

# AQA

## GCSE

# BIOLOGY

## SET A – Foundation Tier

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# Answers

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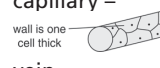
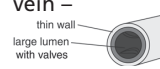
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# Paper 1

Question	Answer(s)	Extra info	Mark(s)	AO/Spec ref.
01.1	<b>B</b> any <b>one</b> from: • axon / long fibre • nerve endings • cell body • sheath		1 1	<b>AO1</b> 4.1.1.3
01.2	<b>C</b> projection / hair	allow is the only plant cell or point that implies this e.g. it is the only one with a cell wall / large vacuole	1 1	<b>AO1</b> 4.1.1.3
01.3	<b>A</b> tail	allow can swim	1 1	<b>AO1</b> 4.1.1.3
01.4	<b>C</b> any <b>one</b> from: • has a cell wall • has a large vacuole	allow is a root hair cell	1 1	<b>AO1</b> 4.1.1.2
02.1	oxygen		1	<b>AO1</b> 4.4.1.1
02.2	palisade mesophyll		1	<b>AO1</b> 4.2.3.1
02.3	$C_6H_{12}O_6$		1	<b>AO1</b> 4.4.1.1
02.4	amino acids – protein synthesis cellulose – strengthen cell walls starch – food storage all three correct for 2 marks one or two correct for 1 mark	each extra line negates a mark	2	<b>AO1</b> 4.4.1.3
02.5	phloem translocation	in this order only	1 1	<b>AO1</b> 4.2.3.2
02.6	midday it is warmer the light is brighter	allow the stomata are fully open	1 1 1	<b>AO2/</b> <b>AO3</b> 4.4.1.2

Question	Answer(s)	Extra info	Mark(s)	AO/Spec ref.
03.1	plasma – carry dissolved food and other substances around the body platelets – form blood clots white blood cells – protect the body against infection all three correct for 2 marks one or two correct for 1 mark	each extra line negates a mark	2	<b>AO1</b> 4.2.2.3
03.2	more likely to become infected <b>or</b> less able to defend against pathogens		1	<b>AO2</b> 4.3.1.6
03.3	artery –  capillary –  vein –  all three correct for 2 marks one or two correct for 1 mark	each extra line negates a mark	2	<b>AO1</b> 4.2.2.2
03.4	less oxygen / glucose gets to heart muscle heart muscle respire less / works less efficiently		1 1	<b>AO1/</b> <b>AO2</b> 4.2.2.4 4.4.2.1
03.5	artificial heart this will keep the patient alive until donor heart available		1 1	<b>AO3</b> 4.2.2.4
04.1	blocks oxygen / air from the water <b>or</b> stops larva / pupa breathing <b>or</b> prevents mosquitoes laying eggs <b>or</b> hampers adult emerging reduces risk of being bitten		1 1	<b>AO2</b> 4.3.1.5
04.2	they are unlikely to bite someone with malaria so they do not carry / transmit <i>Plasmodium</i> (if they bite someone else)		1 1	<b>AO3</b> 4.3.1.5

Question	Answer(s)	Extra info	Mark(s)	AO/Spec ref.
04.3	measles – viral rose black spot – fungal salmonella food poisoning – bacterial all three correct for 2 marks one or two correct for 1 mark	each extra line negates a mark	2	AO1 4.3.1.2 4.3.1.3 4.3.1.4
04.4	it has a nucleus it does not have a cell wall	allow it does not have plasmids allow DNA is not in a loop allow it does not have a (slime) capsule allow it does not have flagella	1 1	AO2 4.1.1.1
05.1	aspirin – willow tree digitalis – foxglove plant penicillin – <i>Penicillium</i> mould all three correct for 2 marks one or two correct for 1 mark	each extra line negates a mark	2	AO1 4.3.1.9
05.2	any <b>two</b> from: • it's easier / quicker • it's cheaper • can produce in greater quantities		2	AO2 4.3.1.9
05.3	<b>Level 2:</b> A detailed and coherent argument is given, describing the effect of aspirin upon the risk of dying from cancer. <b>Level 1:</b> Discrete relevant points are made, although the arguments may not be clear.		3–4 1–2	AO3 4.2.2.5

