

AQA Style

GCSE

BIOLOGY

Higher Tier

Biology Paper 1

H

Mark Scheme



Question 1

Question	Answers	Extra information	Mark
01.1	lipase		1
01.2	simple sugars/glucose		1
01.3	salivary glands pancreas	Answers in either order.	1 1
01.4	add Biuret reagent turns lilac/purple	Allow add sodium hydroxide and copper sulfate.	1 1
01.5	liver		1
01.6	bile emulsifies fat/forms small fat droplets which increases the surface area for digestion or bile is alkaline so it neutralises stomach acid (to create optimum pH for enzymes)	Allow 1 mark for a correct function of bile. For 2 marks, students must give both the function of bile and an explanation of how it increases the rate of fat digestion.	2



Question	Answers	Extra information	Mark
01.7	Level 3: There is a clear and detailed method which would produce valid results. The method must include at least one control variable and a description of what is being measured.		5-6
	Level 2: Most of the method is described with only some missing detail. The method must include at least one control variable or a description of what is being measured.		3-4
	Level 1: There are simple statements that give a brief description of parts of the method.		1-2
	No relevant content.		0
	Indicative content: <ul style="list-style-type: none">• Description of how the apparatus would be used.• Reference to the control of temperature using a water bath or electric heater.• Use of a measuring cylinder or syringe to measure the volume of starch solution and amylase solution.• Use of timer to record equal intervals between samples.• Use of iodine reagent to test for starch, including colour change to blue/black.• Identification of when starch is fully digested, because iodine remains orange/yellow.• Record the time taken for complete digestion by counting the number of wells tested positive for starch.• Repetition at different pH values.• Repetition of investigation, or comparison with other groups, and calculation of a mean.		
Total			15



Question 2

Question	Answers	Extra information	Mark
02.1	to remove excess solution/liquid/water from the carrot sticks		1
02.2	Any two from: <ul style="list-style-type: none">• cut carrots into sticks of equal size/length• use a wider range of concentrations of sugar solution• use smaller intervals of concentration of sugar solution• control volume of sugar solution• leave the carrots in the sugar solutions for a longer time• repeat the investigation		2
02.3	$\frac{0.8}{16.0} \times 100$ = (+) 5 (%)	An answer of (+) 5 (%) with no working scores 2 marks. Allow 1 mark for evidence of $\frac{0.8}{16.0}$.	1 1
02.4	the carrot sticks have different masses at the start percentage change allows results to be compared		1 1
02.5	all points plotted correctly straight line of best fit ignoring the point at (5.0, -20)	Allow $\pm \frac{1}{2}$ a small square. Allow error carried forward from 02.3 . Allow 1 mark for 4 or 5 points plotted correctly. Allow correct line of best fit for incorrectly plotted points.	2 1
02.6	water is lost (from the carrot sticks) by osmosis from the dilute solution inside the carrot to the concentrated solution in the test tube		1 1 1
Total			13



Question 3

Question	Answers	Extra information	Mark
03.1	antibiotic		1
03.2	<p>Any four from:</p> <ul style="list-style-type: none">• (small amounts of) dead/inactivate pathogen/<i>Salmonella</i>/bacteria• injected/introduced into the body• white blood cells are stimulated• to produce antibodies• antibodies are specific to <i>Salmonella</i>/the pathogen• if the pathogen/<i>Salmonella</i>/bacteria enters the body again, the correct antibodies are produced rapidly• to destroy the pathogen/<i>Salmonella</i>/bacteria/preventing infection		4



