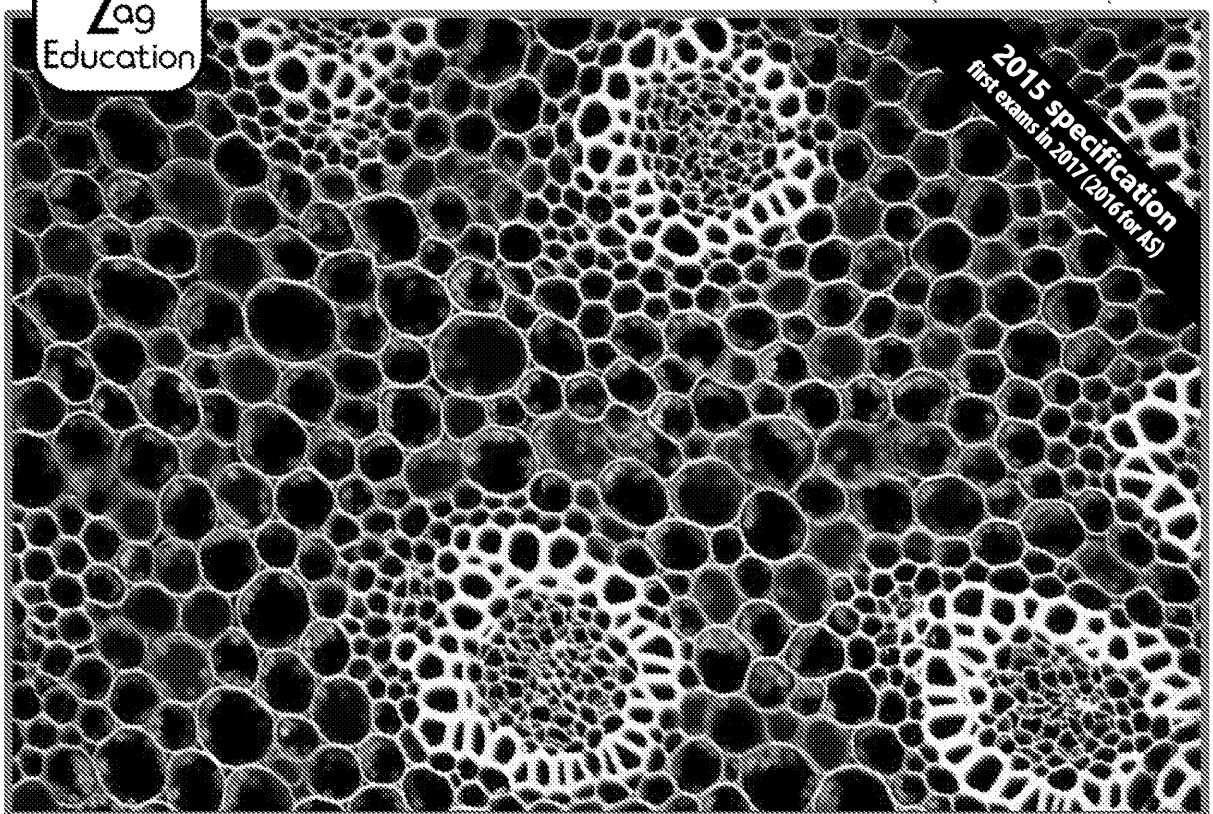
Zig Zag Education

Science

AS and A Level | Edexcel | 8BI0



Practice Exams for AS Edexcel Biology B

Paper 2: Core Physiology and Ecology

zigzageducation.co.uk

POD 6815

Contents

Teacher's Introduction

This pack contains **four practice paper 2s** for the **AS Edexcel Biology B** specificat
2015). The papers and corresponding mark schemes in this pack are modelled o
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
pack can be used for both purposes.

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

A specification analysis grid is also included, enabling teachers to identify questio
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
obtain an overview of their students' knowledge and understanding for each uni

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

I hope you and your students find this pack useful.

Specification Analysis Gric

Skill/content	2A	2B	
Classification/domain			
Electrophoresis and DNA sequencing/heterozygosity index			
Evolution through natural selection/pathogen evolution/speciation	Q5 Q1 (speciation) Q7 (speciation)	Q4	
Biodiversity index and heterozygosity index	Q7		
Transport mechanisms (all)	Q8Q9	Q7	
Gas exchange in animal	Q2	Q6 Q4	
Gas exchange plants	Q6	Q3	
Circulation and cardiac cycle and control	Q3		
ECG and pressure volume charts			
Blood and vessel components/clotting and atherosclerosis/tissue fluid	Q4	Q3	
Oxygen dissociation		Q9	
Transport in plants: transpiration/water transport/translocation		Q1 Q5	
Core practical tested	Core Practical 8	Core Practical 2 Core Practical 5	Core Core Core
% marks for practical skills	16%	16%	
% marks for quantitative skills	21%	19%	

AS Biology

Core Physiology and Ecology

Practice Paper 2B

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.

