

Learning Grids

For GCSE (9-1) OCR A Biology

Gateway Science

*Topics 1–3: Cell Level Systems, Scaling Up,
Organism Level Systems*

Update v1.1, November 2018

zigzageducation.co.uk

POD
7204a

Publish your own work... Write to a brief...
Register at publishmenow.co.uk

Contents

Thank You for Choosing ZigZag Education	ii
Teacher Feedback Opportunity.....	iii
Terms and Conditions of Use	iv
Teacher’s Introduction	v
Topic B1 – Cell Level Systems.....	1
Experiment Time 1	9
Quick Quiz.....	10
Experiment Time 2	15
Quick Quiz.....	16
Experiment Time 3	23
Quick Quiz.....	24
Topic B2 – Scaling Up	25
Experiment Time 4	29
Quick Quiz.....	30
Quick Quiz.....	39
Quick Quiz.....	43
Topic B3 – Organism Level Systems.....	44
Experiment Time 5	46
Quick Quiz.....	52
Experiment Time 6	61
Quick Quiz.....	62
Quick Quiz.....	73

Teacher's Introduction

These learning grids are designed to help your students independently learn content and will help you to assess their knowledge during teaching of each section of **Sections B1-B3 – Cell level systems, Scaling up and Organism level systems** within the **OCR GCSE Year 1 Biology** specification. The concept is that your students are assigned a set of pages to read from the relevant book and are then asked to complete the relevant learning grids, possibly for homework or as a refresher for a topic. These activities are particularly useful for students who need more support, but they also contain some thought-provoking reasoning questions which will stimulate highly engaged students.

Each learning grid is closely linked to the OCR 2016 specification and to the approved textbooks. Relevant textbook page numbers are provided at the top of each worksheet, to allow easy cross-referencing.

Each learning grid contains a range of question styles, including:

- **Quick-testing questions**- these may be a phrase, a definition or a numeric response.
- **Labelling questions** – designed to introduce structural and anatomical concepts to the student
- **Missing-information/Match-terms-to-definitions questions**- test key knowledge quickly.
- **Explain-a-process questions**- encourage students to recognise cause and effect in Biological processes.
- **Applied knowledge questions**- challenge students to apply knowledge in unfamiliar situations.
- **Experiment Time**- asks students to analyse a practical, interpret its results and recognise strengths and weaknesses.
- **Quick Quiz** at the end of each topic assesses understanding and can be used to confirm students are ready to move on to the next topic.

This resource directly references:

OCR Gateway – GCSE Biology
Locke 2016, Oxford University Press
OCR Gateway – GCSE Biology (9-1),
Beeby and Pilling 2016, Collins

Learning grids in this section will on average take 20-30 minutes each. However, this resource includes substantial opportunities to develop mathematics skills, and students who find maths challenging may find that these resources take longer to complete.

These resources can be used to engage students and allow those who have missed lessons to catch up quickly. They can be the basis for a homework exercise, and the answer scheme allows them to be easily used in cover lessons. Students could also use the sheets as an independent learning and revision resource.

All resources can be photocopied into black and white.

We hope you and your students enjoy this resource!

Update v1.1, November 2018

- Added question on calculating rate to Experiment Time, p. 15
- Changed answer on lenses and short/long-sightedness to clarify meaning and explain more fully, p. 49
- Replaced existing question on brain repair and surgery, p. 51
- Deleted unhelpful and ambiguous question on abstinence and contraception, p. 58

Free Updates!

