

# Practice Exams for AS OCR Biology A

## Paper 1

Update v1.3, May 2024

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# Teacher's Introduction

This pack contains **four practice Paper 1s** for the OCR AS Biology A syllabus.

The AS Level consists of two papers, both of 1 hour 30 minutes duration and both worth 70 marks.

Paper 1 is entitled **Breadth in Biology** and has 20 multiple-choice questions along with short-answer questions.

Paper 2 covers **Depth in Biology** and comprises short- and long-answer questions. Students will also be tested on their quality of written communication in Paper 2.

A specification grid and mark schemes have been provided with the papers, and this resource has been designed to reflect the new syllabus and sample assessment materials as closely as possible. Each topic has been covered, more than once where possible, and all new entries to the syllabus are included within the pack. With the government's focus on improving mathematical and practical skills, I hope that you and your students find the content of these papers both challenging and helpful.

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

Enjoy!

April 2016

#### Update v1.1, 25 April 2016

Title corrected in the footer of the resource.

#### Update v1.2, 23 May 2016

Update to the answers for Paper 1C Question 7 on pages 31 and 77.

Update to the answers for Paper 1D Question 12 on pages 49 and 89.

#### Update v1.3, 28 May 2024

*Changes have been made to reflect the 2023 accessibility and clarity amendments to the specification:*

Update to Paper 1B Question 1 on pages 16 and 68 to remove LSCMs.

Update to Paper 1B Question 8 on pages 18 and 69 to correct notation of  $R_r$ .

Update to Paper 1C Question 8 on pages 31 and 77 to remove trypsin.

Update to Paper 1C Question 11 on pages 32 and 78 to remove vacuolar pathway.

Update to Paper 1C Question 12 on pages 33, 78 and 102 to remove lupus and multiple sclerosis

Update to Paper 1C Question 22 c) on pages 39, 82 and 104 to replace question parts on copper ions and anions/cations, and restructure question.

Paper 1C Question 22 d) on biosensors removed, and update to Question 23 on pages 39, 82 and 104 to add two extra marks.

Update to Paper 1D Question 21 on pages 51-53, 91-92 and 106-107 to remove part c) on MRSA and add an extra mark for each of parts a) iii) and b) ii)

## Free Updates!

Register your email address to receive any future free updates\* made to this resource or other Biology resources your school has purchased, and details of any promotions for your subject.

*\* resulting from minor specification changes, suggestions from teachers and peer reviews, or occasional errors reported by customers*

Go to [zzed.uk/freeupdates](https://www.zzed.uk/freeupdates)

# Specification Cross-Referencing Table

Section A (MCQs) (Question numbers not underlined) Section B: (Question numbers underlined)

