

**2015 specification**  
first exams in 2017 (2016 for AS)

# Practice Exams for AS Edexcel Biology B

Paper 1: Core Cellular Biology and Microbiology

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# Teacher's Introduction

This pack contains **four practice paper 1s** for the **AS Edexcel Biology B** specification (2015). The papers and corresponding mark schemes in this pack are modelled on material provided by Pearson.

Paper 1 is entitled **Core Cellular Biology and Microbiology** and covers:

- Topic 1: Biological Molecules
- Topic 2: Cells, Viruses and Reproduction of Living Things

Paper 2 is entitled **Core Physiology and Ecology** and covers:

- Topic 3: Classification and Biodiversity
- Topic 4: Exchange and Transport

Questions for mock examinations and formative activities are in short supply for this pack can be used for both purposes.

Each practice paper contains a range of short- and long-answer questions, similar to a specimen paper. Papers have been designed to ensure that the mathematical skills in the new syllabus are assessed, and that short- and long-answer questions are included. Detailed mark schemes are included for each paper, but as always, teachers should use their judgement when marking students' work using these resources.

A specification analysis grid is also included, enabling teachers to identify questions for use in tests and exam-technique activities, or as homework assignments.

The author has aimed to include a spread of material from the relevant topics in order to obtain an overview of their students' knowledge and understanding for each unit.

Write-on and non-write-on versions are included in this pack.

I hope you and your students find this pack useful.

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## Specification Analysis Grid

Skill/content	1A	1B	
Carbohydrates	Q8	Q3	
Lipids	Q1	Q4	
Proteins	Q4 Q8	Q7	
DNA/protein synthesis	Q6	Q7	
Enzymes	Q4 Q8	Q9	
Ions		Q8	
Water	Q3		
Eukaryotic/prokaryotic cell structure	Q2	Q1 Q7	
Viruses	Maths questions and 1 recall Q4		
Cell division	Q9	Q2	
Animal reproduction	Q5		
Plant reproduction		Q5	
Core practical tested	Core Practical 2 Core Practical 3	Core Practical 1	Core P
% marks for practical skills	25%	35%	17
% marks for quantitative skills	23%	23%	23

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# ZigZag Practice Exams

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## AS Biology

### Core Cellular Biology and Microbiology

### Practice Paper 1B

Name

#### Time allowed

1 hour 30 minutes

#### Instructions

- Answer **all** of the questions and use the space provided.
- Use black ink. You may use an HB pencil for graphs and diagrams.
- Show your working for questions that require calculations.
- In questions marked with an asterisk (\*), marks are awarded for the quality of your written communication.

#### Information

- The total marks available for this paper is **80**.
- Use of an electronic calculator is permitted.

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# Paper 1B

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1. a) Which of the following cell structures would only be found in a plant cell?

Put a tick in the appropriate box.

- Mitochondria
- Cell wall
- Chloroplast
- Ribosomes
- Pili

b) The length of a mitochondrion was recorded as 2 micrometres (2  $\mu\text{m}$ ). Convert the length into millimetres. Write your answer in the space below.

.....

c) Describe the mitochondrial cristae and explain their role.

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2. The table below shows two cells undergoing cell division.

DNA concentration ( $\text{pg } \mu\text{l}^{-1}$ )	Time (hours)					
	1	2	3	4	5	6
Cell 1	6	12	12	12	6	6
Cell 2	6	6	6	12	12	12

a) Use the data to explain which of these cells is undergoing meiosis to form four daughter cells.

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b) i) Describe the function of meiosis.

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ii) Explain how the process of meiosis leads to the function identified in (i).

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3. Glycogen and cellulose are polysaccharides.

a) Which of the structural features below are present in both glycogen and cellulose?

Put a tick in the appropriate box.

- Alpha glucose monomer
- Have 1-4 and 1-6 glycosidic bonds
- Have 1-4 glycosidic bonds formed by condensation
- Alternate monomers are inverted

b) Explain three ways in which the properties of glycogen make it suitable for its function.

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c) Describe the structure of cellulose and explain why it is able to provide structural support to plant cells.

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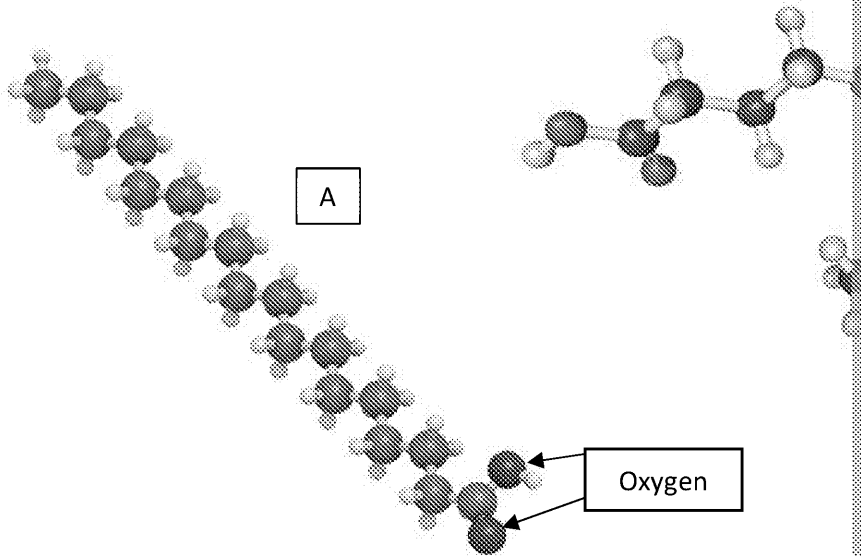
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4. a) The diagram below shows a saturated and an unsaturated fatty acid. Identify each clearly on the dotted lines provided underneath. Use your choices.