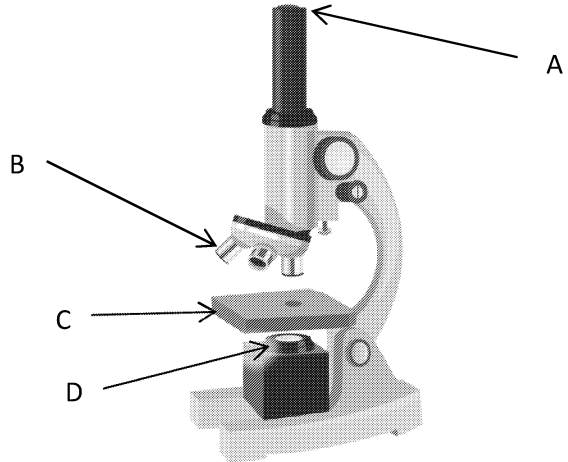
Register your email address to receive any future free updates* made to this resource or other Biology resources your school has purchased, and details of any promotions for your subject.

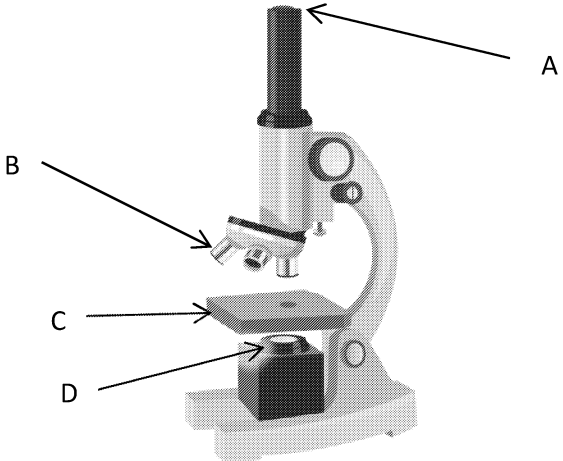
* resulting from minor specification changes, suggestions from teachers and peer reviews, or occasional errors reported by customers

Go to zzed.uk/freeupdates

Selected Question and Answer Pages

For demonstration only, the sample answer pages immediately follow their corresponding question pages

	Questions	
Cell structures 1.1a (continued)	<p>Label the parts of the instrument below:</p> 	
	<p>Why are stains used in microscopy?</p>	
	<p>(HT only) Ⓜ</p> <p>If an animal cell measures 2×10^{-3} mm across, and a bacterium is 2×10^{-4} mm long, how many orders of magnitude smaller are the bacteria?</p>	

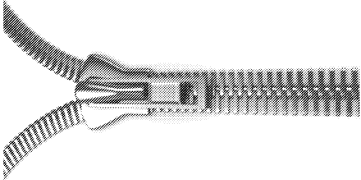
Questions	Answers
<p>Label the parts of the instrument below:</p> 	<p>A – eyepiece lens B – objective lens C – stage D – lamp</p>
<p>Why are stains used in microscopy?</p>	<p>To allow specimens without colour to be seen, or to show the difference between different tissues or structures.</p>
<p>(HT only) H</p> <p>If an animal cell measures 2×10^{-3} mm across, and a bacterium is 2×10^{-4} mm long, how many orders of magnitude smaller are the bacteria?</p>	<p>10 times. One order of magnitude. $2 \times 10^{-3} = 0.002$ $2 \times 10^{-4} = 0.0002$ $0.002/0.0002 = 10$</p>

Cell structures 1.1a (continued)

