Topical Past Paper Questions Worksheets

Edexcel IGCSE (4BI1) Paper 2B

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 Biology (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: 2B
- Number of pages: 658
- Number of questions: 147

Contents

Chapter 1

Structure and functions in living organisms

1.1 Cell structure

1. 4BI1_2B_que_20211116 Q: 7

As an embryo develops, its cells differentiate.

(a) Explain the importance of cell differentiation in the development of the growing embryo.

(2)

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(b) (i) Which of these is a feature of adult stem cells?

(1)

- ☒ **A** they do not divide
- ☒ **B** they divide by meiosis
- ☒ **C** they can become all cell types
- ☒ **D** they are found in some tissues and organs

(ii) Adult stem cells or embryonic stem cells can be used in medical treatments.

Explain why the choice between these two types of stem cells can cause issues for doctors.

(2)

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(Total for Question 7 = 5 marks)

TOTAL FOR PAPER = 70 MARKS

Answer:

Question Number	Answer	Additional guidance	Mark
(a)	An explanation that makes reference to two of the following points: • (unspecialised cells) develop into specialised cells / cells with specific functions (1) • to produce tissues / organs / example of tissue or organ (1)	**Allow** examples of specific cell types e.g. muscle cells / bone cells	**2**

Question Number	Answer	Mark
(b) (i)	The only correct answer is D are found in some tissues and organs A is not correct as they can divide B is not correct as do not divide my meiosis C is not correct as cannot become all cell types	**1**

Question Number	Answer	Additional guidance	Mark
(b)(ii)	An explanation that makes reference to two of the following points: • cells from embryos can make any cell type / many more cell types / adult stem cells can become fewer cell types (1) • ethical issues about the use of embryonic cells / eq (1)	**Allow** converse for adult cells for both MPs **Allow** only stem cells that come from embryos are totipotent / eq **Allow** people object to killing embryos / embryos are potential human lives / eq **Allow** embryo cells can become tumours	**2**

1.2 Biological molecules

2. 4BI1_2B_que_20190608 Q: 3

Bags made from starch are better for the environment than plastic bags made from fossil fuels.

Bags made from starch are decomposed by microorganisms such as soil fungi.

(a) (i) Which of these is a feature of fungi?

(1)

- ☒ **A** chloroplasts in the cytoplasm
- ☒ **B** starch stored in the cytoplasm
- ☒ **C** thread-like hyphae
- ☒ **D** walls made of cellulose

(ii) The soil fungi release an enzyme called amylase that digests the bag.

What is the product of this digestion?

(1)

- ☒ **A** amino acids
- ☒ **B** fatty acids
- ☒ **C** glycerol
- ☒ **D** maltose

(iii) Amylase is a protein.

Describe how protein is made in a cell.

(5)

(b) A student investigates the effect of soil pH on the decomposition of bags made from starch.

She uses this method.

- cut two small squares from a bag
- measure the mass of each small square
- place one square in a beaker of soil with a pH of 7.0
- place the other square in a beaker of soil with a pH of 9.0
- after 10 days, remove the squares and measure their mass again

The table shows the student's results.

pH of soil	Mass of square in g		Percentage loss in mass (%)
	at start	after 10 days	
7.0	2.00	1.00	50.0
9.0	2.10	0.62	

(i) Calculate the percentage loss in mass shown by the square in pH 9.0 soil.

(1)

percentage = ...

(ii) Calculate the difference between the percentage loss in mass for the two squares.

(1)

difference = ...

(iii) Explain how the student could improve her method so that she can obtain more accurate results.

(4)

(Total for Question 3 = 13 marks)

Answer:

Question Number	Answer	Mark
(a)(i)	The only correct answer is C thread-like hyphae *A is incorrect because fungi lack chloroplasts* *B is incorrect because fungi do not store starch* *D is incorrect because fungi walls are made of chitin*	**1**

Question Number	Answer	Mark
(a)(ii)	The only correct answer is D maltose *A is incorrect because amino acids are products of protease digestion* *B is incorrect because fatty acids are products of lipase digestion* *C is incorrect because glycerol is a product of lipase digestion*	**1**

