These fruit juices increase the number of bacteria in the mouth.

This may lead to an increase in tooth decay.

(i) Suggest why high concentrations of sugar may increase tooth decay.

(2)

(ii) Explain another health risk to children who drink fruit juices with high concentrations of sugars.

(2)

(Total for Question 7 = 11 marks)

Answer:

Question Number	Answer	Additional guidance	Mark
(a) (i)	An answer that makes reference to two of the following: • volume / 5cm^3 of fruit juice (1) • volume / 5cm^3 of Benedict's (1) • temperature / use 70°C (1) • time / for 3 minutes (1)	Ignore amount / concentration / mass	**2**

Question Number	Answer	Additional guidance	Mark
(a) (ii)	B C D A (2)	B D C A = 1	**2**

Question Number	Answer	Additional guidance	Mark
(a)(iii)	An explanation that makes reference to three of the following: • use 5cm^3 / same volume of each (sugar) solution **and** use 5cm^3 / same volume of Benedict's (1) • heat at same temperature **and** for 3 minutes / heat at 70°C **and** for 3 minutes (1) • match / compare <u>colour</u> of sugar solutions with fruit juices / eq (1)	use the original/ same method alone = 1 only if mp1 or mp2 are not awarded	**3**

Question Number	Answer	Additional guidance	Mark
(b) (i)	An answer that makes reference to two of the following: • (sugar) provides energy (1) • respiration (in bacteria) (1) • produce acid / low(ers) pH (1)	Mp1 Ignore food	**2**

Question Number	Answer	Additional guidance	Mark
(b) (ii)	An explanation that makes reference to two of the following: • develop obesity / overweight (1) • sugar provides energy / joules / calories (1) or • (type 2) diabetes (1) • increase in <u>blood</u> glucose/sugar / insulin no longer works (1) or • CVD / heart disease / stroke (1) • sugar converted to fat / fat deposits in arteries (1)	Only credit 1 health risk Can only earn 2 marks if risk and explanation are linked (from same pair) Mp4 Ignore not enough insulin	**2**

12. 4BI1_1B_que_20200305 Q: 4

Enzymes are biological molecules that act as catalysts in metabolic reactions.

(a) (i) State what is meant by the term **catalyst**.

(1)

.....

.....

(ii) State what is meant by the term **metabolic**.

(1)

.....

.....

(b) A teacher investigates the effect of enzyme concentration on the rate of a reaction.

He uses the enzyme catalase, which is found in potato.

He changes the enzyme concentration by adding different numbers of potato discs.

Catalase breaks down hydrogen peroxide solution into water and oxygen.

This is his method.

- cut same-sized discs from a potato
- put 5 cm^3 of hydrogen peroxide solution into each of five test tubes
- add a different number of potato discs to the hydrogen peroxide
- measure the volume of oxygen gas produced in three minutes

The teacher repeats each test four times for each concentration.

He then calculates the mean rate of oxygen production for each concentration.