	Practice Exam Papers for AS OCR Biology A							
	Paper 1s				Paper 2s (available separately)			
	Paper 1A	Paper 1B	Paper 1C	Paper 1D	Paper 2A	Paper 2B	Paper 2C	Paper 2D
<b>1 Development of Practical Skills in Biology</b>								
1.1.1 Planning	<u>23</u>	<u>22</u>	<u>22, 23</u>	<u>22</u>	1	2	2, 3	4
1.1.2 Implementing	4, <u>23</u>	1, 8, <u>22</u>	7, <u>23</u>	<u>21, 22</u>	1,2	3	2	1, 2, 4
1.1.3 Analysis	<u>21, 23</u>	5, 16, 20	<u>22, 23</u>	9, <u>21, 22, 24</u>	1,2	2	4	4
1.1.4 Evaluation	5, <u>21, 23</u>	7, 17, <u>22, 23</u>	<u>22</u>	<u>21, 22</u>	2	2	3	
<b>2 Foundations in Biology</b>								
2.1.1 Cell Structure	1, 3, 4, 7, 17	1, 3, 10, 15, <u>21</u>	2	18, 21		1	4	1
2.1.2 Biological Molecules	8, 10	6, 8, <u>21</u>	7, 13	1, 2, 14	2	2, 4	4	
2.1.3 Nucleotides and Nucleic Acids	9, 11, 18	9, <u>23</u>	3	5, 8			1	
2.1.4 Enzymes	6	7	8, <u>22</u>	13	2		4	
2.1.5 Biological Membranes	2	2, 17, <u>22</u>	4, 20, <u>22</u>	3, <u>22</u>	1	1		
2.1.6 Cell Division, Diversity and Organisation		18, <u>21, 23</u>	1, 9, 14, 19	10	3			
<b>3 Exchange and Transport</b>								
3.1.1 Exchange Surfaces	19	4	<u>24</u>	4, 9, 12		1, 3	3	3, 5
3.1.2 Transport in Animals	16, 20, <u>24</u>	11	6, 10, 15, <u>21</u>	7, 20			3	5
3.1.3 Transport in Plants	13, 15	5, 16	11, 17, <u>23</u>	6, 17, 19		5	2	
<b>4 Biodiversity, Evolution and Disease</b>								
4.1.1 Communicable Diseases, Disease Prevention and the Immune System	5, 21	12	12	15, 21	1			6
4.1.2 Biodiversity	12, 14, 23	14	16	16, 24	4			2, 4
4.1.3 Evolution and Classification	<u>22</u>	13, 19	5, 18, <u>24</u>	11, <u>21, 23</u>				2, 6
<b>TOTAL marks for quantitative skills (Target = 10%)</b>	<b>11 (16%)</b>	<b>12 (17%)</b>	<b>15 (21%)</b>	<b>8 (11%)</b>	<b>8 (11%)</b>	<b>9 (13%)</b>	<b>5 (7%)</b>	<b>14 (20%)</b>
<b>TOTAL marks for practical skills (Target = 15%)</b>	<b>21 (30%)</b>	<b>23 (33%)</b>	<b>27 (39%)</b>	<b>20 (29%)</b>	<b>21 (30%)</b>	<b>27 (39%)</b>	<b>17 (24%)</b>	<b>27 (39%)</b>

### AS Biology

#### Breadth in Biology

#### Practice Paper 1A



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.

#### Information

The total marks available for this paper is **70**.

Use of an electronic calculator is **permitted**.



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## Section A

You should spend a maximum of 25 minutes on this section.  
Answer **all** the questions by writing A, B, C or D in the boxes.

1. Three different types of cell are listed in the table below.

Select the row that shows the correct features for each type of cell.

Type of cell and its features		
	Prokaryotic Cell	Eukaryotic Animal Cell
<b>A</b>	ribosomes are 18 nm, does not have a cell wall	ribosomes are 18 nm, has a cell wall
<b>B</b>	ribosomes are 22 nm, does not have a cell wall	ribosomes are 22 nm, has a cell wall
<b>C</b>	ribosomes are 22 nm, has a cell wall	ribosomes are 18 nm, does not have a cell wall
<b>D</b>	ribosomes are 18 nm, has a cell wall	ribosomes are 22 nm, does not have a cell wall

Your answer

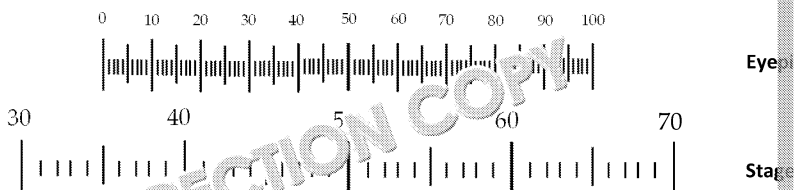
2. A red blood cell is placed in a hypotonic solution. What will happen to the cell?
- A Water will leave the cell and it will become flaccid
  - B Water will enter the cell and it will become turgid and burst
  - C Water will enter the cell and lysis will occur
  - D Incipient plasmolysis will occur

Your answer

3. Erythrocytes have a life span of approximately 120 days. From what cells and where are new erythrocytes produced?
- A Kupffer cells in the liver
  - B Stem cells in the bone marrow
  - C Lymphocytes in the bone marrow
  - D Stem cells in the spleen

Your answer

4. The image below shows a stage micrometer and eyepiece graticule. Each division on the stage micrometer scale measures 0.1 mm.