1. a) Tick the relevant box to indicate the correct answer. Water enters the x because the space inside the vascular bundle is the:

hypertonic ☐
hypotonic ☐
isotonic ☐
apoplastic ☐

b) Tick the relevant box to indicate the correct answer. Water can travel a pathways. The fastest pathway to the Casparian strip is the:

symplastic ☐
vacuolar ☐
hypertonic ☐
apoplastic ☐

c) The endodermis can control mineral uptake because active transport is

Explain why active transport is selective.

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2. Guard cells control the opening and closing of stomata in plant leaves. A stu apertures (guard cells and the stomata they surround) in eyepiece units (ep Each eyepiece unit of the eyepiece graticule measured 0.25 mm.

a) Calculate the diameter of each stomatal aperture in mm, and use your c mean diameter (mm).

Write all answers in the table. Show your working in the space below.

Stomatal aperture and guard cell diameter (epu)	Diameter of the
48	
56	
52	
Mean diameter of stomatal aperture in mm	

b) Explain how an increase in light intensity would affect the diameter of t

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3. a) i) Tick the row in the table that describes capillary structure.

Structural feature	Capillaries
Thick muscle layer	
Epithelium	
Thin muscle layer	
Wide lumen	
Pores	

ii) Tick the row that describes artery structure.

Structural feature	Artery
Thick muscle layer	
Epithelium	
Thin muscle layer	
Wide lumen	
Pores	

iii) Tick the row that describes vein structure.

Structural feature	Vein
Thick muscle layer	
Epithelium	
Thin muscle layer	
Wide lumen	
Pores	

Researchers measured the volume of fluids in and around capillary beds. Th

Distance from arteriole (mm)	Volume of tissue fluid surrounding the capillary (mm^3)	Volume of fluid in capillary (mm^3)
0	24	75
0.2	55	44
0.4	71	28
0.6	51	48
0.8 (start of venule)	22	73

b) Analyse the data and use your biological knowledge to explain the resu obtained.

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c) Describe the fate of the tissue fluid that has not been reabsorbed into t

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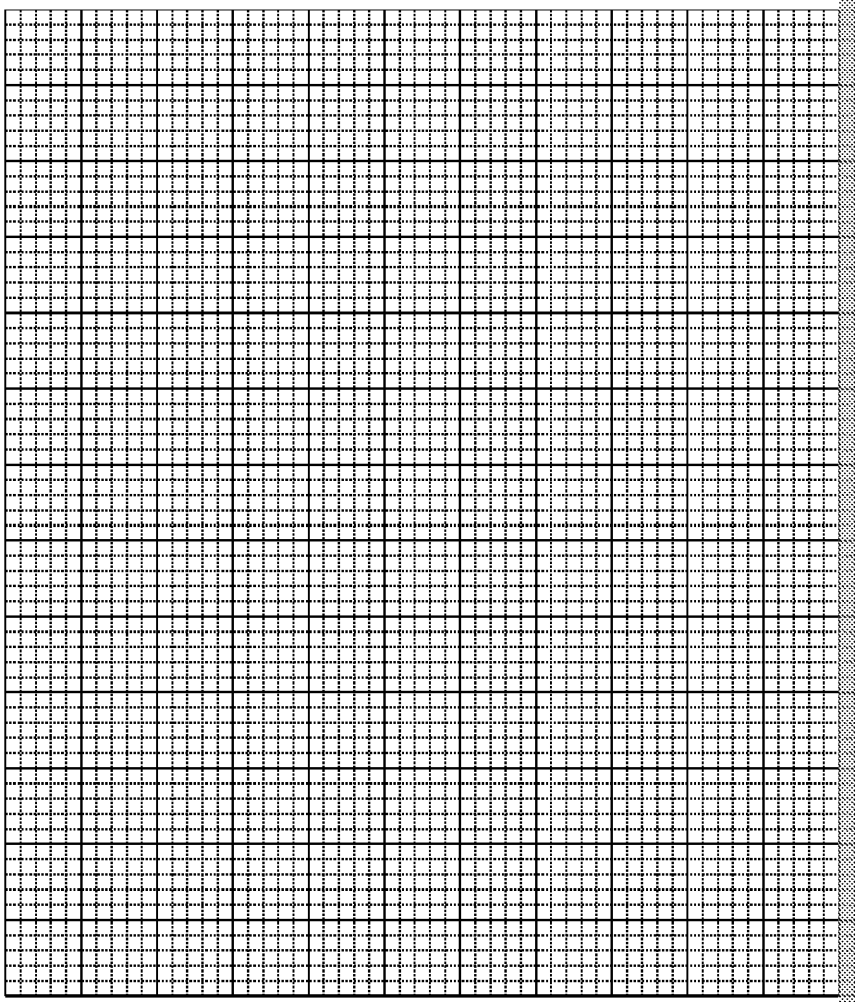
4. Although the HIV virus can now be controlled effectively using a cocktail of develops rapidly. When resistant strains emerge, patient viral load (the nur increases and so virus number is regularly monitored.

