

2016 specification  
first exams in 2018

# Learning Grids

For GCSE (9–1) AQA Biology

*Paper 1 (Topics 1–4): Cell Biology, Organisation, Infection and Response and Bioenergetics*

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# 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 **4.1–4.4 – Cell Biology, Organisation, Infection and Response and Bioenergetics** within the **AQA GCSE 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 AQA 9–1 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:  
*AQA GCSE Biology*; 3<sup>rd</sup> Edition; Fullick and Ryan;  
and  
*AQA GCSE (9–1) Biology*; Dixon and Hodgson;  
and  
*AQA Science Biology*; Fullick, Cox and Miles

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 in black and white. We hope you and your students enjoy this resource!

## 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.

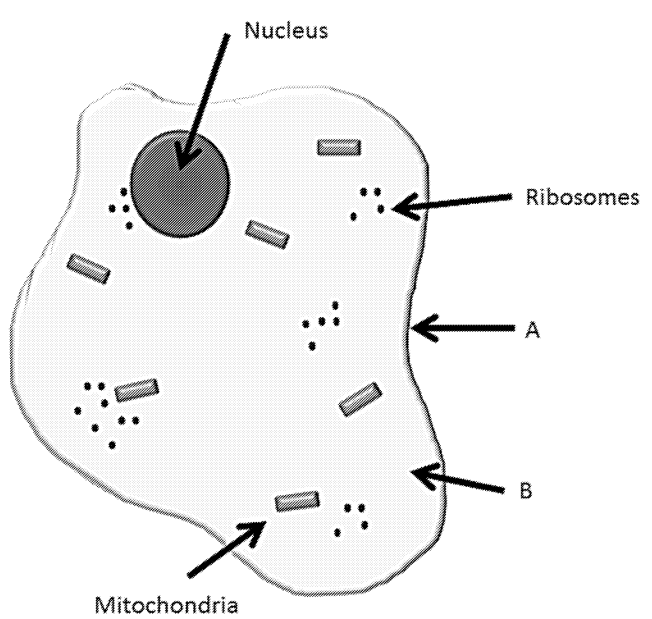
\* resulting from minor specification changes, suggestions from teachers and peer reviews, or occasional errors reported by customers

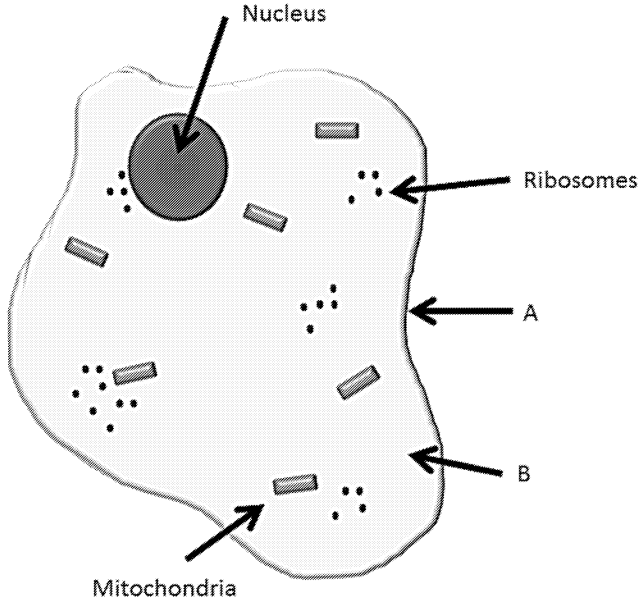
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## **Selected Question and Answer Pages**