**Key:**  
 Grey = carbon  
 White = hydrogen



The grey molecules are carbons, the white molecules are hydrogens.

A is ..... because .....

.....

B is ..... because .....

.....

- b) Saturated fatty acids combine with lipoproteins to make LDLs (incorrect) whereas unsaturated fatty acids combine with lipoproteins to make HDL. 4:1 total cholesterol: HDL has been linked to a lower incidence of coron below shows the mean concentration of HDL, LDL and total cholesterol group of 40-year-old women and men.

Concentration mmol L <sup>-1</sup>	Women	Men
HDL	1.8	0.9
LDL	3.0	4.5
Total cholesterol	6.0	4.5

- i) Calculate the ratio of total cholesterol to HDL for both groups.

Ratio for women = ..... Ratio for men = .....

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ii) Calculate the percentage difference between LDL concentration in

Percentage increase =

iii) Use the information supplied and the data to explain which group

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5. a) Tick the appropriate box to indicate if, in angiosperms, the **anther**:
- is the site of female gamete synthesis
  - is sticky, to receive pollen from a male flower
  - is the site of male gametogenesis
  - is brightly coloured to attract insects

- b) Tick the appropriate box to indicate if, in angiosperms, the **stigma**:
- is the site of female gametogenesis
  - is sticky to receive pollen from a male flower
  - is the site of male gametogenesis
  - is brightly coloured to attract insects

- c) Tick the appropriate box to indicate if, after fertilisation, the **ovary** of a
- the seed coat
  - the embryo plant
  - the seed food store
  - the fruit

d) Compare fertilisation in angiosperms with human fertilisation.

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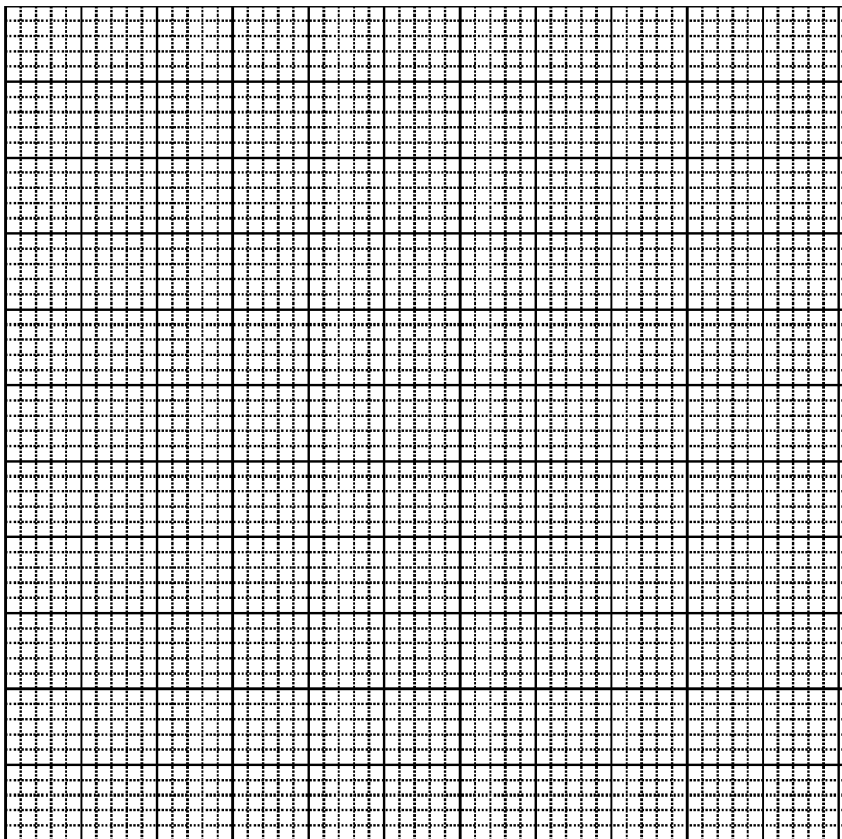
6. The HIV virus infects T helper (Th) cells in the human immune system. Unless using antiviral therapy, Th cell number declines linearly over a number of years. Without antiviral therapy, patients with HIV can no longer mount an effective immune response. In the absence of treatment, the number of Th cells in  $\text{mm}^{-3}$  of blood, patients can no longer mount an effective immune response.

Patient X was diagnosed with HIV in 1988 and in 1989 they had 650 Th cells  $\text{mm}^{-3}$  of blood. In 2003, 15 years later, their T helper count was 10 Th cells  $\text{mm}^{-3}$ .

a) i) Use the equation  $y = mx + c$  to calculate the time in years and months it took Patient X to develop AIDS.