a) Use the space below to convert the figures provided into a suitable for on the following page, using error bars to show the spread of the data:

Viral load in untreated patients (viruses per ml^{-1} of blood)	Viral load in patients treated therapy (viruses per ml
15000000	243
16000001	136
15670983	169



b) Calculate the percentage decrease in viral load in patients treated with
of AIDS symptoms.

Percentage decrease =

c) Describe how drug-resistant strains could emerge in the 'treated' patie

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5. a) Describe how the transpiration stream is maintained.

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b) Tick the appropriate box to show which of the following substances are

Water and minerals ☐

Glucose and amino acids ☐

Lipids and water ☐

Sucrose and amino acids ☐

Researchers completed an experiment using radioactive carbon dioxide to p
claim that translocation is not simply due to mass flow. They covered plant
enclose them, and then pumped radioactive carbon dioxide into the bags. T
monitored distribution of the radioactive carbon dioxide and obtained the r

c) Use your biological knowledge and the data provided to explain how th
evidence that translocation does not occur through mass flow alone.

Plant region	Concentration of radioactive carbon diox
Untreated leaves	53
Untreated shoots	39
Treated leaves	23
Roots	39

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6. Mammalian gas exchange occurs in organs called lungs.

a) Describe and explain three ways in which the gas exchange surface in n maximise the gas exchange.

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b) Identify the gas exchange surface in mammalian lungs.

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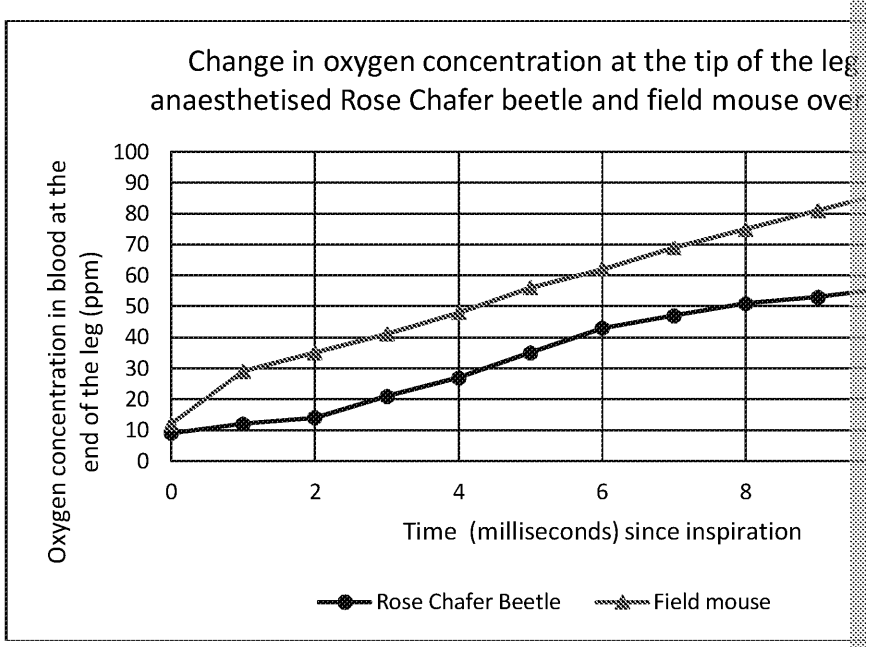
c) Tick the appropriate box to indicate the correct term for the definition: in one direction at a constant speed'.

Mass transport ☐
Mass flow ☐
Mass diffusion ☐
Mass movement ☐

d) In insects, oxygen diffuses directly to the tissues.

Calculate the rate of oxygen transfer from the gas exchange site to the beetle and the field mouse, using the data shown in the graph.

Rate of oxygen transfer =



e) Explain why it is more appropriate to calculate rate of oxygen uptake to mice and beetles.