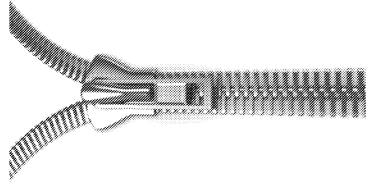


© ZigZag Education

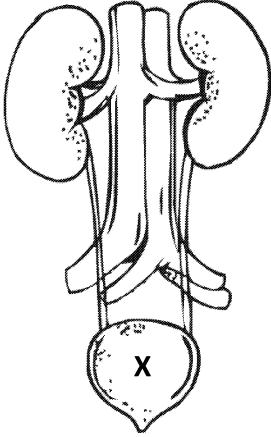


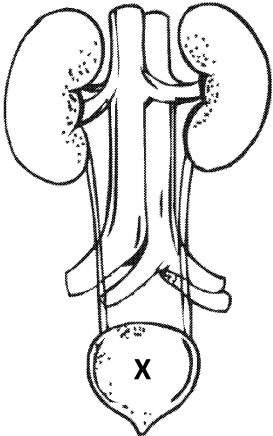
Questions	Answers
<p>Explain how the image below can be used as a model of DNA.</p> 	
<p>True or false? Transcription describes the process of making proteins from a nucleic acid template.</p>	
<p>(HT only) H</p> <p>Order this description of how proteins are made from DNA:</p> <ol style="list-style-type: none">1. Amino acids align to the template sequence in order2. The template binds to a ribosome3. An mRNA template is made and released into the cytoplasm4. Carrier molecules carry amino acids to the template5. The formed protein folds into its specific shape6. The formed protein detaches from the ribosome	
<p>How many nucleotides are necessary to code for a single amino acid during protein synthesis?</p>	
<p>Fill in the blanks.</p>	<p>The chemicals responsible for breaking down food are called _____ . They are very large molecules of _____ with a very highly organised shape.</p>



	Questions	Answers
What happens in cells (and what do cells need)? 1.2d–e	<p>Explain how the image below can be used as a model of DNA.</p> 	<p>Two strands are initially attached, but are pulled apart (unzipped) to make new proteins.</p>
	<p>True or false? Transcription describes the process of making proteins from an RNA template.</p>	<p>False; that is the description of translation. Transcription is the production of an mRNA template from DNA.</p>
	<p>(HT only) H</p> <p>Order this description of how proteins are made from DNA:</p> <ol style="list-style-type: none"> 1. Amino acids align to the template sequence in order 2. The template binds to a ribosome 3. An mRNA template is made and released into the cytoplasm 4. Carrier molecules carry amino acids to the template 5. The formed protein folds into its specific shape 6. The formed protein detaches from the ribosome 	<ol style="list-style-type: none"> 3. An mRNA template is made and released to the cytoplasm 2. The template binds to a ribosome 4. Carrier molecules carry amino acids to the template 1. Amino acids align to the template sequence in order 6. The formed protein detaches from the ribosome 5. The formed protein folds into its specific shape
	<p>How many nucleotides are necessary to code for a single amino acid during protein synthesis?</p>	<p>3; the code responsible for making proteins. Three nucleotides are necessary for each amino acid.</p>
	<p>Fill in the blanks.</p>	<p>The chemicals responsible for breaking down proteins are called enzymes. They are very large molecules of protein with a specific shape.</p>



	Questions	Answers
Maintaining internal environments 3.3e (continued)	<p>Name organ X which is a part of the excretory system?</p> 	
Maintaining internal environments 3.3f	<p>How might the urine content of a marathon runner differ from the urine content of an office worker?</p>	
	<p>When water potential is decreased, what effect does it have on cells?</p>	
	<p>What term is used to describe the rupture of animal cells due to them taking on too much water?</p>	

	Questions	Answers
Maintaining internal environments 3.3e (continued)	<p>Name organ X which is a part of the excretory system?</p> 	<p>Bladder</p>
Maintaining internal environments 3.3f	<p>How might the urine content of a marathon runner differ from the urine content of an office worker?</p>	<p>The marathon runner does more exercise, losing more water, and making the urine more concentrated.</p> <p>The office worker maintains a cooler temperature, losing less sweat and maintaining urine concentration.</p>
	<p>When water potential is decreased, what effect does it have on cells?</p>	<p>Water moves out of cells, causing them to shrink.</p>
	<p>What term is used to describe the rupture of animal cells due to them taking on too much water?</p>	<p>Lysis</p>