Select the value which shows the correct value of one eyepiece graticule division.

- A 0.1 mm
- B 3.0  $\mu\text{m}$
- C 30  $\mu\text{m}$
- D 30 nm

Your answer

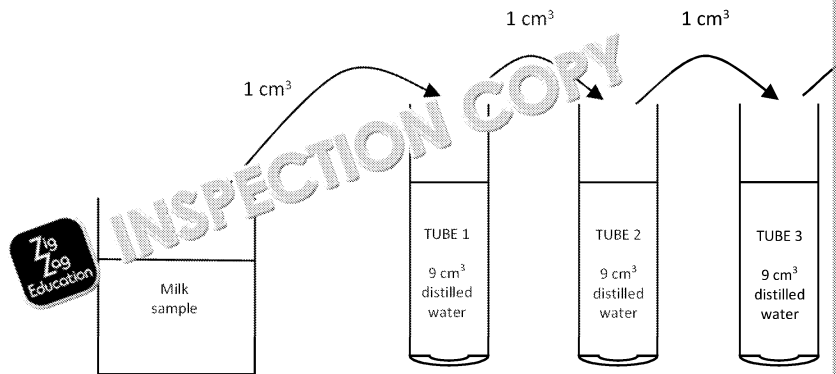
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5. Manufacturers of pasteurised milk regularly test samples of their products to see if the number of bacteria within the milk do not exceed a specified value.

A serial dilution was carried out on a milk sample as illustrated in the diagram.



If  $1 \text{ cm}^3$  of the original milk sample contained 60,000 bacteria, how many bacteria would be present in  $0.5 \text{ cm}^3$  of a sample from tube 4?

- A 6
- B 60
- C 30
- D 3

Your answer

6. Ritonavir is an antiviral drug used in the treatment of HIV. The drug binds to the active site of the protease enzyme.

Which of the following statements about Ritonavir are false?

- Statement 1: Ritonavir is a competitive inhibitor
- Statement 2: Ritonavir is a non-competitive inhibitor
- Statement 3: Ritonavir is an end-product inhibitor
- Statement 4: Ritonavir binds to the allosteric site of the protease enzyme

- A 1, 3 and 4
- B 2 only
- C 2, 3 and 4
- D 2 and 3

Your answer

7. Which statement about the structure and function of the smooth endoplasmic reticulum is correct?

- A The SER is made of a series of flattened sacs called cristae and is involved in photosynthesis.
- B The SER is made of a series of flattened sacs called cisternae and is involved in protein synthesis.
- C The SER is made of a series of flattened sacs called cisternae and is involved in lipid synthesis.
- D The SER is made of a series of flattened sacs called cristae and is involved in lipid synthesis.

Your answer

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8. Select the row that correctly shows the elements found in each of the named

Biological Molecule and the Elements it Contains			
	Carbohydrate	Protein	Lipid
A	C, H, O	C, H, O, S, P	C, H, O, N
B	C, H, O	C, H, O, N, P	C, H, O
C	C, H, O	C, H, O, N	C, H, O
D	C, H, O	C, H, O, N, K	C, H, O