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f) Analyse the data and use your biological knowledge to explain why larg to meet their oxygen requirements.

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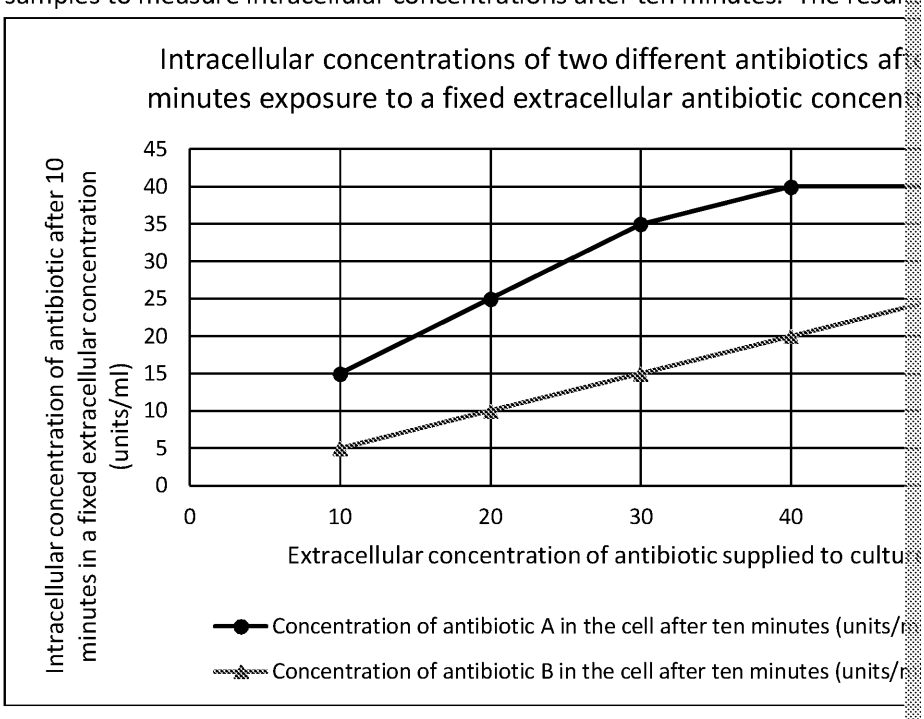
7. Researchers are investigating the uptake of two new potential antibiotics for respiratory tract infections in children. To establish the mode of absorption, intestinal epithelial cells. They exposed the cells to increasing concentrations samples to measure intracellular concentrations after ten minutes. The resul



a) Use the data and your biological knowledge to identify the type of tran transport antibiotic A into the blood from the small intestine.

Explain your choice.

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b) From the current data it is not possible to establish whether antibiotic B
diffusion or facilitated diffusion.

Describe how the investigation could be extended to establish whether
facilitated diffusion or simple diffusion.

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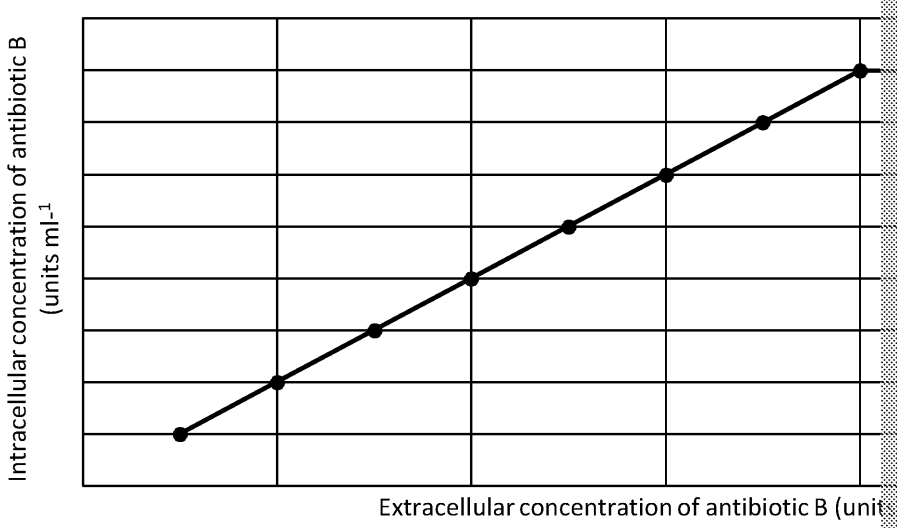
When researchers extended their investigation to establish the transport m
obtained the graph below.

Concentration of antibiotic B in the cell after ten minute
increasing extracellular concentrations supp



c) Use the shape of the graph and your biological knowledge to describe h

Explain your reasoning.