Question	Answer(s)	Extra info	Mark(s)	AO/Spec ref.
	<b>No relevant content</b>		0	
	<b>Indicative content</b> <ul style="list-style-type: none"> <li>starting to take aspirin up to 2 years (before death) has no effect on risk of dying from cancer / there is no difference between taking aspirin and taking a placebo</li> <li>starting to take aspirin for more than 2 years (before death) reduces risk of dying from cancer / compared with a placebo</li> <li>as time from starting to take aspirin before death increases, aspirin has a greater effect reducing risk of dying from cancer / compared with a placebo</li> </ul>			
06.1	fermentation		1	AO1 4.4.2.1
06.2	keep out oxygen so yeast does anaerobic respiration <b>or</b> so yeast cannot use aerobic respiration, which gives different products		1 1	AO2 4.4.2.1
06.3	to allow carbon dioxide to escape otherwise pressure will build up		1 1	AO2 4.4.2.1
06.4	glucose → lactic acid	all correct for 2 marks allow 1 mark if glucose shown as reactant <b>or</b> lactic acid shown as product deduct mark for each additional incorrect reactant or product (e.g. oxygen, carbon dioxide) allow correct symbols in place of glucose or lactic acid	2	AO1 4.4.2.1
06.5	any <b>one</b> from: • lactic acid causes fatigue / aches • anaerobic respiration transfers less energy than aerobic respiration		1	AO2 4.4.2.1 4.4.2.2
07.1	8		1	AO2 4.1.1.6

Question	Answer(s)	Extra info	Mark(s)	AO/Spec ref.
07.2	(step 1:) to sterilise the loop / kill any unwanted microorganisms (step 2:) to avoid killing bacteria from the culture (step 8:) to prevent water dropping on to the colonies / prevent any airborne microorganisms falling onto the agar (step 9:) warm enough to encourage growth / not warm enough to <b>encourage</b> growth of harmful pathogens / not warm enough to kill the bacteria		1 1 1 1	<b>AO1</b> 4.1.1.6
07.3	<b>C</b> it has the largest area with no bacteria growing / largest zone of inhibition		1 1	<b>AO3</b> 4.1.1.6
07.4	to work out a mean / average the zones are not perfect circles		1 1	<b>AO2</b> 4.1.1.6
08.1	(spines) deter animals so plant is not eaten (waxy coating) provides a barrier against microorganisms <b>OR</b> heat to help survive in the desert		1 1 1 1	<b>AO2</b> 4.3.3.2
08.2	any <b>two</b> from: • yellow / pale green (in colour) • (magnesium is) needed to make chlorophyll • cannot photosynthesise as much		2	<b>AO2</b> 4.3.3.1
09.1	malignant benign	in this order only	1 1	<b>AO1</b> 4.2.2.7
09.2	allow air to move in and out of lungs		1	<b>AO1</b> 4.2.2.2
09.3	undifferentiated / unspecialised cells that can develop into other types of cell		1 1	<b>AO1</b> 4.1.2.3
09.4	ethical / religious objection to using human stem cells	ignore unqualified reference to ethical / religious objection  allow other specific ethical / religious objection	1	<b>AO1</b> 4.1.2.3
09.5	(stem cells / new cells) not attacked by patient's immune system / white blood cells	allow no ethical / religious objections	1	<b>AO2</b> 4.3.1.6