Your answer

9. A section of DNA has the following base sequence:

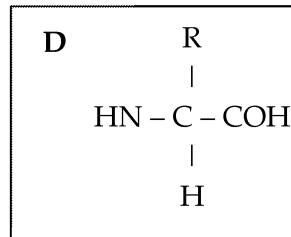
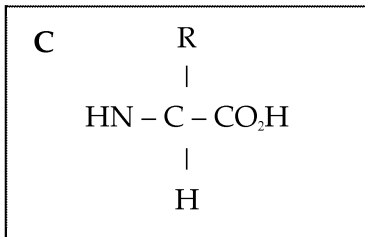
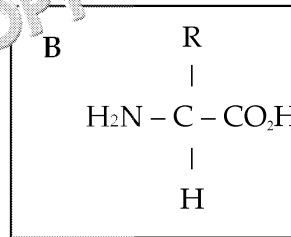
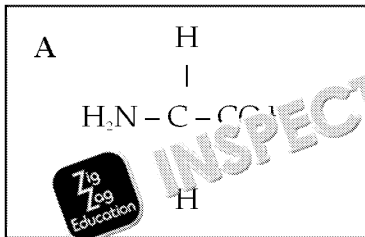
CGTTACTGGCATTGCCCA

Which letter shows the corresponding mRNA sequence?

- A GCAAUCACCGTAACGGGT
- B GCAATGACCGTAACGGGT
- C GCAAUGACCGUAACGGGU
- D GCUUTGUCCGTUUCGGT

Your answer

10. Which diagram shows the general structure of an amino acid?



Your answer

11. Which letter correctly defines the term 'homologous chromosomes'?

- A A different version of a particular gene
- B Two different chromosomes that contain the same genes but in different order
- C Two different chromosomes that contain different genes but in the same order
- D Two different chromosomes of the same size with the same genes in the same order

Your answer

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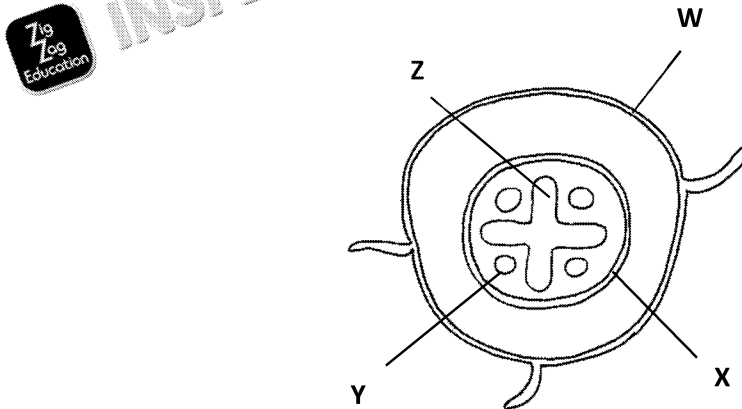




12. Which of the characteristics below is an example of discontinuous variation?
- A Height
  - B Foot length
  - C Blood group
  - D Weight

Your answer

13. The following diagram shows a cross-section of a root.



Which row in the table correctly identifies parts W, X, Y and Z?

	Structure		
	W	X	Y
A	epidermis	endodermis	xylem
B	epidermis	epidermis	phloem
C	epidermis	endodermis	phloem
D	endodermis	epidermis	xylem

Your answer

14. What is the following sentence the definition of?

*'The degree of variation within a particular species'*

- A Biodiversity
- B Interspecific variation
- C Continuous variation
- D Intraspecific variation

Your answer

15. Which of the following statements about the Casparian strip is false?

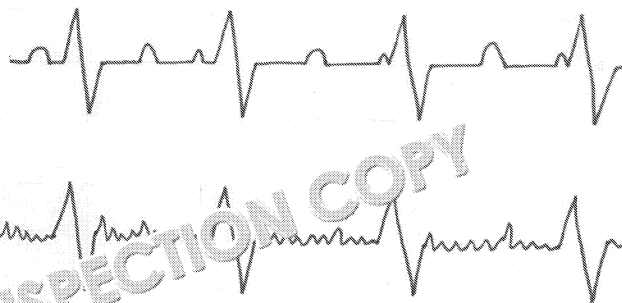
- A Found in the epidermis
- B Made of suberin
- C Prevents water moving by the apoplast pathway
- D Found in roots

Your answer

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16. The following diagram shows two electrocardiogram (ECG) traces. Trace I shows a normal ECG. What does trace II show?