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d) The cell membrane is described as a fluid mosaic model.

Draw the fluid mosaic model of the membrane and clearly label the co
in the transport of antibiotic B.

e) Explain why the transporter for antibiotic A does not transport antibiot

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8. A student wanted to investigate the effect of increasing temperature on the
pigment from beetroot cells. She used a cork borer with a diameter of 11 m
beetroot tissue. She then used a ruler to cut the cylinder into five small slic
length.

a) Use the formula $2(\pi r^2) + 2(\pi r)$ x length to calculate the surface area of e

b) Calculate the volume of each cylinder, using the formula πr^2 x length, t
volume ratio.

The student put the five discs in a boiling tube and submerged them in wate
80 °C water bath for ten minutes, then used a sieve to separate the water fr
colour of the water using a colorimeter,and recorded the absorbance in a ta
at temperatures of 65 °C, 45 °C, room temperature, and 4 °C, using freshly c
that the absorbance readings increased as the temperature was raised, and
increases, the rate of diffusion of beetroot pigment from cells increases'.

c) Describe the improvements that she would need to make to her experi
conclusion valid.

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d) State why it is important to control the length and diameter of each dis

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9. The graph below shows oxygen dissociation for two sub-species of deer mic
forest deer mouse and the low altitude prairie wood mouse. The forest-dw
different phenotype, exhibiting longer tails, ears, skulls and hind feet than t
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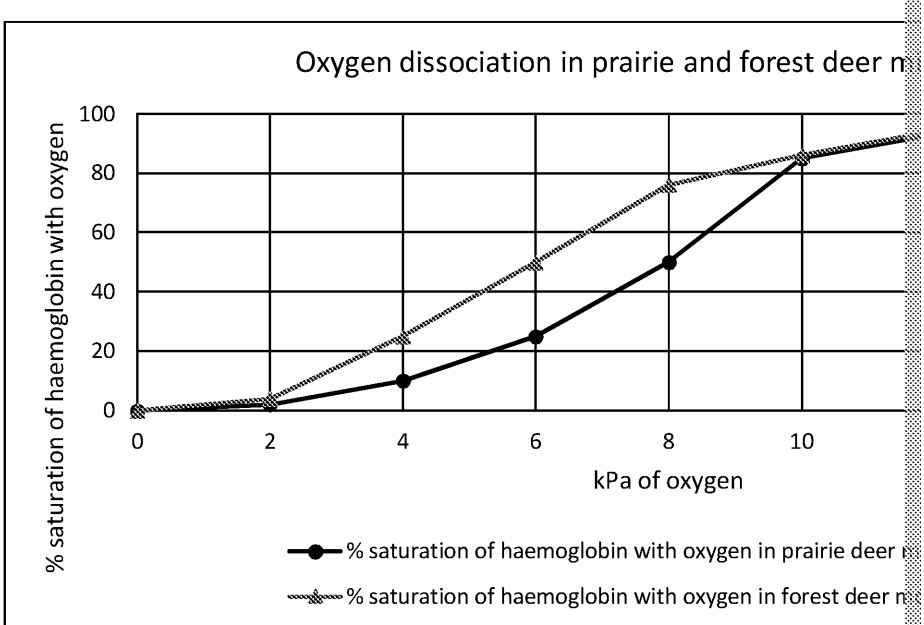

a) Tick the definition of the term 'oxygen affinity'.

How many oxygen molecules bind to haemoglobin	
How readily oxygen molecules separate from haemoglobin	
How readily oxygen molecules bind to haemoglobin	
How easy it is to separate oxygen from haemoglobin	

b) Calculate the percentage increase in the oxygen affinity of forest deer m
deer mouse at 8 kPa of oxygen.

c) Forest and prairie deer mice are not classified as different species and h
do not appear to interbreed.

Use your biological knowledge and the information provided to explain
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The table below shows the saturation of haemoglobin with oxygen and the c
the tissues of mutant and normal forest deer mice during exposure to low o

Mouse type	kPA of oxygen in tissues at low oxygen kPA	Haemogl oxyge
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'Mutant' forest mouse	8	

d) Compare and contrast haemoglobin saturation and oxygen concentrati
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Practice Paper 2B