Question 3

Question	Answers	Extra information	Mark
03.3	Level 3: There is a clear description that includes points from all three stages. An explanation is provided for at least two of the stages.		5-6
	Level 2: There is a simple description that includes points from at least two different steps. An explanation is included for at least one of them.		3-4
	Level 1: There are simple statements about preparing uncontaminated cultures. Two marks can be given for any two valid statements.		1-2
	No relevant content.		0
	Indicative content: Step 1 <ul style="list-style-type: none">• Petri dish and agar are sterilised (by heating/autoclave/UV light/gamma radiation)• to kill unwanted bacteria/microorganisms <ul style="list-style-type: none">• inoculating loop is passed through a flame• to kill unwanted bacteria/microorganisms <ul style="list-style-type: none">• the neck of the culture bottle is flamed• to kill unwanted bacteria/microorganisms Step 2 <ul style="list-style-type: none">• inoculating loop or sterile swab is used to spread bacteria/<i>Salmonella</i> onto agar/Petri dish• lid of the petri dish is opened as little as possible/at an angle• to prevent unwanted microorganisms from entering Step 3 <ul style="list-style-type: none">• the Petri dish is sealed with tape• to prevent unwanted microorganisms from entering <ul style="list-style-type: none">• leaving some gaps• to prevent the growth of anaerobic pathogens/to ensure that enough oxygen can enter for normal growth <ul style="list-style-type: none">• the Petri dish is incubated• to allow the growth of bacteria/<i>Salmonella</i> <ul style="list-style-type: none">• at 25°C• to prevent the growth of harmful pathogen <ul style="list-style-type: none">• upside down• to prevent condensation dripping onto the agar/bacteria/<i>Salmonella</i>		



Question 3

Question	Answers	Extra information	Mark
03.4	B		1
03.5	the area where no bacteria is growing/ where the most bacteria was killed (zone of inhibition) is the largest (around handwash B)	Students must refer to the number or growth of bacteria/ <i>Salmonella</i> in their answer.	1
03.6	to show that bacterial growth is only affected by the handwash	Allow 'as a control'.	1
03.7	$\frac{4 \times 60}{40} = 6$ divisions	Allow evidence that 4 hours = 6 divisions.	1
	$2000 \times 2^6 = 128\ 000$	Allow other correct methods of calculation.	1
	1.28×10^5	1.28×10^5 with no working scores 3 marks.	1
Total			17



Question 4

Question	Answers	Extra information	Mark
04.1	<p>Any three from:</p> <ul style="list-style-type: none">• at rest/for the first 2 minutes the heart rate is constant at 60 beats per minute• while running/exercising the heart rate increases• from 60 to 130 beats per minute• the maximum heart rate reached is 130 beats per minute• when the exercise stops/at 7 minutes the heart rate decreases• the heart rate returns to 60 beats per minute/resting heart rate at 11 minutes/4 minutes after the person stopped running		3
04.2	<p>Any four from:</p> <ul style="list-style-type: none">• to supply more blood to muscles• so more oxygen/glucose is supplied muscle cells (allow oxygenated blood)• for (aerobic) respiration• so more energy is released/transferred• for muscle contraction	<p>Allow correct symbols for oxygen and glucose.</p> <p>Allow more carbon dioxide/CO₂ is removed from the muscle cells.</p> <p>Do not accept anaerobic respiration.</p> <p>Do not accept produced/created/made.</p> <p>Idea of more/increased must be mentioned at least once for full marks.</p> <p>If no other marks are awarded, allow 1 mark for reference to blood/oxygen/glucose reaching muscle cells.</p>	4



Question 4

04.3	Any four from: <ul style="list-style-type: none">• the heart rate stays high• the breathing rate stays high• to supply the oxygen needed to pay off the oxygen debt• lactic acid is transported back to the liver (via the blood)• where it reacts with the oxygen to form glucose	Allow correct symbols for oxygen and glucose.	4
Total			11