Question Number	Answer	Mark
(a)(iii)	A description that makes reference to five of the following points: • transcription / transcripts / transcribes (1) • mRNA/messenger RNA **and** leaves nucleus / mRNA/messenger RNA **and** enters cytoplasm (1) • ribosomes (1) • tRNA/transfer RNA (brings) attached amino acids (1) • codons / anticodons / complementary bases (1) • translation / translated / translates / amino acid chain / polypeptide chain (1)	**5**

Question Number	Answer	Mark
(b)(i)	70.475 to 70.5	**1**

Question Number	Answer	Additional guidance	Mark
(b)(ii)	(70.5 – 50 =) 20.5	Allow (answer from 3(b)(i) – 50) eg: 70.4 – 50 = 20.4	**1**

Question Number	Answer	Additional guidance	Mark
(b)(iii)	An answer that makes reference to four of the following points: • same surface area / mass / thickness / area / size (1) • remove soil from square (before weighing) (1) • control <u>temperature</u> / oxygen / moisture / water (1) • (soil) same mass / same amount / same volume / same type / same soil / decomposers / bacteria / fungi (1) • repeat / use more squares / obtain average / remove anomalies (1) • increase range of pH / use different pHs / more pHs (1)	Ignore more time Mp3 Ignore light / carbon dioxide Mp4 Ignore sterile soil	**4**

3. 4BI1_2B_que_20210304 Q: 6

Catalase is an enzyme found in many cells.

It speeds up the breakdown of hydrogen peroxide into water and oxygen.

The equation for the reaction is

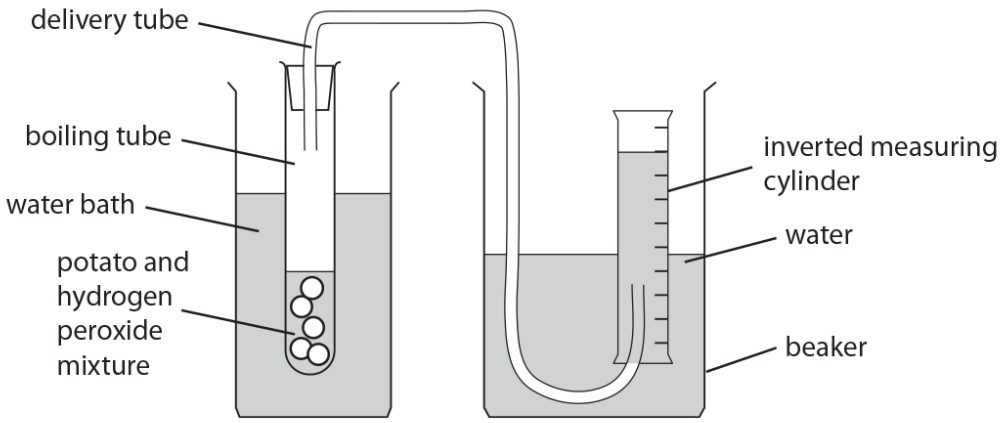
$$2H_2O_2 \rightarrow 2H_2O + O_2$$

A teacher demonstrates the effect of increasing catalase concentration on the initial rate of the reaction.

This is the teacher's method.

- cut five equal size discs from a potato, each 0.2 mm thick
- place the discs in a boiling tube with 5 cm^3 of buffer solution
- add 5 cm^3 of hydrogen peroxide solution to the boiling tube
- place a bung and delivery tube firmly into the boiling tube
- position the other end of the delivery tube under an inverted measuring cylinder
- start a timer as soon as the first bubble of oxygen enters the measuring cylinder
- measure the volume of oxygen produced in one minute

Repeat this method three times.



The teacher uses this method with different numbers of potato discs, making sure that other conditions are unchanged.

(a) Give the expected relationship between the named independent variable and the named dependent variable in this demonstration.

(2)

(b) Give **two** variables that the teacher controls in this demonstration.

(2)

1 .....

2 .....

(c) The table shows the teacher's results.

Enzyme concentration in number of discs	Volume of oxygen produced in one minute in cm^3				
	Reading 1	Reading 2	Reading 3	Reading 4	Mean reading
5	1.2	1.5	0.0	1.5	
10	3.5	4.5	6.0	5.5	4.9
15	6.5	7.0	7.5	8.0	7.3
20	9.0	8.5	8.0	7.5	8.3
25	15.0	11.0	11.5	12.0	12.4

(i) Calculate the mean volume of oxygen produced in one minute using 5 potato discs.