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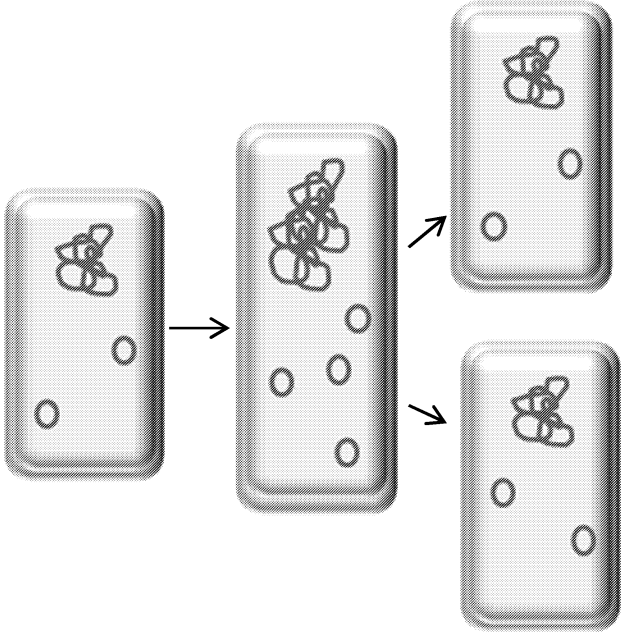
For demonstration only, the sample answer pages immediately follow their corresponding question pages

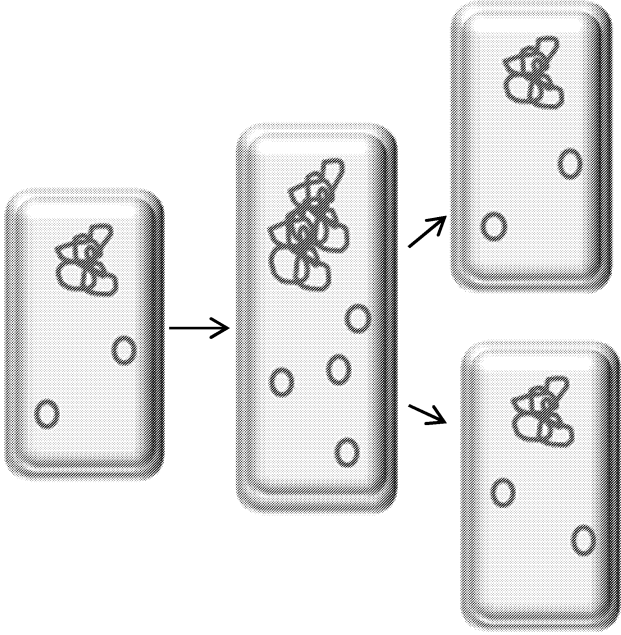
	Questions	Answers
1.1 Eukaryotes and Prokaryotes (cont.)	<p>What is the scientific name for bacteria?</p> <p>If an animal cell measures <math>2 \times 10^{-3}</math> mm across, and a bacterium is <math>2 \times 10^{-4}</math> mm long, how many times smaller are the bacteria?</p>	
1.2 Animal and Plant Cells	<p>Name the animal cell parts labelled A and B.</p>  <p>The diagram shows an animal cell with the following labeled parts:</p> <ul style="list-style-type: none"><li>Nucleus (large dark sphere)</li><li>Mitochondria (bean-shaped organelles)</li><li>Ribosomes (small dots)</li><li>A (cell membrane)</li><li>B (cytoplasm)</li></ul>	A.  B.

	Questions	Answers
<b>1.1 Eukaryotes and Prokaryotes (cont.)</b>	What is the scientific name for bacteria?	Prokaryotic cells
	If an animal cell measures $2 \times 10^{-3}$ mm across, and a bacterium is $2 \times 10^{-4}$ mm long, how many times smaller are the bacteria?	10 times. One order of magnitude. $2 \times 10^{-3} = 0.002$ $2 \times 10^{-4} = 0.0002$ $0.002/0.0002 = 10$
<b>1.2 Animal and Plant Cells</b>	Name the animal cell parts labelled A and B.  	A = Cell Membrane B = Cytoplasm



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	Questions	Answers
<b>1.6. Culturing Microorganisms</b>	<p>The image shows bacteria dividing. What term describes this?</p> 	
	<p>What controls how quickly bacteria divide?</p>	
	<p>If you know the mean division time of bacteria, and the total growth time:</p> <ul style="list-style-type: none"> <li>• How do you calculate total number of bacteria?</li> <li>• How many bacteria are there if you start with one bacteria, and they divide every hour for 10 hours?</li> </ul>	