- A Tachycardia  
 B Bradycardia  
 C Atrial fibrillation  
 D Ectopic heartbeat

Your answer

17. What is the image size of the nucleus shown in the diagram to the right?

- A 0.24 cm  
 B 240  $\mu\text{m}$   
 C 24 mm  
 D 0.24 mm

Your answer

18. What is chromatin?

- A Super coiled DNA  
 B DNA associated with RNA  
 C DNA that has just been replicated  
 D DNA wrapped around proteins

Your answer

19. What is the following sentence the definition of?

*The volume of air moved in and out of the lungs in one breath*

- A Total lung capacity  
 B Vital capacity  
 C Tidal volume  
 D Residual volume

Your answer

20. When is the pressure inside the left ventricle of the heart the greatest?

- A During atrial systole  
 B When the atrioventricular valves open  
 C When the atrioventricular valves close  
 D During atrial systole

Your answer

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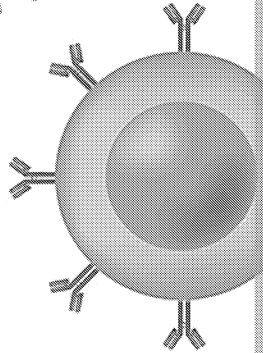


## Section B

Answer **all** the questions.

21. White blood cells are involved in destroying pathogens within the human body.

a) Identify the following white blood cells:



i) .....

ii) .....

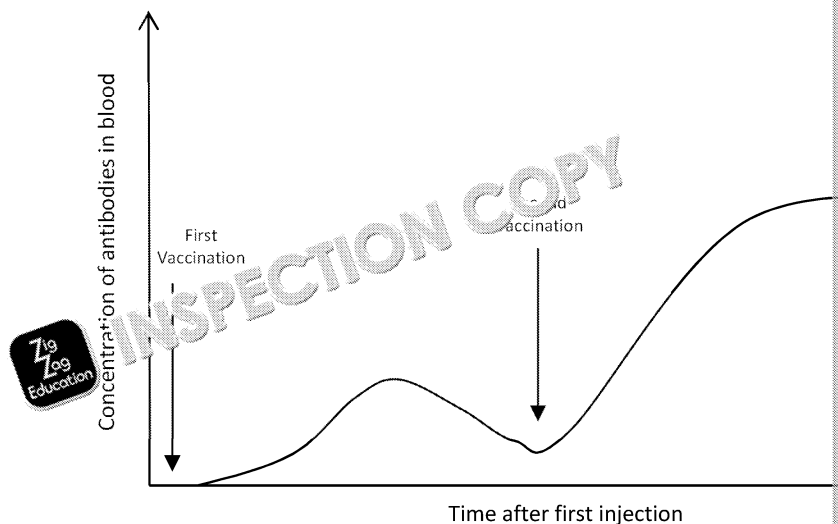
b) Give two differences between B cells and T cells.

.....  
.....  
.....  
.....

c) Meningitis is a bacterial infection caused by the bacterium *Neisseria meningitidis*. There are several different forms of meningitis but in the UK, babies are currently vaccinated against meningitis.

Babies are vaccinated at 3 months old and then again at a year.

The graph below shows the effect of vaccination on the number of antibodies in the blood.



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Explain the difference in the response to the first and second injections