(2)

mean reading = ... cm^3

(ii) Calculate the percentage increase in mean volume of oxygen produced in one minute as the concentration of enzyme changes from 15 to 20 discs.

(2)

percentage increase = ... %

(iii) Explain the relationship between the concentration of enzyme and mean volume of oxygen produced in one minute.

(2)

(d) Suggest why the teacher measures the volume of oxygen after the first minute of the reaction rather than after 10 minutes.

(2)

(Total for Question 6 = 12 marks)

TOTAL FOR PAPER = 70 MARKS

Answer:

Question Number	Answer		Mark
(a)	An answer that makes reference to two of the following points: • increasing enzyme concentration increases the rate of oxygen production / eq (2) **one mark** for naming the enzyme concentration / number of potato discs as independent variable and the oxygen production as the dependent variable (1)	**Allow** increasing catalase concentration / number of potato discs increases the amount of oxygen produced / eq (2) **Max one** for correct relationship but variables named wrongly e.g. increasing potato disc number (dependent variable) increases the volume of oxygen produced (independent variable)	**2**

Question Number	Answer	Mark
(b)	An answer that makes reference to two of the following points: • pH / volume of buffer (1) • volume of hydrogen peroxide / substrate (1) • time / duration of reaction (1) • size / volume / mass / shape / surface area of each disc (1) • temperature (1)	**2**

Question Number	Answer	Additional guidance	Mark
(c) (i)	• 4.2 ÷ 3 • 1.4 (2)	Allow **one mark** for mean using all values e.g. 4.2 ÷ 4 = 1.05 or 1.1 or 1.0	**2**

Question Number	Answer	Additional guidance	Mark
(c) (ii)	• 8.3 - 7.3 ÷ 7.3 x 100 • = 13.7 (2)	**Allow one mark** for 1(.0) or (8.3 – 7.3) **Allow one mark** for ÷ by 7.3 **Allow one mark** for 0.137 **Allow** 13.6986 / 14 for 2 marks **Allow one mark** for 13.69	**2**

Question Number	Answer	Additional guidance	Mark
(c) (iii)	An explanation that makes reference to two of the following points: • increasing enzyme concentration /number of discs increases volume of oxygen produced (1) • more active sites (1) • (increase in enzyme concentration) means more collisions / more enzyme substrate complexes / more enzymes combine with substrates / eq (1)		**2**

4. 4BI1_2B_que_20220115 Q: 2

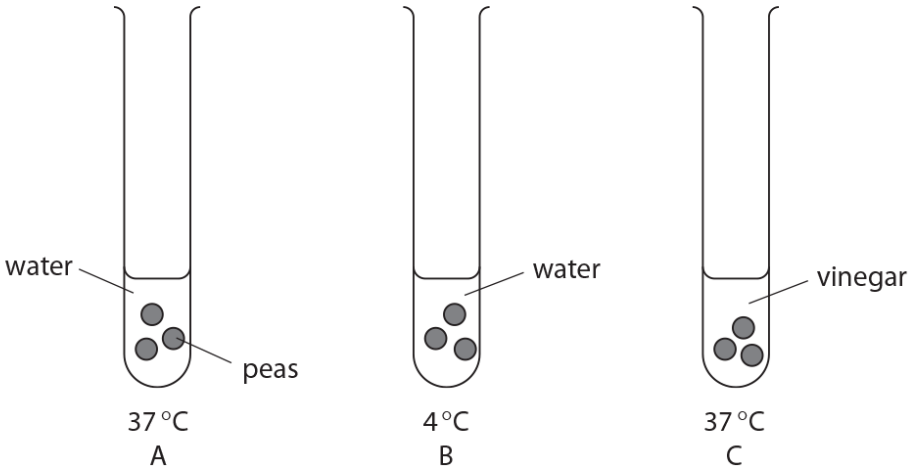
Food items can often be spoiled if saprotrophic microorganisms such as mould fungi grow on them.