	Questions	Answers
<b>1.6. Culturing Microorganisms</b>	<p>The image shows bacteria dividing. What term describes this?</p> 	<p>Binary fission</p>
	<p>What controls how quickly bacteria divide?</p>	<p>Available nutrients and temperature</p>
	<p>If you know the mean division time of bacteria, and the total growth time:</p> <ul style="list-style-type: none"> <li>• How do you calculate total number of bacteria?</li> <li>• How many bacteria are there if you start with one bacteria, and they divide every hour for 10 hours?</li> </ul>	<p>You use <math>1 \times 2^{\text{division time}}</math>  <math>1 \times 2^{10} = 1024</math></p>



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		<b>Questions</b>	<b>Answers</b>
<b>2.3 Metabolism</b>	<p>Select the most appropriate statement:</p> <ul style="list-style-type: none"> <li>• Metabolism is the building of new substances in the body</li> <li>• Metabolism is the breakdown of large molecules in the body</li> <li>• Metabolism is the sum of all chemical reactions in the body</li> <li>• Metabolism is the production of new enzymes in the body</li> </ul>		
	<p>Proteins are made from, and break down into what?</p>		
	<p>Enzymes are vital to metabolism and are made from _____.</p>		
	<p>Carbohydrates are metabolised to form new molecules, including (pick as many as apply):</p> <ul style="list-style-type: none"> <li>• Amylase</li> <li>• Starch</li> <li>• Triglyceride</li> <li>• Cellulose</li> <li>• All of the above</li> </ul>		
	<p>Which of these form part of the body's process of metabolism?</p> <ul style="list-style-type: none"> <li>• Chemical reactions</li> <li>• Physical forces</li> <li>• Biological organisms</li> </ul>		

	Questions	Answers
<b>2.3 Metabolism</b>	<p>Select the most appropriate statement:</p> <ul style="list-style-type: none"> <li>• Metabolism is the building of new substances in the body</li> <li>• Metabolism is the breakdown of large molecules in the body</li> <li>• Metabolism is the sum of all chemical reactions in the body</li> <li>• Metabolism is the production of new enzymes in the body</li> </ul>	Metabolism is the sum of all chemical reactions in the body
	Proteins are made from, and break down into what?	Amino acids
	Enzymes are vital to metabolism and are made from _____.	Proteins
	<p>Carbohydrates are metabolised to form new molecules, including (pick as many as apply):</p> <ul style="list-style-type: none"> <li>• Amylase</li> <li>• Starch</li> <li>• Triglyceride</li> <li>• Cellulose</li> <li>• All of the above</li> </ul>	Starch Cellulose
	<p>Which of these form part of the body's process of metabolism?</p> <ul style="list-style-type: none"> <li>• Chemical reactions</li> <li>• Physical forces</li> <li>• Biological organisms</li> </ul>	Chemical reactions



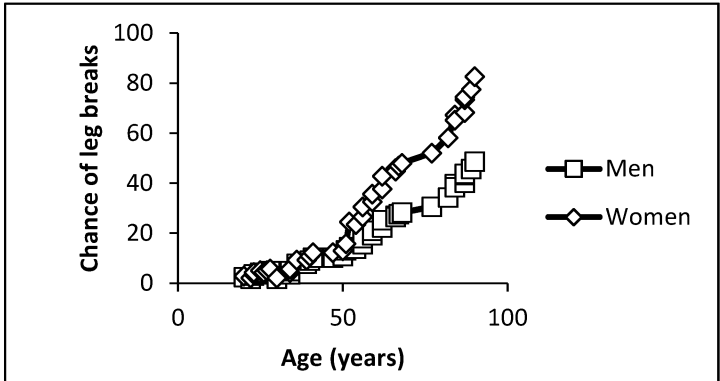
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## **Additional Selected Question Pages**