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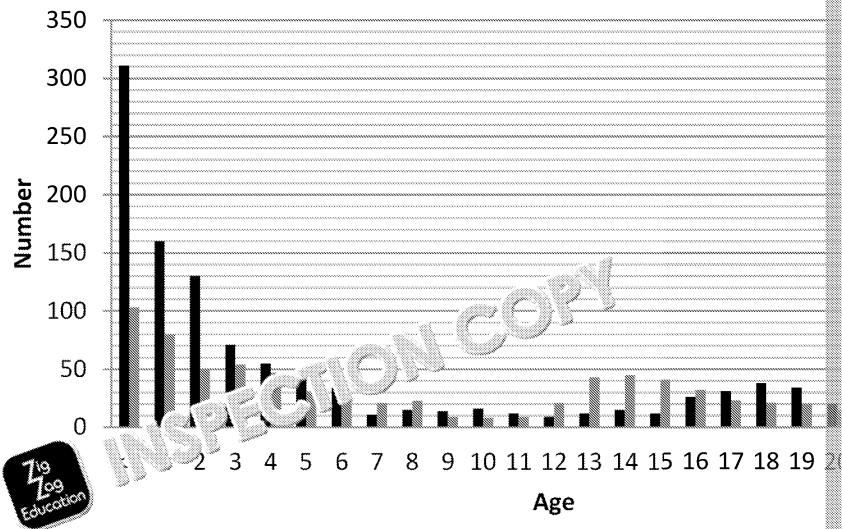
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d) The graph below illustrates the number of cases of meningitis C and meningitis B, that have occurred in individuals up to the age of 24 in the UK between 1990 and 2000.

Number of laboratory-confirmed cases of meningitis B and meningitis C in the UK between 1990 and 2000



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Source: <http://www.nhs.uk/Plann>

i) Describe the trend shown in the graph for children between the age of 0 and 4. Give an explanation for this trend.

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ii) Between which two age groups does the biggest change in confirmed cases occur? Explain your answer.

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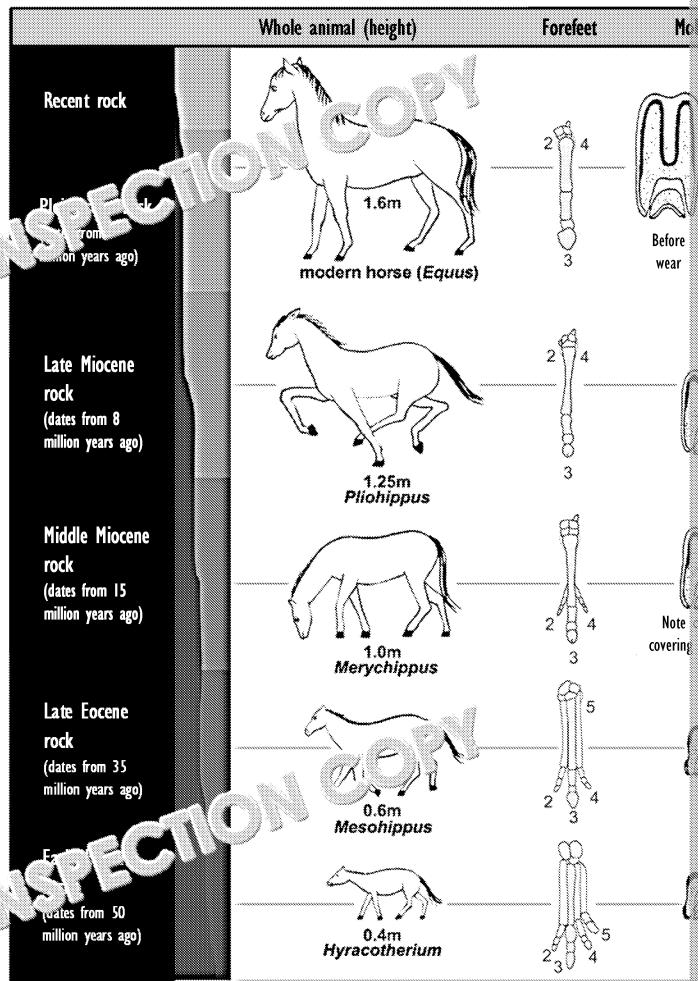
.....

iii) Calculate the percentage difference in the ratio of children with meningitis B and meningitis C in 2005 and 2012. Show your working.



Difference

22. The figure below shows some of the features of several different species of horse in their evolutionary history.



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a) To which class do all of these species belong?

.....

b) Using information from the diagram, explain why scientists think that *Pliopithecus* is more closely related to *Merychippus* than *Mesohippus*.

.....