Time taken =

ii) Plot the graph on the grid provided. Use it to calculate the number of Th cells in blood four years after data collection started.



b) Explain why it is not accurate to regress the line to establish a patient's

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7. *Yersinia pestis* bacteria cause bubonic and pneumonic plague. Although rare, they occur in developing countries. Recently, researchers have discovered that the toxin designated Pla, transforms *Yersinia pestis* from a mild gastrointestinal pathogen to one responsible for pneumonic plague. A single base change in the Pla gene gives it the ability to invade the lymph nodes and spread throughout the body to cause plague.

a) Name the process that causes a single base change in DNA.

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b) The sequence below shows a section of the primary protein sequence of the Pla protein: Met – Arg – Cys

i) Define the term 'primary sequence'.

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ii) Use the mRNA codon table below to determine the DNA sequence of the Pla protein.

Amino Acid	mRNA Codons	DNA Sequence
Met	AUG	
Arg	AGG	
Cys	UGC	

iii) Calculate the percentage of cytosine present in this double-stranded DNA genome.

Percentage increase =

iv) The Pla gene codes for a globular protein on the surface of the *Yersinia pestis* bacterium. This protein allows the bacteria to bind to specific cells in the host's respiratory tract, causing pneumonia.

Using your knowledge of DNA and protein structure, explain how a mutation in the Pla gene, might give *Yersinia pestis* the ability to spread into the lymph nodes.

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c) *Yersinia pestis* is a Gram negative rod-shaped bacterium.

Describe the structure of Gram negative bacteria and explain why *Yersinia* is resistant to some antibiotics.

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8. a) Which of the following minerals is a key component of proteins and nucleic acids? Tick the appropriate row in the table.

Phosphate	
Nitrate	
Calcium	
Magnesium	

A student investigated the growth of a plant in the presence and absence of nitrate. The sterile nutrient agar, with and without nitrate. The sterile medium contained the same concentrations for growth. Plants were watered daily.

The student measured stem length (mm) at daily intervals. She predicted that plants grown without nitrate would have shorter stems than those grown with nitrate.

b) Using your biological knowledge, explain why she predicted that plants grown without nitrate would have shorter stems.

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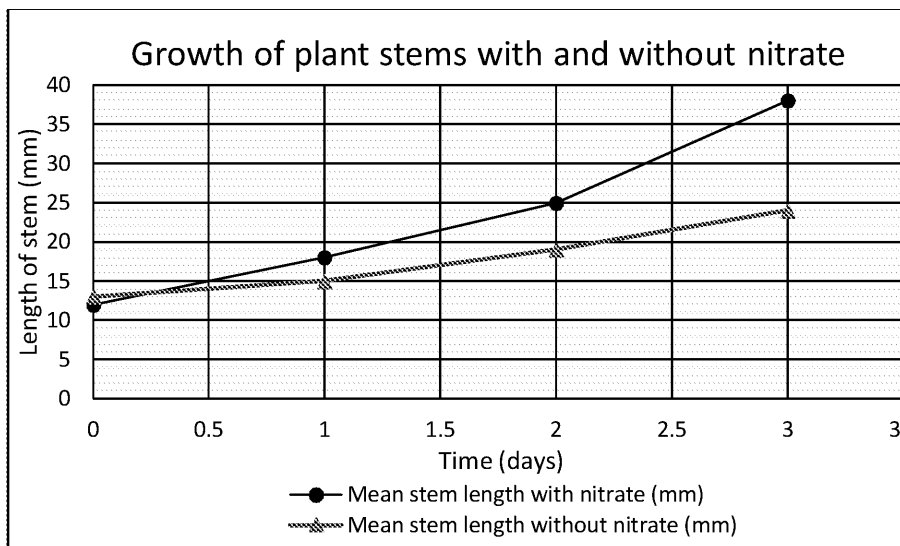
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She obtained the results shown below.



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- c) Calculate the average rate of growth for plants grown in the presence of a concentration of 0.1 mg dm<sup>-3</sup>. Give your answer to the nearest whole mm.

Average rate of growth =

- d) The student decided to adapt her experiment to investigate the effect of concentration on the rate of plant stem growth.

Describe the method she might use, clearly identifying her independent variable and the variables she should control.

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- e) Predict how eliminating magnesium from the growth medium would affect the rate of plant stem growth. Use your scientific knowledge to explain your reasoning.