Question	Answer(s)	Extra info	Mark(s)	AO/Spec ref.
10.1	(medicines like aspirin) are painkillers / treat the symptoms (antibiotics) do not kill viruses		1 1	<b>AO2</b> 4.3.1.8
10.2	any <b>two</b> from: • test for toxicity / safety • test for efficacy / effectiveness • test to find best dose		2	<b>AO1</b> 4.3.1.9
10.3	<b>Level 2:</b> A detailed and coherent argument is given, which explains why placebos should be used with healthy volunteers but not ill patients.		3–4	<b>AO3</b> 4.3.1.9
	<b>Level 1:</b> Discrete relevant points are made, although the arguments may not be clear.		1–2	
	<b>No relevant content</b>		0	
	<b>Indicative content</b> • a placebo is a treatment that does not contain the (active) medicine / drug • placebos are used with a control group / to compare with the group taking the medicine / drug • placebos can be used with healthy volunteers • placebos should not be used with ill patients • if ill patients took placebos then would not be getting any treatment • trials involving ill patients should use currently available medicines / drugs for the control group			
10.4	to avoid bias	allow so that neither doctors or participants know who has received the (active) medicine / drug (until the trial is completed)	1	<b>AO2</b> 4.3.1.9
11.1	in order: virus, red blood cell, ant, acorn  all correct for <b>2</b> marks allow <b>1</b> mark if three are in the correct order		2	<b>AO2</b> 4.1.1.1
11.2	60 mm = 60 000 $\mu\text{m}$ magnification = $60\,000 \div 12 = 5000$ <b>OR</b> if converted to $\text{mm} = \frac{60 \times 10^3}{12 \times 10^{-6}} = 5000$	allow 5000 with no working shown for <b>3</b> marks  allow equivalent marking points if 12 $\mu\text{m}$ is converted to 0.012 mm	1 1 1	<b>AO2</b> 4.1.1.5

Question	Answer(s)	Extra info	Mark(s)	AO/Spec ref.
11.3	to make the structures more visible to have a large field of view / to see the layout of cells / easier to locate cells		1  1	<b>AO1</b> 4.1.1.2
12.1	all points correctly plotted <b>2 marks</b> <b>but</b> three or four points correctly plotted <b>1 mark</b> anomalous result (25 mm) circled straight line of best fit through all points except anomalous result	allow ± half a small square	2   1  1	
12.2	as water evaporated / transpired from the leaves, water was pulled through the capillary tube (moving the air bubble)		1	<b>AO2</b> 4.2.3.2
12.3	<b>Level 3:</b> A coherent method is described with relevant detail, which demonstrates a broad understanding of the relevant scientific techniques and procedures. The steps in the method are logically ordered. The method would lead to the collection of valid results.		5–6	<b>AO3</b> 4.2.3.2
	<b>Level 2:</b> The bulk of a method is described with mostly relevant detail, which demonstrates a reasonable understanding of the relevant techniques and procedures. The method may not be in a completely logical sequence and may be missing some detail.		3–4	
	<b>Level 1:</b> Discrete relevant points are made which demonstrate some understanding of the relevant scientific techniques and procedures. They may lack a logical structure and would not lead to the production of valid results.		1–2	
	<b>No relevant content</b>		0	
	<b>Indicative content</b> <ul style="list-style-type: none"><li>independent variable is air movement</li><li>air movement varied by altering the speed of the fan / distance of fan from plant using measuring equipment</li><li>dependent variable is distance bubble moves in a given time or time for bubble to move a given distance</li><li>control variables include: same plant, temperature, light intensity, humidity</li><li>repeat readings and calculate means</li></ul>			