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

(3)

(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)

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

(2)

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

(2)

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(Total for Question 2 = 8 marks)

Answer:

Question Number	Answer	Additional guidance	Mark
(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
(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
(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
(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**

5. 4BI1_2B_que_20220616 Q: 5

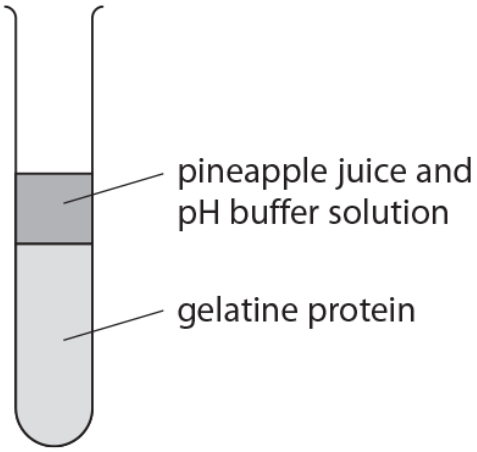
Pineapple juice contains a protease called bromelain.

A student uses this method to investigate the digestion of solid gelatine protein by bromelain.

- place solid gelatine protein into a test tube up to a height of 5 cm
- mix 5 cm^3 pineapple juice with 1 cm^3 of pH 4 buffer
- place 1 cm^3 of the pineapple juice and buffer solution on top of the gelatine
- leave for one hour in a water bath set to 37 °C
- measure the height of the solid gelatine and use it to calculate the volume of gelatine that has been digested

Repeat the method three more times.

The diagram shows part of the student's method.



(a) The table shows the student's results for the volumes of gelatine digested at pH 4.

Tube number	Volume of gelatine digested in cm^3
1	0.55
2	1.89
3	0.54
4	0.61

(i) Calculate the mean volume of gelatine digested in cm^3.

Give your answer to two decimal places.

(3)

mean volume = ... cm^3

(ii) State what substances are produced when the gelatine protein is digested.

(1)

.....

(b) The student repeats the investigation with different pH buffers.

The table shows their results.

pH	Mean volume of gelatine digested in cm^3
3	0.32
5	0.98
7	0.51
9	0.33
11	0.01

(i) Give two variables the student should control.

(2)

1 .....

2 .....

(ii) Explain the effect of changing the pH on the mean volume of gelatine digested.

(3)

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(c) Describe how to test for the presence of protein.

(2)

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(Total for Question 5 = 11 marks)

Answer:

Question Number	Answer	Additional guidance	Mark
(a)(i)	0.57 (3)	0.57 gains all **three marks** **Accept** 0.90 for **two marks** OR **Accept** 0.56 or 0.56(66666….7) or 0.56	**3**

		recurring for **two marks** **Accept** 0.9 or 0.8975 or 1.7 or ÷3 for **one mark** *Example calculation (not mark points):* *(0.55 + 0.54 + 0.61) = 1.7* *÷ 3* *to two dp* Correct answer with no working gains all three marks.	

Question Number	Answer	Additional guidance	Mark
(a)(ii)	• amino acids / peptides (1)	**Accept** polypeptide	**1**

Question Number	Answer	Additional guidance	Mark
(b)(i)	An answer that makes reference to two of the following. • temperature (1) • height / volume / mass / concentration of gelatine / protein/ eq (1) • volume / concentration, of, enzyme / bromelain / pineapple juice / eq (1) • volume of buffer (1) • time (in incubator) (1) • surface area of gelatine / SA:vol ratio / width of tube (1)	**Ignore** amount **Accept** gel for gelatine **Ignore** type / source of protein **Ignore** type / source of juice	**2**

Question Number	Answer	Additional guidance	Mark
(b)(ii)	An explanation that makes reference to three of the following. • volume digested increases up to (pH) 5 then decreases (above 5) / volume digested decreases above and below 5 / eq (1) • optimal pH / optimum pH (1) • (away from optimal pH / 5) enzyme denatures / (active site) shape changes / eq (1) • substrate no longer binds / fits / shape not complementary to substrate (1)	**Accept** rate increases up to 5 then decreases **Accept** denatures at high pH / low pH **Accept** E/S complexes do not form	**3**

Question Number	Answer	Additional guidance	Mark
(c)	A description that makes reference to the following. • add biuret (reagent) / add biuret A and biuret B / sodium hydroxide & copper sulfate (1) • turns lilac / purple / pink / mauve / eq (1)	**Accept** correct, alternative tests e.g. ninhydrin test goes red / brown xanthoproteic test goes yellow	**2**