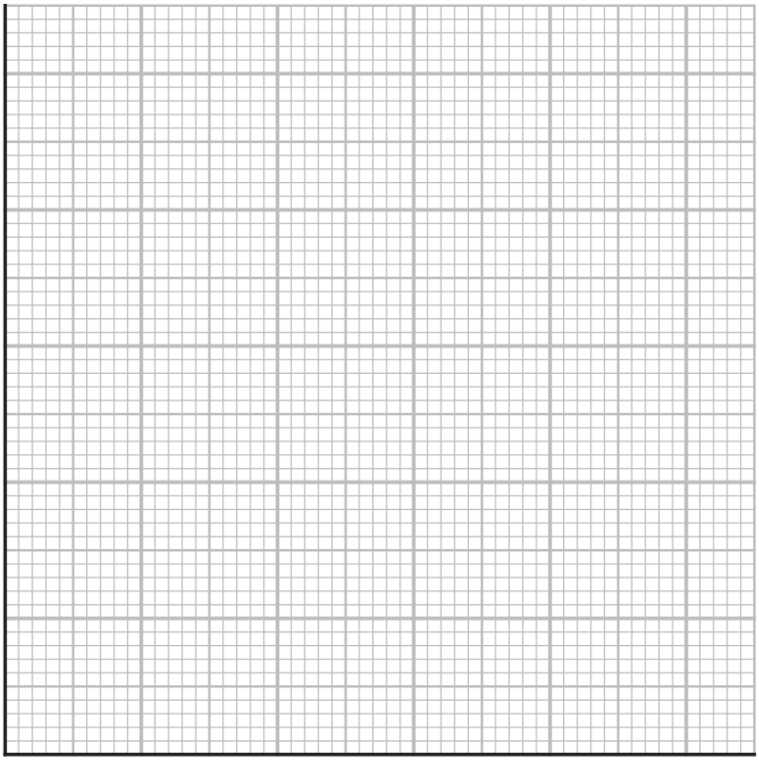
The table shows his results.

Enzyme concentration (number of potato discs)	Mean rate of oxygen production in cm^3 per minute
2	2.0
4	4.4
6	7.0
8	8.2
10	8.2

(i) Plot a line graph to show the effect of enzyme concentration on the mean rate of oxygen production.

Use a ruler to join the points with straight lines.

(5)



(ii) Explain the effect of increasing enzyme concentration on the rate of oxygen production.

(3)

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.....

(iii) Name a piece of apparatus suitable for measuring the volume of oxygen produced.

(1)

.....

.....

(iv) Explain why it is important for the teacher to keep the volume and concentration of the hydrogen peroxide constant.

(2)

.....

.....

.....

.....

(v) Name another variable the teacher should keep constant in his investigation.

(1)

.....

(Total for Question 4 = 14 marks)

Answer:

Question Number	Answer	Additional guidance	Mark
(a) (i)	• (substance that) speeds up (chemical) reactions (1)	**Allow** correct reference to activation energy **Ignore** catalyses	**1**

Question Number	Answer	Mark
(a) (ii)	• (chemical) reactions / processes in cells / cytoplasm / body /organisms (1)	**1**

Question Number	Answer	additional guidance	Mark
(b) (i)	An answer that includes: • scale linear and half of grid (1) • lines drawn neatly between points (1) • axis correct way around (1) • points correctly plotted (1) • axes labelled with (concentration in) **number of discs** (of potato) **and oxygen (production) in cm^3 min^{-1}** or **cm^3 per min** (1)	lose L if extrapolated bar charts lose L	**5**

Question Number	Answer	Additional guidance	Mark
(b) (ii)	An explanation that makes reference to the following points: • as enzyme concentration increases so does oxygen production / rate / it increases / eq (1) • up to 8 (discs) / 8.2 ($cm^3\ min^{-1}$) / levels off after / from 8 (discs) / 8.2 ($cm^3\ min^{-1}$) / eq (1) • more enzyme (molecules) available to react with / break down hydrogen peroxide / substrate / form enzyme substrate complexes / more collisions / eq (1) • until all substrate molecules / hydrogen peroxide are combined with enzyme molecules / substrate limiting (1)	must give value for discs or rate **Ignore** faster collisions	**3**

Question Number	Answer	Mark
(b) (iii)	• use (gas) syringe / (inverted) measuring cylinder / eq (1)	**1**

Question Number	Answer	additional guidance	Mark
(b) (iv)	An explanation that makes reference to the following points: • only one variable is changed / one independent variable / control variable / carry out valid experiment / produce accurate results / eq (1) • these (also) affect / change the rate (1)	**allow** make it a fair test **allow** so that they are controlled	**2**

Question Number	Answer	additional guidance	Mark
(b) (v)	• temperature / pH / type / eq of potato / eq (1)	**ignore** time	**1**