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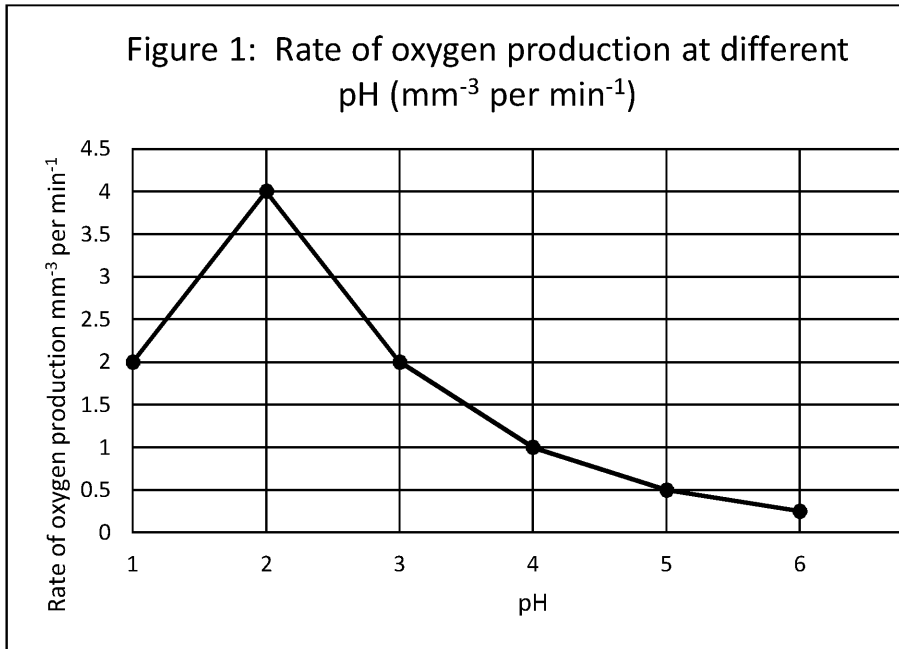
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9. Hydrogen peroxide is a toxic by-product of aerobic respiration. The enzyme catalase breaks hydrogen peroxide into oxygen and water, and oxygen volume can be monitored to indicate the rate of reaction. Figure 1 shows the initial rate of oxygen production  $\text{mm}^{-3}$  per  $\text{min}^{-1}$  by catalase at different pH values using 5 vols of hydrogen peroxide.



- a) Identify the optimum pH for the catalase enzyme
- .....
- b) The catalase used in this experiment was extracted from a species of liver. Use the information provided and your biological knowledge to explain

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- c) A student decided to repeat the experiment using sheep liver as a source of catalase in buffers at pH 4, 5, 6, 7, 8 and 9 to release the catalase. He used the volume of oxygen produced every 30 seconds for two minutes.

Predict the results that you would expect. Use your biological knowledge.

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- d) Using the information supplied, and your biological knowledge, describe how you would investigate the effect of increasing hydrogen peroxide concentration on the breakdown by catalase in sheep liver.

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# ZigZag Practice Exams

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## AS Biology

### Core Cellular Biology and Microbiology

### Practice Paper 1B

Name

#### Time allowed

1 hour 30 minutes

#### Instructions

- Answer **all** of the questions and use the space provided.
- Use black ink. You may use an HB pencil for graphs and diagrams.
- Show your working for questions that require calculations.
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#### Information

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- Use of an electronic calculator is permitted.

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# Paper 1B

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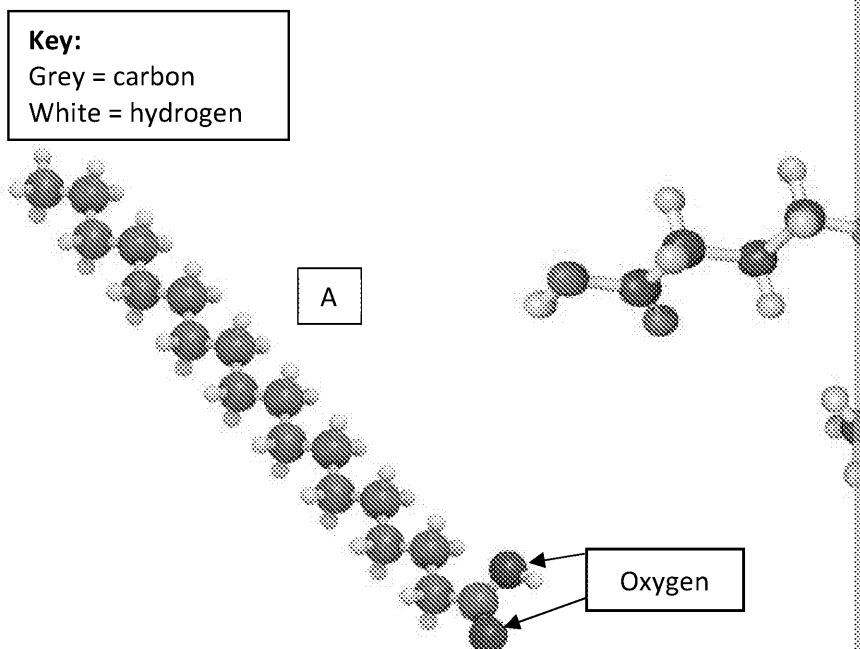
1. a) Which of the following cell structures would only be found in a plant cell?  
*Mitochondria*      *Cell wall*      *Chloroplast*  
*Ribosomes*      *Pili*
- b) The length of a mitochondrion was recorded as 2 micrometres (2  $\mu\text{m}$ ).  
 Convert the length into millimetres.
- c) Describe the mitochondrial cristae and explain their role.