## Paper 2

Question	Answer(s)		Extra info	Mark(s)	AO/Spec ref.															
01.1	blood vessels dilate (get wider) sweat is produced			1 1	<b>AO1</b> 4.5.2.4															
01.2	brain blood		in this order only	1 1	<b>AO1</b> 4.5.2.4															
01.3	<table border="1"><thead><tr><th>Process</th><th>Increases water in the body</th><th>Decreases water in the body</th></tr></thead><tbody><tr><td>Breathing</td><td></td><td>✓</td></tr><tr><td>Eating</td><td>✓</td><td></td></tr><tr><td>Sweating</td><td></td><td>✓</td></tr><tr><td>Urinating</td><td></td><td>✓</td></tr></tbody></table>		Process	Increases water in the body	Decreases water in the body	Breathing		✓	Eating	✓		Sweating		✓	Urinating		✓		2	<b>AO1</b> 4.5.3.3
	Process	Increases water in the body	Decreases water in the body																	
	Breathing		✓																	
	Eating	✓																		
	Sweating		✓																	
	Urinating		✓																	
all four rows correct for <b>2 marks</b> two or three rows correct for <b>1 mark</b>																				
01.4	homeostasis			1	<b>AO1</b> 4.5.1															
02.1	X = pituitary Y = pancreas Z = adrenal			1 1 1	<b>AO1</b> 4.5.3.1															
02.2	in the blood (system)			1	<b>AO1</b> 4.5.3.1															
02.3	insulin – pancreas oestrogen – ovary testosterone – testis all three correct for <b>2 marks</b> one or two correct for <b>1 mark</b>	each extra line negates a mark		2	<b>AO1</b> 4.5.3.2 4.5.3.4															
02.4	(type 1) diabetes			1	<b>AO1</b> 4.5.3.2															
03.1	Arctic willow / grass			1	<b>AO2</b> 4.7.2.1															
03.2	Arctic fox / snowy owl			1	<b>AO2</b> 4.7.2.1															
03.3	the number would increase they have more food / Arctic hares to eat <b>or</b> there is less competition for food (with the Arctic foxes)			1 1	<b>AO3</b> 4.7.1.1															
03.4	community			1	<b>AO1</b> 4.7.1.1															
03.5	mates			1	<b>AO1</b> 4.7.1.3															

Question	Answer(s)	Extra info	Mark(s)	AO/Spec ref.										
03.6	any <b>one</b> adaptation with corresponding explanation: sharp / pointed teeth; to catch prey  sharp / pointed claws; to catch prey  eyes at front of head; binocular vision / judge distance  white fur; camouflage	only award explanation mark if it matches with the adaptation	2	<b>AO2</b> 4.7.1.4										
03.7	any <b>one</b> adaptation with corresponding explanation: eyes at side of head; wide field of view  large ears; hear predators  white fur; camouflage  long legs; escape from predators	only award explanation mark if it matches with the adaptation	2	<b>AO2</b> 4.7.1.4										
04.1	FSH – causes eggs to mature LH – stimulates the release of eggs  Progesterone – maintains uterus lining  all three correct for 2 marks  one or two correct for 1 mark	each extra line negates a mark	2	<b>AO1</b> 4.5.3.4										
04.2	<table><tr><th>Type of cell</th><th>Number of chromosomes in cell</th></tr><tr><td>Sperm</td><td>23</td></tr><tr><td>Egg</td><td>23</td></tr><tr><td>Fertilised egg</td><td>46</td></tr><tr><td>Embryo</td><td>46</td></tr></table> all three correct for 2 marks one or two correct for 1 mark	Type of cell	Number of chromosomes in cell	Sperm	23	Egg	23	Fertilised egg	46	Embryo	46		2	<b>AO2</b> 4.6.1.2
Type of cell	Number of chromosomes in cell													
Sperm	23													
Egg	23													
Fertilised egg	46													
Embryo	46													
04.3	differentiation		1	<b>AO1</b> 4.6.1.2										