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.....

c) Describe a method, other than comparing fossils, that can be used to determine the evolutionary relatedness of two organisms.

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.....

d) The climate during the Miocene period was much cooler than that of the Pliocene period. During the Pliocene period, the grasslands became more abundant.

Using information from the diagram and your own knowledge, explain the difference in the diets of *Pliopithecus* and *Merychippus* between these two periods.

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e) Identify each adaptation of the modern horse (Equus) given below as either a physiological adaptation or a behavioural adaptation.

Adaptation	Behavioural, Physiological or Both?
The horse has the ability to rapidly increase its heart rate when being chased	
Horses socialise in herds	
Horses have the ability to sleep standing up	
Horses have eyes on the side of their head	

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23. Some students investigated the distribution of organisms on two different rocks. The results they collected are shown in the table below.

Species	Number of Individuals	
	Shore A	Shore B
Mussels	10	10
Periwinkles	102	102
Dog whelks	181	181
Top shells	26	26
Barnacles	126	126
Limpets	402	402
Beadlet anemones	9	9
<b>Total Number of Individuals (N)</b>	<b>1,044</b>	<b>1,044</b>

a) Suggest how the students accurately collected this data and give the correct technique used.

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b) i) Simpson's Index of Diversity (D) can be used to calculate the biodiversity. Using the formula:

$$D = 1 - \left( \sum \left( \frac{n}{N} \right)^2 \right)$$

Calculate the biodiversity of shore A. Give all values to 3 decimal places. Show all of your working.

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Biodiversity of shore

ii) The value of D at shore B is calculated to be 0.709.

Explain the significance of this value compared to the value at shore A.

.....  
.....

iii) Why is Simpson's Index of Diversity considered a better method of measuring species richness?

.....  
.....  
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24. a) Complete the following passage by using the **most suitable** term in each box.

Haemoglobin is a \_\_\_\_\_ protein made up of

\_\_\_\_\_ polypeptide chains. Each polypeptide chain has a

\_\_\_\_\_ group with the element \_\_\_\_\_ at

the centre. In the lungs, haemoglobin has a high affinity for \_\_\_\_\_

whereas in the respiring tissues, it releases oxygen readily \_\_\_\_\_

In high concentrations of carbon dioxide, haemoglobin releases its oxygen \_\_\_\_\_

This is known as the \_\_\_\_\_ effect.



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b) State the three ways in which carbon dioxide is transported around the body.

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**END OF QUESTIONS**



## **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 1B  
Section A

Question	Answer	Marks
1	B	1
2	C	1
3	C	1
4	D	1
5	C	1
6	C	1
7	A	1
8	C	1
9	A	1
10	A	1
11	D	1
12		1
13		1
14	D	1
15	C	1
16	A	1
17	A	1
18	D	1
19	A	1
20	B	1

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Section B

Question	Answer										
21											
a	Amino acids										
a	<p>For 1 mark:</p> <ul style="list-style-type: none"> <li>3D shape (of protein)</li> </ul> <p>ALL from:</p> <ul style="list-style-type: none"> <li>(held together by) disulphide bonds/bridges</li> <li>Ionic bonds</li> <li>Hydrogen bonds</li> <li>Hydrophobic/hydrophilic interactions</li> </ul>										
a	<p>Any ONE from:</p> <ol style="list-style-type: none"> <li>Lots of / many ribosomes</li> <li>Lots of / many RER</li> </ol>										
b	<p>For ONE mark:</p> <ul style="list-style-type: none"> <li>TEM</li> </ul> <p>And any ONE from:</p> <ol style="list-style-type: none"> <li>High magnification (of image)</li> <li>High resolution (of image)</li> <li>Can see ultrastructure / small organelles</li> </ol>										
c	<ol style="list-style-type: none"> <li>mpv</li> <li>Golgi apparatus / body</li> <li>Vesicle</li> <li>Plasma membrane / cell surface membrane</li> <li>Homologous pair correctly identified</li> </ol>										
d											
d											
	<table border="1"> <thead> <tr> <th>Event</th> <th>Stage of Mitosis</th> </tr> </thead> <tbody> <tr> <td>DNA is replicated</td> <td>interphase</td> </tr> <tr> <td>Chromosomes line up along the equator of the cell</td> <td>metaphase</td> </tr> <tr> <td>Chromosomes start to condense</td> <td>prophase</td> </tr> <tr> <td>Spindle fibres attach to the chromosomes</td> <td>anaphase</td> </tr> </tbody> </table>	Event	Stage of Mitosis	DNA is replicated	interphase	Chromosomes line up along the equator of the cell	metaphase	Chromosomes start to condense	prophase	Spindle fibres attach to the chromosomes	anaphase
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Chromosomes line up along the equator of the cell	metaphase										
Chromosomes start to condense	prophase										
Spindle fibres attach to the chromosomes	anaphase										