2. The table below shows two cells undergoing cell division.

DNA concentration ( $\mu\text{g } \mu\text{l}^{-1}$ )	Time (hours)					
	1	2	3	4	5	
Cell 1	6	12	12	12	6	
Cell 2	6	6	6	12	12	

- a) Use the data to explain which of these cells is undergoing meiosis to form four daughter cells.
- b) i) Describe the function of meiosis.  
 ii) Explain how the process of meiosis leads to the function identified in b) i).
3. Glycogen and cellulose are polysaccharides.
- a) Which of the structural features below are present in both glycogen and cellulose?  
*Alpha glucose monomer*      *Have 1-4 glycosidic bonds*  
*Have 1-4 glycosidic bonds formed by condensation*      *Alternate monomers*
- b) Explain three ways in which the properties of glycogen make it suitable for storage in liver cells.
- c) Describe the structure of cellulose and explain why it is able to provide structural support in plant cells.

4. a) The diagram below shows a saturated and an unsaturated fatty acid.  
 Identify A and B. Use your biological knowledge to explain your choice.



The grey molecules are carbons, the white molecules are hydrogens.

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- b) Saturated fatty acids combine with lipoproteins to make LDLs (incorrect) whereas unsaturated fatty acids combine with lipoproteins to make HDL. A 4:1 total cholesterol: HDL has been linked to a lower incidence of coronary heart disease. The table below shows the mean concentration of HDL, LDL and total cholesterol in a group of 40-year-old women and men.

Concentration mmol L <sup>-1</sup>	Women	Men
HDL	1.8	0.9
LDL	3.0	4.5
Total cholesterol	6.0	4.5

- i) Calculate the ratio of total cholesterol to HDL for both groups.
- ii) Calculate the percentage difference between LDL concentration in women and men.
- iii) Use the information supplied and the data to explain which group has a higher risk of coronary heart disease.
5. a) Select the correct answer. In angiosperms, the **anther**...:  
*is the site of female gamete synthesis*                      *is sticky, to receive pollen*  
*is the site of male gametogenesis*                      *is brightly coloured to attract insects*
- b) Select the correct answer. In angiosperms, the **stigma**...:  
*is the site of female gametogenesis*                      *is sticky to receive pollen*  
*is the site of male gametogenesis*                      *is brightly coloured to attract insects*
- c) Select the correct answer. After fertilisation, the **ovary** of angiosperms develops into...:  
*the seed coat*                      *the embryo plant*  
*the seed food store*                      *the fruit*
- d) Compare fertilisation in angiosperms with human fertilisation.
6. The HIV virus infects T helper (Th) cells in the human immune system. Unless using antiviral therapy, Th cell number declines linearly over a number of years. In a group of 1000 Th cells mm<sup>-3</sup> of blood, patients can no longer mount an effective immune response. Patient X was diagnosed with HIV in 1988 and in 1989 they had 650 Th cells mm<sup>-3</sup>. They died 15 years later, their T helper count was 10 Th cells mm<sup>-3</sup>.
- a) i) Use the equation  $y = mx + c$  to calculate the time in years and months it took Patient X to develop AIDS.
- ii) Plot the graph on a sheet of graph paper. Use it to calculate the number of Th cells in patient X's blood four years after data collection started.
- b) Explain why it is not accurate to regress the line to establish a patient's life expectancy.
7. *Yersinia pestis* bacteria cause bubonic and pneumonic plague. Although rare, they do occur in developing countries. Recently, researchers have discovered that the toxin designated Pla, transforms *Yersinia pestis* from a mild gastrointestinal pathogen to one responsible for pneumonic plague. A single base change in the Pla gene gives it the ability to invade the lymph nodes and spread throughout the body to cause disease.
- a) Name the process that causes a single base change in DNA.
- b) The sequence below shows a section of the primary protein sequence of Pla:  
 Met – Arg – Cys

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- i) Define the term 'primary sequence'.
- ii) Copy the mRNA codon table below and use it to determine the DNA sequence of the Pla gene.

Amino Acid	mRNA codons	DNA
Met	AUG	
Arg	AGG	
Cys	UGC	

- iii) Calculate the percentage of cytosine present in this double-strand genome.
- iv) The Pla gene codes for a globular protein on the surface of the *Yersinia pestis*. This protein allows the bacteria to bind to specific cells in the host's respiratory tract, causing pneumonia.

Using your knowledge of DNA and protein structure, explain how the Pla gene, might give *Yersinia pestis* the ability to spread into the lymph nodes.

- c) *Yersinia pestis* is a Gram negative rod-shaped bacterium. Describe the structure of Gram negative bacteria and explain why *Yersinia pestis* is resistant to some antibiotics.

- 8. a) Which of the following minerals is a key component of proteins and nucleic acids?
 

