



**Biology**

GCSE (9-1) | AQA | 8461



**2016 specification**  
first exams in 2018

# Learning Grids

For GCSE (9-1) AQA Biology

*Paper 2 (Topics 5-7): Homeostasis and response; Inheritance, variation and evolution; Ecology*

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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 **Sections 5 –7: Homeostasis and Response, Inheritance, Variation and Evolution and Ecology** within the **AQA GCSE (9 –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.

This resource directly references:

AQA GCSE Biology (3<sup>rd</sup> Edition)  
Fullick and Ryan

AQA GCSE (9-1) Biology  
Dixon and Hodgson

Each learning grid is closely linked to the AQA 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.
- **Required Practicals** ask 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.

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!

## 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](http://zzed.uk/freeupdates)

## **Selected Question and Answer Pages**

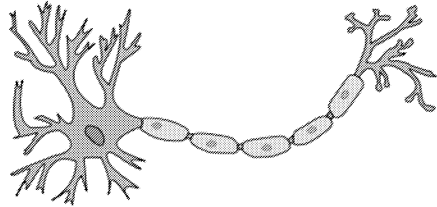
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For demonstration only, the sample answer pages immediately follow their corresponding question pages

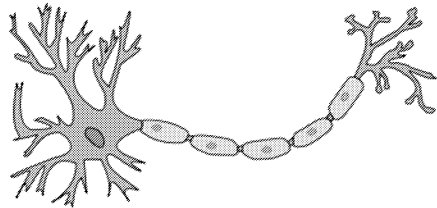

## 5.2 The human nervous system

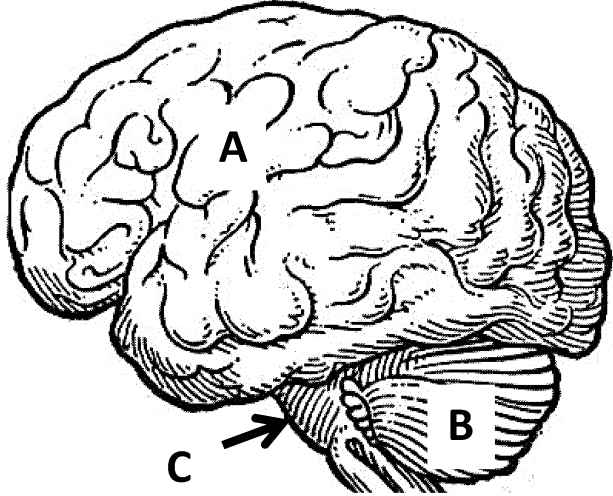


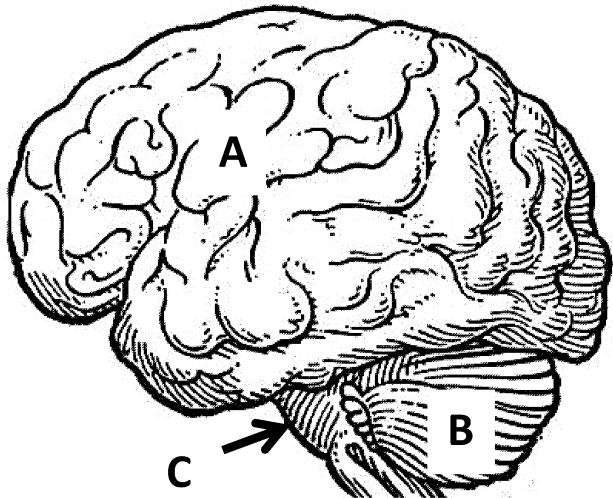
Hodder: pp. 133–147  
Oxford: pp. 148–157, 182–184

		Questions	Answers
5.2.1 Structure and function		Give an example of a 'sense organ'.	
		Name the stimulus that this sense organ detects.	
		What type of cell is this?  	
		Complete this flow chart of a typical nerve response:	<div style="border: 1px solid black; height: 40px; width: 100%;"></div> <div style="text-align: center;">↓</div> <div style="border: 1px solid black; height: 40px; width: 100%;"></div> <div style="text-align: center;">↓</div> <div style="border: 1px solid black; height: 40px; width: 100%;"></div> <div style="text-align: center;">↓</div> <div style="border: 1px solid black; height: 40px; width: 100%;"></div> <div style="text-align: center;">↓</div> <div style="border: 1px solid black; height: 40px; width: 100%;"></div>