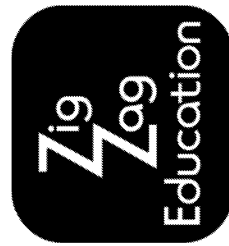
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Question	Answer
22	
a (i)	1. units included in body of table (in sucrose concentration column) 2. mass at 4% sucrose not recorded to a consistent number of decimal places
a (ii)	1. +0.01 2. -0.06 3. -0.31
a (iii)	14.
b (i)	1. 2% 2. Little or no change in mass of potato chip <b>OR</b> No loss or gain of water
b (ii)	Include more intermediate values for sucrose concentration between 1% and 3%
c	L1 – potatoes were not blotted/dried before weighing E1 – excess water included so results will be an <b>overestimate</b> L2 – no repeats/replicates E2 – results will not be reliable / will be less accurate L3 – size of discs not specified E3 – different sizes of discs / different number of cells so results could be over/underestimate E4 – different species/variety of potato not specified E5 – different types of potato contain different types/ number of cells so results could be over/underestimate
d	Osmosis
e	1. Plant cells have a (cellulose) cell wall 2. Provides strength / allows turgidity
23	
a (i)	Mutation
a (ii)	semi-conservative (replication)
a (iii)	1. Helicase 2. Unwinds the DNA helix / separates DNA helix after uncoiling 3. DNA polymerase 4. Joins the DNA strands together 5. Relieves strain / tension while DNA is unwinding 6. Primase 8. Synthesises RNA primers

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Question	Answer
23	Adenine, guanine, cytosine, thymine
b (i)	<p>Phosphate</p> <p>Deoxyribose</p> <p>Base</p>
b (ii)	
c	G1 / G / G2 / Growth phase
d (i)	<ol style="list-style-type: none"> <li>The UK</li> <li>6.3 % increases – this is the <b>largest</b> of all the countries</li> </ol>
d (ii)	<ol style="list-style-type: none"> <li>UK survival rate steadily increased as did Austrian survival rate but there was a slight decrease in 2000</li> <li>Greatest increase in UK between 1995 and 1996, whereas greatest increase in Austria was between 1995 and 1996</li> </ol>
e (i)	<ol style="list-style-type: none"> <li>Budding</li> <li>Nucleus divides</li> <li>Cell membrane on one side</li> <li>Cell wall / cytoplasm move into bulge</li> <li>Cell wall / bulge pinches off (to become a separate cell)</li> </ol>
e	<p>For 3 marks</p> <p>33.51 <math>\mu\text{m}^3</math></p> <p>For 2 marks</p> <p>33.51</p> <p>OR</p> <p>33.5 <math>\mu\text{m}^3</math></p> <p>For 1 mark</p> <p>34 <math>\mu\text{m}^3</math></p> <p>OR</p> <p>Sight of <math>\frac{4}{3} \times \pi \times 2^3</math></p>

## **Preview of Answers Ends Here**

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This is a limited inspection copy. Sample of answers ends here to stop students looking up answers to their assessments. See contents page for details of the rest of the resource.