Question 5

Question	Answers	Extra information	Mark
05.1	aorta	Answers in this order only.	1
	carries oxygenated blood to (the rest of) the body		1
	pulmonary artery		1
	carries deoxygenated blood to the lungs		1
05.2	Level 2: Some logically linked reasons are given. There may also be a simple judgement.		3-4
	Level 1: Relevant points are made. They are not logically linked.		1-2
	No relevant content.		0
	Indicative content: Advantages of mechanical valves: <ul style="list-style-type: none">• mechanical valves last longer than biological valves• some patients have personal reasons for not wanting to use biological valves which are taken from animals• mechanical valves are cheaper than biological valves to fit Disadvantages of mechanical valves: <ul style="list-style-type: none">• blood clots are likely to form on mechanical valves, which can lead to strokes• patients will need to take blood thinning drugs for the rest of their lives to prevent blood clots• mechanical valves will have ongoing costs due to drugs		
05.3	statins reduce blood cholesterol levels		1
	which slows down the rate that fatty material is deposited (in blood vessels)		1
Total			10



Question 6

Question	Answers	Extra information	Mark
06.1	measles is spread by inhalation of droplets from sneezes and coughs	Allow any sensible reason why the disease would spread quickly through a group of children.	1
	(young) children are less likely to cover their mouths/noses (when coughing/sneezing) or (young) children are less likely to wash hands or (young) children have more contact with each other/play in closer proximity		1
06.2	Any two from: <ul style="list-style-type: none">• herd immunity/large proportion of the population immune• the spread of measles is reduced/eliminated• protects people who can't have the vaccination		2
06.3	measles is caused by a virus		1
	viruses live and reproduce inside cells		1
	(so) it is difficult to kill the viruses without also damaging the body's cells/tissues		1
06.4	toxicity/check they are safe for use/check they aren't poisonous/don't have harmful side effects		1
	efficacy/check that they work/cure the disease/improve symptoms		1
	dose/find out how much can be given while still being safe to use/find out how much is needed to cure the disease		1
Total			10



Question 7

Question	Answers	Extra information	Mark
07.1	70 × 400	0.07 × 400 scores 2 marks.	1
	= 28 000 (µm)	An answer of 28 000 (µm) with no working scores 2 marks.	1
	28 (mm)	An answer of 28 (mm) with no working scores 3 marks.	1
07.2	translocation		1
07.3	Any four from: <ul style="list-style-type: none">• mouse lymphocytes are stimulated to produce the antibody• the lymphocytes are combined with a tumour cell• to make a hybridoma• the (hybridoma) cells are cloned• the (hybridoma) cells divide rapidly and produce the antibody• the antibody is collected and purified	To score marking points 1 and 2 lymphocyte must be used at least once.	4
07.4	monoclonal antibodies are specific to molecule Z		1
	a fluorescent dye is attached to the monoclonal antibody		1
	the antibody binds to molecule Z		1
	the fluorescence allows you to see where <u>molecule Z</u> is in the tissue/phloem/plant	Do not allow 'to see where the antibody is'.	1
07.5	glucose	Allow sugar.	1
Total			13



Question 8

Question	Answers	Extra information	Mark
08.1	left-hand side: water		1
	right-hand side: glucose and oxygen	Answers in either order.	1
08.2	$\frac{1}{25^2}$	An answer of 0.0016 with no working scores 2 marks.	1
	= 0.0016 (arbitrary units)		1
08.3	it will be quartered/decrease by a quarter/ decrease by a factor of four		1
08.4	as the temperature increases from 0°C to 10°C, the rate of photosynthesis increases for both 0.04% carbon dioxide and 1% carbon dioxide	Allow reference to section A instead of 0°C to 10°C.	1
	because temperature is the limiting factor		1
	as the temperature increases from 15°C to 35°C, the rate of photosynthesis continues to increase for 1% carbon dioxide but levels off for 0.04% carbon dioxide	Allow reference to section B instead of 10°C to 35°C.	1
	because carbon dioxide is the limiting factor	Allow CO ₂ for carbon dioxide.	1
08.5	Any two from: <ul style="list-style-type: none">• stunted growth• spots on leaves• areas of decay (rot)• growths• malformed stems or leaves• discolouration• presence of pests		2
Total			11