## 5.2 The human nervous system

		Questions	Answers
<b>5.2.1 Structure and function</b>		Give an example of a 'sense organ'.	Eye; Skin; Nose; Tongue; Ear
		Name the stimulus that this sense organ detects.	Light (sight); Pressure (feel); Temperature (feel); Pain (feel); Chemicals (scent); Chemicals (taste); Vibrations (sound)
		What type of cell is this?  	Neurone
		Complete this flow chart of a typical nerve response:	<div style="text-align: center;"> <div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 0 auto;">Stimulus</div> <div style="text-align: center;">↓</div> <div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 0 auto;">Receptor</div> <div style="text-align: center;">↓</div> <div style="display: flex; align-items: center; justify-content: center;"> <div style="border: 1px solid black; width: 100px; height: 20px; margin-right: 10px;"></div> <div style="font-size: 20px;">C</div> </div> <div style="display: flex; align-items: center; justify-content: center; margin-top: 10px;"> <div style="border: 1px solid black; width: 100px; height: 20px; margin-right: 10px;"></div> <div style="border: 1px solid black; width: 100px; height: 20px; margin-right: 10px;"></div> <div style="border: 1px solid black; width: 100px; height: 20px; margin-right: 10px;"></div> </div> </div> <div style="text-align: right; margin-top: 20px;">   <b>© ZigZag Education</b> </div>

	Questions	Answers
<b>5.2.2 The brain</b>	<p>Identify the parts labelled A, B and C in the figure below.</p> 	
	<p>The human brain is made up of how many neurones?</p> <ul style="list-style-type: none"> <li>• 1 million</li> <li>• 10 million</li> <li>• 1 billion</li> <li>• 10 billion</li> <li>• 100 billion</li> </ul>	
	<p>What is the function of part A in the figure above?</p>	
	<p>What does a neuroscientist study?</p>	
	<p>(HT only) Explain why our understanding of the brain is limited.</p>	

		Questions	Answers
<b>5.2.2 The brain</b>		<p>Identify the parts labelled A, B and C in the figure below.</p> 	<p>A – Cerebral cortex B – Cerebellum C – Medulla</p>
		<p>The human brain is made up of how many neurones?</p> <ul style="list-style-type: none"> <li>• 1 million</li> <li>• 10 million</li> <li>• 1 billion</li> <li>• 10 billion</li> <li>• 100 billion</li> </ul>	<p>100 billion (100,000,000,000)</p>
		<p>What is the function of part A in the figure above?</p>	<p>Consciousness, intelligence, memory</p>
		<p>What does a neuroscientist study?</p>	<p>The nervous system and its functions</p>
		<p>(HT only) Explain why our understanding of the brain is limited.</p>	<p>It is very delicate and is protected. Studying its functions is difficult.</p>



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## 7.5 Food production

	Questions	Answers
7.5.1. Factors affecting food security	What is meant by the term 'food security'?	
	Name one biological factor and one non-biological factor that affect food security.	
	A government has suggested purchasing large amounts of land and intensively farming it to increase food security.  Why might this not be considered 'sustainable food production'?	
7.5.2 Farming techniques	True or false? Eating meat is more efficient for humans than eating plants.	
	Explain the reason a farmer might keep his entire herd of cows in a small pen to limit their movement.	
	Why might people ethically object to modern intensive farming techniques?	

## 7.5 Food production


	Questions	Answers
<b>7.5.1. Factors affecting food security</b>	What is meant by the term 'food security'?	Having enough food to feed the population.
	Name one biological factor and one non-biological factor that affect food security.	Biological: increased birth rate; changing diet; new pests and pathogens; environmental change; Non-biological: cost of agriculture; war
	A government has suggested purchasing large amounts of land and intensively farming it to increase food security. Why might this not be considered 'sustainable food production'?	Intensive farming can destroy land and soil, making it difficult to farm on that land in the future. Sustainability means that we should be able to feed future populations as well as our own.
<b>7.5.2 Farming techniques</b>	True or false? Eating meat is more efficient for humans than eating plants.	False: the fewer trophic levels between producer and consumer, the better in terms of efficiency.
	Explain the reason a farmer might keep his entire herd of cows in a small pen to limit their movement.	Movement uses energy, which means he would have to feed the cows more if they moved more.
	Why might people ethically object to modern intensive farming techniques?	Use of protein sources that could have been used to take up a lot of land; reduce biodiversity

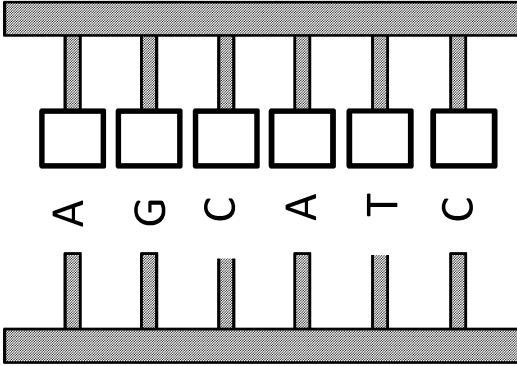


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## **Additional Selected Question Pages**