© ZigZag Education

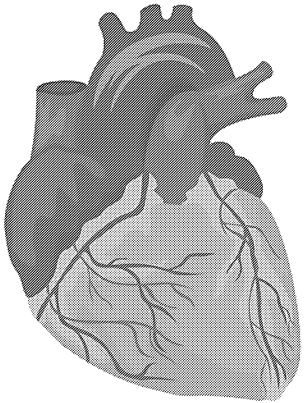
Additional Selected Question Pages

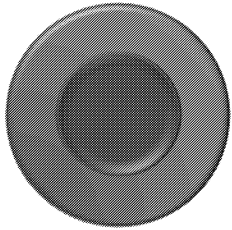
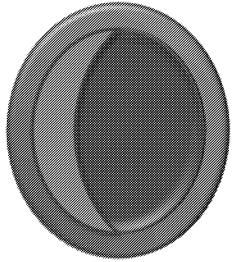

	Questions	Answers											
Supplying the cell 2.1d-f (continued)	<p>Which of these tissues is a rich source of stem cells?</p> <ul style="list-style-type: none"> • Adult's lung • Pensioner's kidney • Child's bone marrow 												
	<p>Why is a stem cell from an embryo so valuable to medicine?</p>												
	<p>What value might stem cells offer to a patient who is paralysed because of a spinal cord injury?</p> <ol style="list-style-type: none"> a. Stem cells can grow new nerves b. Stem cells are very cheap c. Stem cells grow quickly d. Stem cells are easy to come by 												
	<p>Adult stem cells exist in the _____ and can give rise to a number of other cell types, including blood.</p>												
	<p>What objections are there to the use of embryonic stem cells in research?</p>												
	<p>Complete this table to compare plant and animal stem cells.</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th></th> <th>Animal stem cells</th> <th>Plant stem cells</th> </tr> </thead> <tbody> <tr> <td>Grow throughout life</td> <td></td> <td></td> </tr> <tr> <td>Cheap to produce</td> <td></td> <td></td> </tr> <tr> <td>Found where?</td> <td></td> <td></td> </tr> </tbody> </table>		Animal stem cells	Plant stem cells	Grow throughout life			Cheap to produce			Found where?		
	Animal stem cells	Plant stem cells											
Grow throughout life													
Cheap to produce													
Found where?													



	Questions	Answers
The challenges of size 2.2a–b	A single-celled organism has a high surface area to volume ratio. Why is this beneficial?	
	An amoeba is a cube with sides of 1 μm. a. What is the surface area of the amoeba? b. What is the volume of the amoeba? c. What is the surface area to volume ratio?	
	What effect does increasing the size of the amoeba have on the surface area to volume ratio?	
	Define the term 'diffusion distance'.	
	Why do humans and other large animals have complex respiratory and digestive systems, but single-celled organisms and worms don't?	



	Questions	Answers
The challenges of size 2.2c–d	Give an example of one substance that will diffuse: a. into the blood from the lungs b. from the blood into the lungs	
	To which system does this organ belong: 	
	Fill in the blanks.	The _____ are responsible for gas exchange. They maintain a steep concentration gradient so that the gases can _____ into and out of the _____.
	What is meant by the term 'double circulatory system'?	

	Questions	
The challenges of size 2.2 c-d (continued)	Which side of the heart contains oxygenated blood?	
	Place these vessels in the order they pass blood through the heart and lungs, starting with the vena cava. <i>vena cava, aorta, pulmonary vein, pulmonary artery</i>	
	Identify the blood vessels, based on their adaptations. <div style="display: flex; justify-content: space-around; align-items: flex-start;"> <div style="text-align: center;"> <p>Thick, muscular walls</p>  <p>Narrow lumen</p> <p>a.</p> </div> <div style="text-align: center;"> <p>Thin walls</p>  <p>Wide lumen Some valves present</p> <p>b.</p> </div> <div style="text-align: center;"> <p>Very thin walls</p>  <p>About as wide as a single cell</p> <p>c.</p> </div> </div>	
	Why do arteries have such thick, muscular walls?	
	What function do the valves in veins play?	