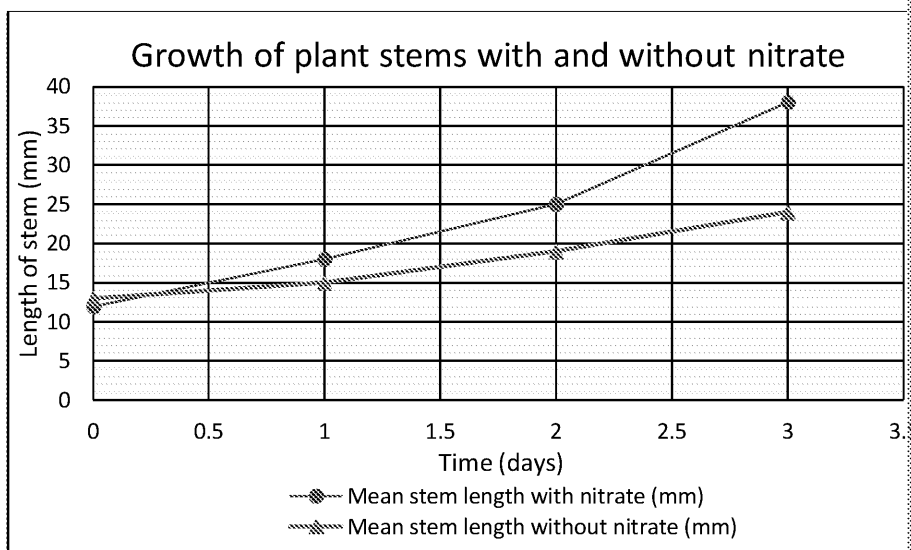
Phosphate	Nitrate
Calcium	Magnesium

A student investigated the growth of a plant in the presence and absence of nitrate. The sterile nutrient agar, with and without nitrate. The sterile medium contained the same concentrations for growth. Plants were watered daily.

The student measured stem length (mm) at daily intervals. She predicted that plants grown without nitrate would have shorter stems than those grown with nitrate.

- b) Using your biological knowledge, explain why she predicted that plants grown without nitrate would have shorter stems.

She obtained the results shown below.



- c) Calculate the average rate of growth for plants grown in the presence of nitrate. Give your answer to the nearest whole mm.

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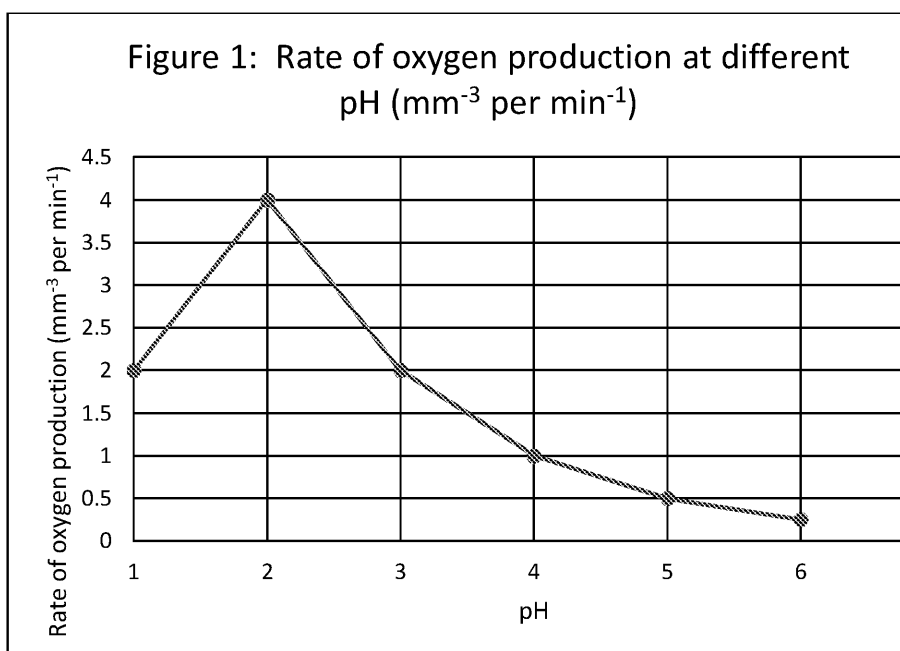
- d) The student decided to adapt her experiment to investigate the effect of concentration on the rate of plant stem growth.

Describe the method she might use, clearly identifying her independent and the variables she should control.

- e) Predict how eliminating magnesium from the growth medium would affect your scientific knowledge to explain your reasoning.

9. Hydrogen peroxide is a toxic by-product of aerobic respiration. The enzyme catalase breaks hydrogen peroxide into oxygen and water, and oxygen volume can be monitored to investigate the rate of reaction.

Figure 1 shows the initial rate of oxygen production  $\text{mm}^3 \text{ per min}^{-1}$  by catalase at different pH values using 5 vols of hydrogen peroxide.



- a) Identify the optimum pH for the catalase enzyme
- b) The catalase used in this experiment was extracted from a species of liver. Use the information provided and your biological knowledge to explain the results.
- c) A student decided to repeat the experiment using sheep liver as a source of catalase. He used buffers at pH 4, 5, 6, 7, 8 and 9 to release the catalase. He used 5 vols of hydrogen peroxide and measured the volume of oxygen produced every 30 seconds for two minutes. Predict the results that you would expect. Use your biological knowledge to explain your answer.
- d) Using the information supplied, and your biological knowledge, describe how you would design an experiment to investigate the effect of increasing hydrogen peroxide concentration on the rate of reaction of catalase in sheep liver.