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1. a) Select the correct answer. Water enters the xylem through the endode
the vascular bundle is the:
   - hypertonic
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pathways. The fastest pathway to the Casparian strip is the:
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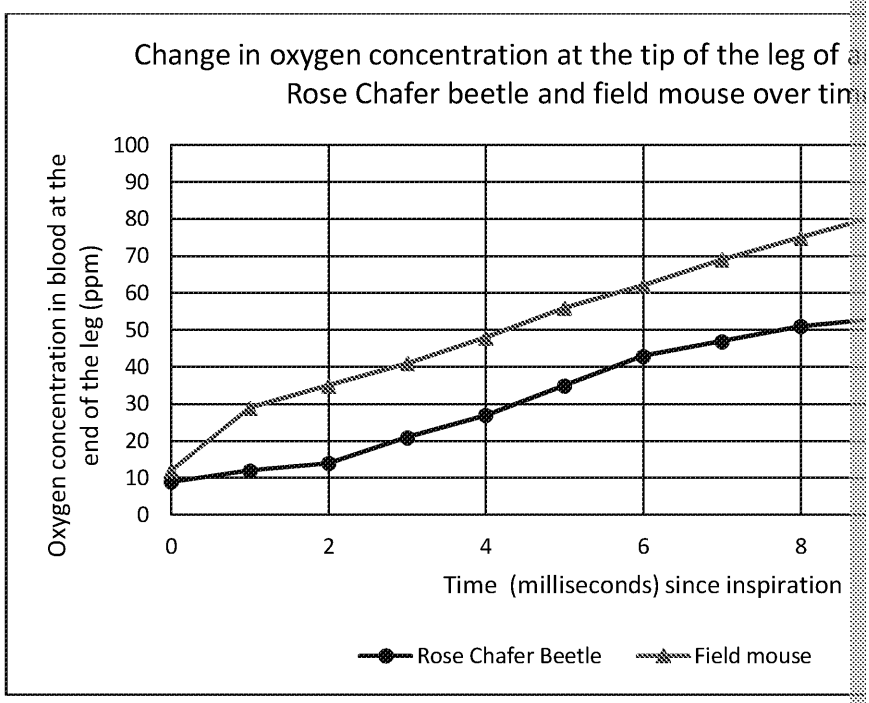

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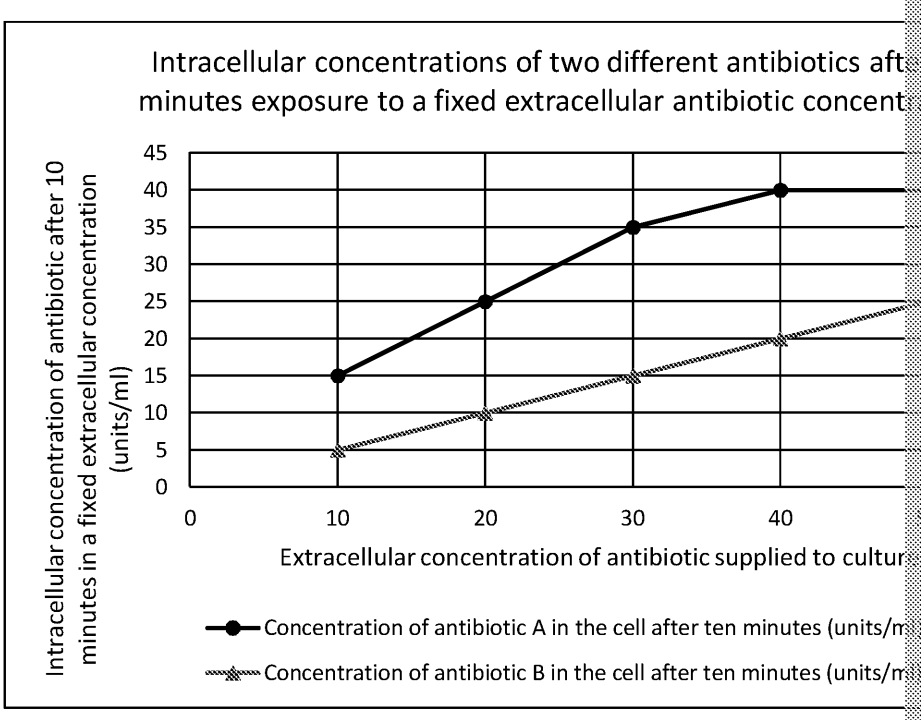