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		Questions	Answers									
<b>2.5. Health Issues (cont.)</b>		Connect the conditions that might interact:	<table border="1" style="display: inline-table; margin-right: 20px;"> <tr><td>Immune System Defect</td></tr> <tr><td>Long-term Illness</td></tr> <tr><td>Human Papilloma Virus</td></tr> </table> <table border="1" style="display: inline-table;"> <tr><td>Cancer</td></tr> <tr><td>Prone to Infectious Diseases</td></tr> <tr><td>Depression</td></tr> </table>	Immune System Defect	Long-term Illness	Human Papilloma Virus	Cancer	Prone to Infectious Diseases	Depression			
	Immune System Defect											
Long-term Illness												
Human Papilloma Virus												
Cancer												
Prone to Infectious Diseases												
Depression												
	<p>The graph below shows data corresponding to a career as a coal miner and the risk of developing lung cancer.</p> <div style="border: 1px solid black; padding: 10px; margin: 10px 0;"> <table border="1" style="margin: 0 auto; text-align: center;"> <caption>Risk of lung cancer (%) by years of coal mining</caption> <thead> <tr> <th>Years of coal mining</th> <th>Risk of lung cancer (%)</th> </tr> </thead> <tbody> <tr> <td>0-10</td> <td>~3</td> </tr> <tr> <td>11-20</td> <td>~21</td> </tr> <tr> <td>21-30</td> <td>~34</td> </tr> <tr> <td>31-40</td> <td>~56</td> </tr> </tbody> </table> </div> <ol style="list-style-type: none"> <li>What does this graph tell us about the risk of developing lung cancer in a sample of coal miners?</li> <li>A large proportion of this sample group also smoked heavily. Why is this sampling not scientifically valid?</li> </ol>	Years of coal mining	Risk of lung cancer (%)	0-10	~3	11-20	~21	21-30	~34	31-40	~56	
Years of coal mining	Risk of lung cancer (%)											
0-10	~3											
11-20	~21											
21-30	~34											
31-40	~56											

**2.6. The Effect of Lifestyle on Some Non-communicable Diseases**

Questions	Answers
<p>List two factors that might put you at risk of developing a non-communicable disease</p>	
<p>Why does smoking pose a risk to a country's health service? What type of disease might smoking cause?</p>	
<p>The graph below shows the chance of leg breaks in men and women of various age groups.</p>  <p>Which conclusion can be drawn from the graph?</p> <ol style="list-style-type: none"> <li>Children do not break their legs</li> <li>People over the age of 75 are as likely to break their legs as people aged 40–60.</li> <li>Women over the age of 75 are more likely to break their legs than men over the age of 75.</li> </ol>	

	Questions	Answers							
<b>2.6. The Effect of Lifestyle on Some Non-communicable Diseases (cont.)</b>	Why is sampling important in biology?								
	A class are measuring their height. Why is it important to measure an equal number of boys and girls?								
	What is meant by 'risk factor'?								
	Match the likely causation to the disease.	<table border="1"> <tr><td>Obesity</td></tr> <tr><td>Alcohol</td></tr> <tr><td>Diet</td></tr> <tr><td>Smoking</td></tr> </table> <table border="1"> <tr><td>Heart Disease</td></tr> <tr><td>Type 2 Diabetes</td></tr> <tr><td>Lung Cancer</td></tr> <tr><td>Liver Disease</td></tr> </table>	Obesity	Alcohol	Diet	Smoking	Heart Disease	Type 2 Diabetes	Lung Cancer
Obesity									
Alcohol									
Diet									
Smoking									
Heart Disease									
Type 2 Diabetes									
Lung Cancer									
Liver Disease									
<b>2.7. Cancer</b>	Cancer is the unregulated _____ of cells								
	What is meant by the terms 'benign' and 'malignant'?								

		Questions	Answers		
<b>2.7. Cancer (cont.)</b>		Tumours are either benign or malignant. Tick either 'benign' or 'malignant' for each row of the table.		<b>Benign</b>	<b>Malignant</b>
			Contained within a membrane		
			Invasive		
	Spreads between multiple tissues				
		Not necessarily harmful			
	Identify which are cancer risk factors, and which aren't:		<b>Risk Factor</b>	✓/✗	
		Tobacco			
		UV exposure			
		Exposure to computer screens			
		Alcohol			
		Genetics			
		High fruit diet			
	Random changes in what can cause a cell to become cancerous?				