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## **Preview of Questions Ends Here**

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This is a limited inspection copy. Sample of questions ends here to avoid students previewing questions before they are set. See contents page for details of the rest of the resource.

## Practice Paper 1A

Question number	Acceptable answer	
1(a)	Glycerol	
1(b)	Ester	
1(c)	<ul style="list-style-type: none"> <li>Phosphate group replaces fatty acid</li> <li>Forms phospholipid bilayer</li> </ul>	
2(a)	Golgi / rer / ser / lysosomes / nucleolus / ribosomes / mitochondria	1 p struc  NO
2(b)(i)	Length of 1 epu = 0.025 mm. Cell diameter measures 55 epu and so the actual cell is 0.025 mm x 55 epu = 1.375mm	1 p ans
2(b)(ii)	Magnification = drawing diameter measurement / actual cell diameter = 120 mm / 13.75 mm = 8.73 x magnification	1 p ans
2(c)	No membrane-bound organelles / pili / capsule plasmid / single free floating chromosome / cell wall	Any rel
2(d)	<ul style="list-style-type: none"> <li>Contains DNA which codes for proteins;</li> <li>And proteins control / complete cell activities</li> </ul>	
3(a)(i)	Dipolar	
3(a)(ii)	Hydrogen atoms labelled and positive charge indicated + oxygen atom labelled and negative charge indicated + hydrogen bond labelled	
3(b)	<ul style="list-style-type: none"> <li>High surface tension due to hydrogen bonds joining water molecules / cohesion;</li> <li>High specific heat capacity due to hydrogen bonds / large quantity of energy required to heat;</li> <li>Cohesion through water molecules makes water form a continuous column / mass flow;</li> <li>High latent heat of evaporation due to hydrogen bonds / water needs a lot of energy to evaporate;</li> <li>Dipole due to positive and negative charges;</li> <li>Adhesion due to hydrogen bond formation with xylem aids transpiration;</li> <li>Solvent (or explained in terms of dissolving polar molecules);</li> <li>Incompressible</li> </ul>	Any  Not sol pol
4(a)	<ul style="list-style-type: none"> <li>Have two or more different polypeptide chains;</li> <li>Polypeptide chains in tertiary structure / sometimes non-protein groups / relevant example described, e.g. haemoglobin</li> </ul>	Bot
4(b)(i)	Similar shape to substrate / complementary to active site;	
4(b)(ii)	<ul style="list-style-type: none"> <li>Binds to active site / blocks active site;</li> <li>Prevents substrate binding / fewer ES complexes;</li> <li>Fewer products</li> </ul>	All
4(c)	<ul style="list-style-type: none"> <li>Viruses are inside host cells so the drug might be toxic to host cells;</li> <li>Host cells will have DNA polymerases and the drug may affect these;</li> <li>Side effects may result due to lack of host DNA replication;</li> <li>Side effects may result from reduced cell division / damaged cells not replaced</li> </ul>	Any
5(a)(i)	Primary oocyte	
5(a)(ii)	Secondary oocyte	
5(b)	<ul style="list-style-type: none"> <li>Mitosis;</li> <li>to produce large numbers of precursor cells prior to meiosis / so large numbers of gametes can be produced</li> </ul>	