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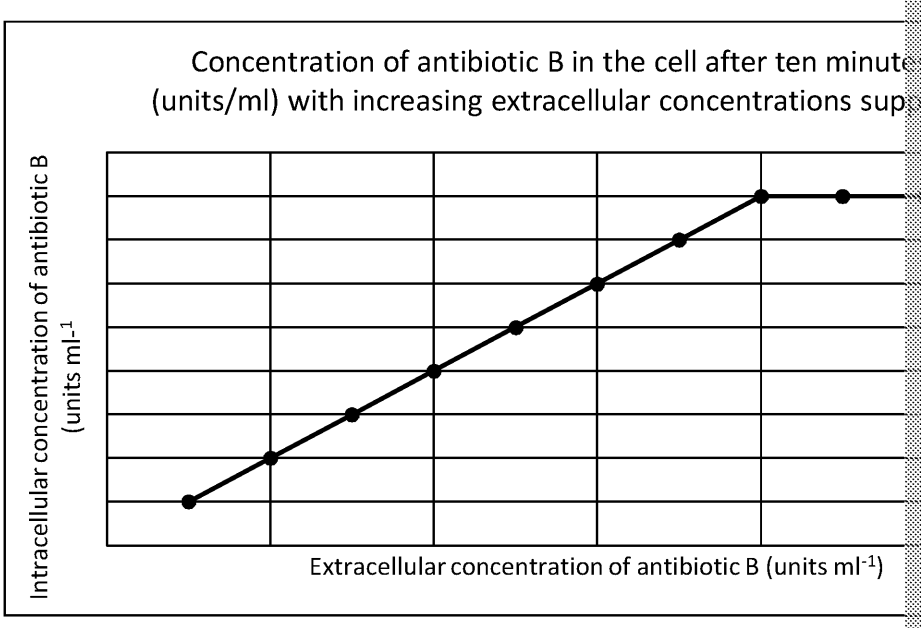

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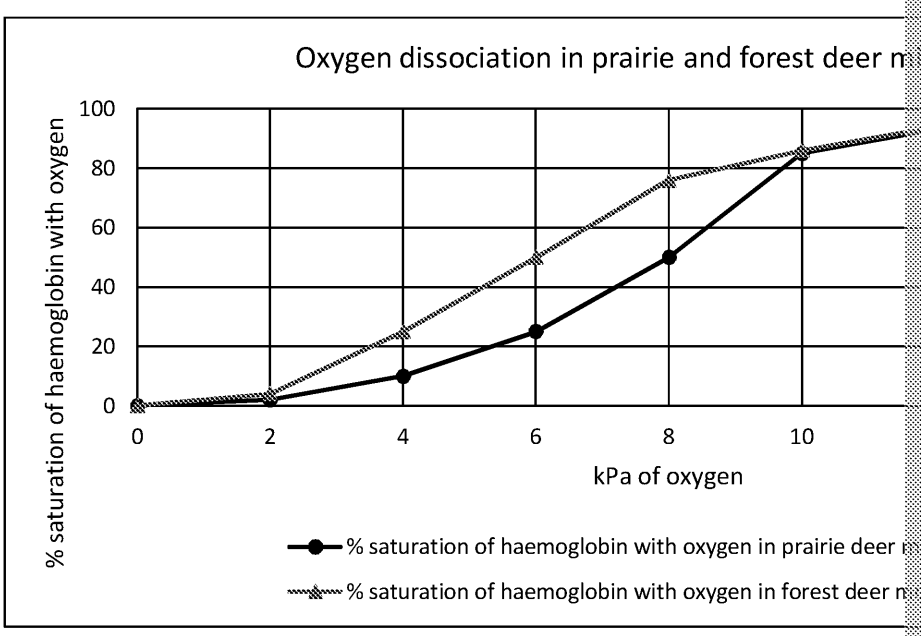

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Preview of Questions Ends Here

Practice Paper 2A

Question number	Acceptable answer	Addi
1(a)	Row 3 ticked	
1(b)	Row 3 ticked	
1(c)	• Lots of variation within a species; • Different species producing fertile hybrids; • Some interbreeding between neighbouring species (ring species)	Any two
2(a)	• Fish B uptake is 0.4 ppm at 0.2 mm from the start of the gill, whereas fish A have taken up 2 ppm • (0.4/2.0) x 100 = only 20 % of the oxygen taken up in fish B compared to fish A at this point • Or a difference of 2–0.4 = 1.6 ppm = 80% lower uptake in fish B at 0.2 mm	Clear working (required for ea Either % calcula
2(b)	• Fish B have counter current flow; • And so maintain oxygen diffusion for the whole length of the gill; • Whereas fish A has parallel flow; • So diffusion will stop when equilibrium is reached half way across the gill (owtte)	All four points r **NOT JUST** main gradient **must b** **whole length o** MUST be comp discussed
3(a)(i)	In atrial systole the atrioventricular valves are open because pressure in the atria is greater than in the ventricles	Correct box tick
3(a)(ii)	Second row ticked	
3(b)	• Measure stroke volume rather than ventricle volume; • Measure heart rate to allow calculation of cardiac output; • Use subjects of the same age; • Control variables such as smoking / drinking alcohol / caffeine intake; increase sample size • If generalising to 'athletes' complete study using females also	Any four
3(c)	• The volume of blood in the ventricle goes back up during ventricular systole; • Suggesting backflow; • Suggesting a leaky valve	NOT heart not v All three
4(a)	A control group with no treatment for the course of the study	
4(b)	• Platelets activated (by exposure to arterial collagen); • Activated platelets secrete thromboplastin; • Thromboplastin initiates clotting cascade; • Prothrombin converted to thrombin; • Thrombin converts soluble fibrinogen to insoluble fibrin; • Fibrin forms a mesh holding the platelet plug in place	Any four
4(c)	Virus vector had to infect cells and undergo protein synthesis in host cell before clotting factor detectable	
4(d)	• Virus vector genes continually expressed; • Protein synthesis using viral genes; • Factor IX continually produced whereas single dose of purified factor	Any for 1 mark