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	Questions	Answers
<b>6.1.4 DNA and the genome</b>	What is the shape and structure of a DNA molecule?	
	What name is given to the collection of all information carried by DNA?	
	<p>What is the name of this structure? What is it made from?</p> 	
	<p>Fill in the blanks in this description:</p>	<p>DNA is composed of elements called _____, each of which codes for a particular sequence of _____. These are the building blocks of _____ that perform most of the body's functions.</p> <p>Faults in the _____ of DNA can cause problems with the proteins and lead to diseases.</p>
	<p>Using ticks and crosses, identify the correct and incorrect statements describing the importance of the human genome project.</p>	<p>Enables a better understanding of the genes that cause disease.</p> <p>Limited the amount of money spent on medical research.</p> <p>Knowing more about the cause of diseases will help to treat the diseases.</p> <p>Better understanding of inherited disorders.</p> <p>Caused fewer jobs to be available for scientists.</p> <p>Able to trace human migration patterns from history.</p>

		Questions	Answers
<b>6.1.5 DNA structure</b>		Describe the structure of a single nucleotide.	
		Identify the missing bases: A, __, T and ____	
		Fill in the blanks with numbers:	DNA is made up of _____ strands, wound into a helix. There are _____ bases in the DNA sequence. These bases code for protein. A code of _____ bases codes for _____ amino acid.
		(HT only) Fill in the blanks so that this DNA structure matches its complementary strand perfectly:	
	(HT only) Order this description of how proteins are made from DNA:		
	<ol style="list-style-type: none"> <li>1. Amino acids align to the template sequence in order.</li> <li>2. The template binds to a ribosome.</li> <li>3. A template is made and released to the cytoplasm.</li> <li>4. Carrier molecules carry amino acids to the template.</li> <li>5. The formed protein folds into its specific shape.</li> <li>6. The formed protein detaches from the ribosome.</li> </ol>		

	Questions	Answers
<b>6.1.5 DNA structure (continued)</b>	(HT only) Mutations are frequently seen as bad things in movies – why is this not always true?	
	(HT only) A lot of DNA does not code for proteins. How do mutations in these regions affect an organism?	
	(HT only) A mutation can alter the structure of the active site of the lactase enzyme. Lactase normally breaks down lactose for digestion. How might this mutation affect a human’s ability to drink milk?	
	(HT only) True or false? Mutations always alter the protein, changing its function.	
	(HT only) Complete the blanks in this description:	Proteins are synthesised on _____. The exact protein is determined by the sequence of DNA _____ in the template. Carrier proteins carry _____ to the suitable base.
	(HT only) Why are there over 3 billion pairs of nucleotides, but only 21,000 genes?	
	(HT only) How might changing a single base change a protein?	

	Questions	Answers								
<b>6.1.6 Genetic Inheritance</b>	<p>Complete the gaps:</p>	<p>Sex cells, such as sperm and eggs, are called _____. In cell nuclei, the DNA can be arranged into _____. Many genes on a chromosome might have different forms called _____. If both copies of an allele are required to make a protein, the allele is considered _____. However, if only one copy of the allele is required, it is considered _____.</p>								
	<p>True or false? Most characteristics, such as height, hair colour or skin tone, are controlled by a single gene.</p>									
	<p>Select the most appropriate answer:</p> <ul style="list-style-type: none"> <li>• The genotype is controlled at the protein level.</li> <li>• The phenotype is not controlled by DNA at all.</li> <li>• The genotype is controlled at the DNA level.</li> <li>• The phenotype is a result of mutations.</li> </ul>									
	<p>If dotted fur is recessive, and both parents have dotted fur, what is the probability of the offspring having dotted fur?</p>									
	<p>a) Complete this Punnett square of a cross between Bb and bb.</p> <p>b) What is the ratio of homozygous to heterozygous offspring?</p>	<p>a)</p> <table border="1" data-bbox="1344 1236 2060 1380" style="margin-left: auto; margin-right: auto;"> <tr> <td></td> <td style="text-align: center;"><b>B</b></td> <td style="text-align: center;"><b>b</b></td> </tr> <tr> <td style="text-align: center;"><b>b</b></td> <td></td> <td></td> </tr> <tr> <td style="text-align: center;"><b>b</b></td> <td></td> <td></td> </tr> </table> <p>b)</p>		<b>B</b>	<b>b</b>	<b>b</b>			<b>b</b>	
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