Question	Answer(s)	Extra info	Mark(s)	AO/Spec ref.
04.4	diaphragm – prevents sperm reaching egg intrauterine device (IUD) – prevents fertilised egg implanting oral contraceptive – prevents eggs maturing spermicide – kills sperm all four correct for 3 marks two or three correct for 2 marks one correct for 1 mark	each extra line negates a mark	3	<b>AO1</b> 4.5.3.5
05.1	100 – 13 – 4 – 9 – 58 = 16 (%)	allow 16 (%) with no working shown for 2 marks	1 1	<b>AO2</b> 4.7.3.5
05.2	emissions from power stations burning fossil fuels / oil / coal / (natural) gas		1 1	<b>AO1</b> 4.7.2.2
05.3	industrial sector – no mark on own jet fuel produces 20% of 58% = 12%	allow industrial sector because jet fuel produces 12 (%) 1 mark	1 1	<b>AO2</b> 4.7.3.5
05.4	global warming	allow increased greenhouse effect ignore greenhouse effect allow description of consequences of global warming, e.g. flooding / drought / famine / climate change	1	<b>AO1</b> 4.7.3.5
05.5	photosynthesis		1	<b>AO1</b> 4.7.2.2
06.1	scar		1	<b>AO2</b> 4.6.2.1
06.2	DNA double helix chromosome	in this order only	1 1 1	<b>AO1</b> 4.6.1.4

Question	Answer(s)	Extra info	Mark(s)	AO/Spec ref.									
06.3	<table><tr><td></td><td>A</td><td>a</td></tr><tr><td>A</td><td>AA</td><td>Aa</td></tr><tr><td>a</td><td>Aa</td><td>aa</td></tr></table> <p>all three correct for <b>2</b> marks one or two correct for <b>1</b> mark</p>		A	a	A	AA	Aa	a	Aa	aa		2	<b>AO2</b> 4.6.1.6
	A	a											
A	AA	Aa											
a	Aa	aa											
06.4	wet (earwax)		1	<b>AO2</b> 4.6.1.6									
06.5	heterozygous		1	<b>AO2</b> 4.6.1.6									
07.1	(intensively reared hens) use less energy / biomass moving  so more energy / biomass is used for egg production		1  1	<b>AO1</b> 4.7.4.3 4.7.5.2									
07.2	(cost more because) fewer eggs are produced so farmers need to charge more to maintain income  (people pay more because) they have ethical objections to intensive farming, e.g. concerns about animal welfare		1  1	<b>AO3</b> 4.7.5.2									
07.3	climate change – less water available for crops  increasing birth rate – more people need food  pests – eat or damage crops  all three correct for <b>2</b> marks  one or two correct for <b>1</b> mark	each extra line negates a mark	2	<b>AO2</b> 4.7.5.1									
07.4	quotas: limit number that can be caught / enough are left to breed and maintain population  net size: smaller nets catch fewer fish / larger hole sizes allow smaller fish to escape and breed		1  1	<b>AO2</b> 4.7.5.3									
08.1	select a male and female with more meat than others  breed these together  from their offspring select those with most meat  use these for breeding  repeat over many generations		1  1  1  1	<b>AO1</b> 4.6.2.3									
08.2	large udder to produce more milk  <b>OR</b>  smaller horns  to avoid harm to farmer / so energy can be used for meat/ milk production instead		2	<b>AO2</b> 4.6.2.3									

Question	Answer(s)	Extra info	Mark(s)	AO/Spec ref.
08.3	genetic engineering		1	AO1 4.6.2.4
09.1	so a large number of clones can be produced (and each needs its own mother)		1	AO2 4.6.2.5
09.2	other offspring		1	AO2 4.6.2.5
09.3	<p><b>Level 2:</b> A detailed and coherent argument is given, which explains at least one advantage and one disadvantage of growing from cuttings.</p> <p><b>Level 1:</b> Discrete relevant points are made, although the arguments may not be clear.</p> <p><b>No relevant content</b></p> <p><b>Advantages</b></p> <ul style="list-style-type: none"> <li>the new plants will have the same characteristics as the parents, so you know what characteristics the new plants will have</li> <li>it's quicker to grow new plants from cuttings</li> </ul> <p><b>Disadvantages</b></p> <ul style="list-style-type: none"> <li>the new plants will have the same characteristics as the parents, so there will be no new varieties</li> <li>the new plants will have the same characteristics as the parents, so if the original plant is susceptible to a disease / pest then so will the offspring</li> <li>(usually) fewer new plants produced from each parent plant (compared with growing from seeds)</li> </ul>		3–4 1–2 0	AO1/AO2 4.6.1.1 4.6.1.3 4.6.2.5
10.1	direction of light make sure light comes from all directions / dish is equally lit from all directions because seedlings will also respond to the direction of light / seedlings are phototropic		1 1 1	AO2 4.5.4.1
10.2	to make sure results are repeatable / to make sure result is not anomalous		1	AO2 4.5.4.1
10.3	auxin collected on lower side of shoot increased growth / elongation on lower side (causes upward growth)		1 1	AO2 4.5.4.1