Question number	Acceptable answer	Ad
5(a)(i)	• Lack of genetic variation • Leads to loss/absence of beneficial alleles causing loss of genetic fitness	Not just varia Not just decre inbreeding de correctly/ter susceptibility survival chan
5(a)(ii)	All the alleles	
5(b)	More forms of the same gene increase chance of survival	
5(c)	• Population 1 = 35/50 = 0.7. Population 2 = 16/35 = 0.46 Population 3 = 26/32 = 0.81; • Population 3 has the highest heterozygosity index; • Indicating that it has the highest genetic variation; • So is more likely to be genetically fit / survive disease, or relevant example	Indexes for al correctly for 1 All three expl
6(a)(i)	Reduce water loss	
6(a)(ii)	More stomata / stomata on the top of the leaf to allow rolling / stomata in pits to trap water	Any one
6(b)(i)	Row 1 ticked	
6(b)(ii)	Row 4 ticked	
6(c)	23/28	
6(d)	• Potassium ions are transported into guard cells; • Lowering the water potential; • Conversion of starch to malate lowers water potential; • Causing opening, so lower ion concentration results in less opening	Role of potas conversion of water potent that water po
6(e)	• Active transport requires ATP; • From photosynthesis; • So lower light intensities result in less ATP and fewer stomata opening	All three
7(a)	• Mutation causes adaptation; • To different niches / suitable example, such as food source or habitat / sympatric speciation prevents interbreeding; • Mutations accumulating eventually leads to reproductive isolation	All three
7(b)	• Bottle nose dolphins in open ocean interbreed more; • Larger gene pool / greater heterozygosity index; • More chance of an allele that promotes survival	All three
7(c)(i)	• 30450+6+812=31268 • 207x 206 = 42642. • 42642/31268 =1.36	Clear working
7(c)(ii)	• Diversity index in the shelf is 2.13 x greater than in abyss; • likely to be greater diversity of other marine animals in the shelf • So greater diversity in dolphin species in the shelf because there is likely to be more types of food available (owtte); • Common dolphin may have behavioural adaptations to outcompete other species in the abyss • More **niches** in shelf region	Any three ma of difference Accept habita NOT just diffe

Question number	Acceptable answer	Add
8(a)	• An increase in external herbicide concentration of 120–140 mmol causes an increase in the internal concentration; • Supporting facilitated diffusion because uptake occurs faster as concentration gradient increases	
8(b)	• Active transport requires ATP; • From respiration; • Respiratory inhibitors stop respiration so active transport should stop / suitable graph annotated appropriately to illustrate understanding	Graph must sh immediately a added
8(c)	• No evidence from this investigation that herbicides are specific; • Repeat experiment using crop plants / animal models	Accept discuss being specific active transpo
9(a)	row 4 ticked	
9(b)	• Air contains oxygen; • Required for aerobic respiration; • Which generates the ATP required for active transport; • Without active transport fewer ions will enter the root cortex; • So the water potential in the soil will not be reduced / less of a water potential gradient; • Less osmosis and less water uptake	Any six **QWC*** Level 0 no mar **Levels 1–2** Some biologica understanding limited attemp comments ger biological term respiration **Levels 3–4** Understanding demonstrated discussed to su **Levels 5–6** Ideas presente using appropri / aerobic respi Links clear and explanation su theory
9(c)	• 145–24 = 121 • (121/145) x 100 = 83%	
9(d)	• Initial increase of the dye movement by 2 mm min^{-1}; • As increased potassium leads to greater stomata numbers opening; • Due to more guard cells taking up potassium / having lower water potential; • After 20mMol rate of dye movement decreases rapidly by 8mm min^{-1}/50%	All four points

Preview of Answers Ends Here