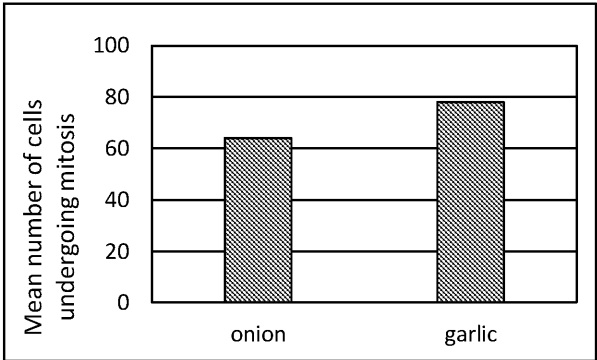
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Question number	Acceptable answer
5(c)	<ul style="list-style-type: none"> <li>• Spermatogenesis starts at puberty, whereas oogenesis starts before birth;</li> <li>• Spermatogenesis does not halt, whereas oogenesis arrested until puberty / until fertilisation / correct stages of meiosis identified;</li> <li>• Many gametes produced by spermatogenesis, whereas oogenesis produces one gamete;</li> <li>• No polar bodies from spermatogenesis, whereas oogenesis produces polar bodies;</li> <li>• Oogenesis is cyclical / regulated by hormones, whereas spermatogenesis is a continuous process;</li> <li>• The last meiotic division in oogenesis occurs at fertilisation, whereas the last division in spermatogenesis generates functional <u>spermatids</u> that mature into sperm</li> </ul>
5(d)	Crossing over / independent assortment
6(a)	<ul style="list-style-type: none"> <li>• Three bases / triplet code for each specific amino acid;</li> <li>• Gene is sequence of bases coding for the order of amino acids in a polypeptide / the primary polypeptide sequence;</li> <li>• Transcribed to mRNA by RNA polymerase, with reference to complementary base pairing and the transcription of only the template strand;</li> <li>• Translated by ribosome;</li> <li>• Role of tRNA to include anticodon-codon interaction and the fact that tRNA brings 1 <u>specific</u> amino acid;</li> <li>• Peptide bond between amino acids</li> </ul>
6(bi)	$3.15 \times 10^7 / 7.50$ $1.60 \times 10^6 / 6.20$
6(bii)	$x1 - x2 = 2.99 \times 10^7$ $s1 \text{ squared} / n1 = 1.07 \times 10^{11} / 3 = 3.58 \times 10^{10}$ $s2 \text{ squared} / n2 = 2.30 \times 10^8 / 3 = 7.66 \times 10^7$ $\text{sum} = 3.59 \times 10^{10}$ square root = $1.89 \times 10^5$ $x1 - x2 / 1.89 \times 10^5 = 158.20$
6(b)(iii)	<ul style="list-style-type: none"> <li>• The t-value is far greater than the critical value for 95% confidence level of 4.303;</li> <li>• As a consequence there is greater than 95% probability that the viral RNA number in patients who died from Ebola is significantly higher than the number in patients who survived the disease</li> </ul>
6 (b)(iv)	<ul style="list-style-type: none"> <li>• This may be due to the immune system in those who die failing to control infected cells</li> </ul>
7(a)	<ul style="list-style-type: none"> <li>• Tertiary structure;</li> <li>• Polypeptide folded;</li> <li>• Due to bonds between amino acids;</li> <li>• Giving a specific 3-D shape</li> </ul>
7(b)	<ul style="list-style-type: none"> <li>• Globular form specific 3-D shape, whereas fibrous wind together to form rope like structures;</li> <li>• Globular form tertiary and quaternary structures, whereas fibrous remain in secondary;</li> <li>• Disulphide bridges in globular;</li> <li>• Both have hydrogen bonds</li> </ul>
8(a)(i)	Hexose
8(a)(ii)	$110 - 74 = 36 / 74 = 48.64\%$ increase
8(a)(iii)	H and OH on carbon 1 inverted
8(b)(i)	Species B
8(b)(ii)	<ul style="list-style-type: none"> <li>• 0.7 increase in absorbance over 20 mins</li> <li>• = <math>0.7 / 20 = 0.035 \text{ abs units min}^{-1}</math></li> </ul>

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Question number	Acceptable answer						
8(b)(iii)	<ul style="list-style-type: none"> <li>At 20 mins species B has an initial rate of <math>0.7 \text{ abs unit min}^{-1}</math></li> <li>Whereas species A is only 0.26</li> <li><math>0.7 - 0.26 = (0.44/0.26) \times 100 = 169.23\%</math> faster with species B than species A</li> </ul>						
8(c)	<ul style="list-style-type: none"> <li>Species B has the fastest initial rate but rate plateaus rapidly, which suggests glucose isomerase active sites become saturated rapidly / substrate concentration limiting</li> <li>Suggests a lower concentration of glucose isomerase produced by species B;</li> <li>No plateau for species C suggests higher concentration of glucose isomerase present / less saturation of active sites;</li> <li>Indicates species C produces higher concentrations of glucose isomerase / more enzyme can be extracted from species C, giving higher fructose yield.</li> </ul>						
9(a)	<ul style="list-style-type: none"> <li>Interphase is when protein synthesis occurs</li> <li>Cell carries out function during G1</li> <li>Relevant example</li> <li>DNA synthesis during S phase</li> <li>Organelle replication</li> <li>Checkpoints at G2</li> </ul>						
9(b)(i)	Onion = $64/111 \times 100 = 57.65\%$ garlic 78 cells/148 total cells = 52.7%						
9(b)(ii)	<ul style="list-style-type: none"> <li>Bar chart of means plotted as shown below;</li> <li>Range for total cells undergoing mitosis calculated. Maximum cells undergoing mitosis in onion repeats is 130 cells and the minimum is 56, so the range is 74. Similarly with garlic the highest number of cells in repeats undergoing mitosis is 83 and the lowest is 72, so the range is 11.</li> </ul>  <table border="1"> <caption>Mean number of cells undergoing mitosis</caption> <thead> <tr> <th>Species</th> <th>Mean number of cells</th> </tr> </thead> <tbody> <tr> <td>onion</td> <td>64</td> </tr> <tr> <td>garlic</td> <td>78</td> </tr> </tbody> </table>	Species	Mean number of cells	onion	64	garlic	78
Species	Mean number of cells						
onion	64						
garlic	78						

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Question number	Acceptable answer
9(b)(iii)	<ul style="list-style-type: none"> <li>• Onion cells have 4.95% more cells in pmat than garlic;</li> <li>• But onion cell ranges are large;</li> <li>• For example, 27-14 cells in onion metaphase gives a range of 13 cells;</li> <li>• Number of cells in each stage quite spread, reducing validity of conclusion;</li> <li>• Range bars for onion cells could overlap;</li> <li>• Only one root used from each plant;</li> <li>• Only three fields of view counted, so many cells would be missed / sample size small;</li> <li>• No reference to conditions of plant growth that could have affected mitosis / named factors;</li> <li>• Validity of conclusion questionable</li> </ul>

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## **Preview of Answers Ends Here**

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