Question	Answer(s)	Extra info	Mark(s)	AO/Spec ref.
10.4	seedlings would grow horizontally auxin is evenly distributed / seedling experiences gravity on all parts equally because of rotation so each side grows / elongates equally		1 1 1	AO3 4.5.4.1
11.1	0		1	AO2 4.7.2.1
11.2	8		1	AO2 4.7.2.1
11.3	all points correctly plotted 4 marks <b>but</b> at least 15 points for 3 marks <b>but</b> at least 10 points correctly plotted 2 marks <b>but</b> at least six points correctly plotted 1 mark points joined up to make a 'kite'	allow $\pm$ half a small square	4	AO2 4.7.2.1
11.4	<b>Level 2:</b> A detailed and coherent argument is given, which explains why species B and D are more common on the path and why species A and C are more common away from the path. <b>Level 1:</b> Discrete relevant points are made, although the arguments may not be clear. <b>No relevant content</b> <b>Indicative content</b> <ul style="list-style-type: none"> <li>species A and C are tall(er)</li> <li>species A and C are killed by mowing on the path</li> <li>species A and C can survive away from the path as they are tall enough to successfully compete for light</li> <li>species B and D are low-growing</li> <li>species B and D are not killed by mowing on the path / are missed by the mower</li> <li>species B and D cannot survive away from the path as they are not tall enough to successfully compete for light</li> </ul>		3–4 1–2 0	AO3 4.7.1.1 4.7.2.1

Question	Answer(s)	Extra info	Mark(s)	AO/Spec ref.
12.1	<b>Level 3:</b> A coherent evaluation is given, with relevant details, which demonstrates an understanding of the principles of investigations and analysis of results. <b>Level 2:</b> An evaluation is given with mostly relevant detail, which demonstrates a reasonable understanding of the relevant principles. The evaluation may not be completely logical and may be missing some detail. <b>Level 1:</b> Discrete relevant points are made which demonstrate some understanding of the relevant principles. <b>No relevant content</b> <b>Indicative content</b> <b>Method</b> <ul style="list-style-type: none"> <li>only recording the shortest time for each student is not as representative as taking the mean result for each student</li> <li>only using the right hand means that some students may not be using their dominant hand</li> <li>different numbers of girls and boys is taken into account by taking mean results</li> <li>sample sizes are small</li> </ul> <b>Conclusion</b> <ul style="list-style-type: none"> <li>it is correct that the mean time for the girls is less than for the boys</li> <li>the results for the boys show more variation than for the girls</li> <li>if the longest boys' result (0.32) is discounted then boys overall have the shortest reaction time</li> <li>the conclusion is based on a small sample size</li> <li>the conclusion should only apply to this way of measuring reaction time</li> </ul>		5–6 3–4 1–2 0	AO3 4.5.2.1
12.2	receptor = ear effector = hand muscles		1 1	AO2 4.5.2.1
12.3	electric impulses along neurones / nerve cells		1 1	AO1 4.5.2.1
12.4	no – no mark pressing the button is a conscious action <b>or</b> pressing the button is not an automatic action		1	AO2 4.5.2.1