Collins

AQA

GCSE

BIOLOGY

F

SET B – Foundation Tier

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Answers

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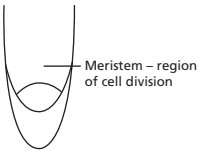
Paper 1

Question	Answer(s)	Extra info	Mark(s)	AO/Spec ref.
01.1	poison		1	**AO1** 4.3.3.2
01.2	mimicry – tricks animals specialised leaves – curl when touched thorns – difficult to eat all three correct for **2** marks one or two correct for **1** mark		2	**AO1** 4.3.3.2
01.3	skin		1	**AO1** 4.3.1.6
01.4	antibody production		1	**AO1** 4.3.1.6
01.5	middle one 		1	**AO1** 4.2.2.3
01.6	kill bacteria inside the body specific bacteria are killed by specific antibiotics		2	**AO1** 4.3.1.8
01.7	painkillers treat the symptoms of disease but do not kill pathogens / antibiotics kill bacteria		2	**AO1** 4.3.1.8
02.1	virus		1	**AO1** 4.3.1.2
02.2	distinctive 'mosaic' pattern of discolouration on the leaves		1	**AO1** 4.3.1.2
02.3	affects the growth of the plant / plant is smaller / stunted		1	**AO1** 4.3.1.2
02.4	black spot		1	**AO1** 4.3.1.4
02.5	looks yellow / lacks normal green colour because magnesium ions needed to make chlorophyll		1 1	**AO1** 4.3.3.1
02.6	nitrate ions needed for protein synthesis (and therefore growth)		1	**AO1** 4.3.3.1
03.1	enzymes		1	**AO1** 4.2.2.1
03.2	amino acids lipids	accept fats (instead of lipids)	1 1	**AO1** 4.2.2.1 4.4.2.3
03.3	amylase, buffer, starch must be correct order		1	**AO2** 4.2.2.1
03.4	**either** of: • buffer must be added to the enzyme before the starch is added – as the reaction will start as soon as the enzyme and starch meet • if no buffer (or added afterwards) results will not be valid as the pH will be changed after the reaction has started		1	**AO2** 4.2.2.1
03.5	a control makes it easier to compare colours as the water in the control doesn't contain any starch / so you can be sure all the starch is gone / digested / broken down, if it is the same colour as the control		1 1	**AO2** 4.2.2.1
03.6	85 + 80 + 75 = 240 240/3 = 80 seconds	Must state unit (seconds) for 3rd mark	2 1	**AO1** 4.2.2.1
03.7	pH 7		1	**AO2** 4.2.2.1
03.8	mean rate increases (or time decreases) up to a maximum at pH 7 and at a higher pH it decreases (or time increases)		1 1	**AO2** 4.2.2.1
04.1	animal cells, line drawn from: • plasma membrane only, no cell wall • carbohydrate stored as glycogen plant cells, line drawn from: • chloroplasts • large vacuole all four correct for **3** marks three correct for **2** marks two correct for **1** mark		3	**AO1** 4.1.1.2
04.2	to keep the specimen flat		1	**AO1** 4.1.1.2
04.3	iodine solution		1	**AO1** 4.1.1.2
04.4	virus bacterium red blood cell leaf cell	**all** must be in correct order for mark	1	**AO1** 4.1.1.1 4.1.1.2
04.5	 Scale bar should be approximately 10 mm long and labelled 2 mm	1 mark for drawing, with distinct meristem area 1 mark for label 1 mark for sensible units / scale 1 mark for correct scale bar	2 2	**AO2** 4.2.3.1 4.1.1.2
05.1	accept values in range 65 000–70 000		1	**AO2** 4.2.2.5 4.2.2.6

Question	Answer(s)	Extra info	Mark(s)	AO/Spec ref.
05.2	active = nearly 4000 incidences (allow ± 1000) drink less alcohol = 12 000 incidences (allow ± 1000) and therefore drinking less alcohol produced about three times fewer cancers as being active	**1** mark for both readings must include the comparison for second mark	1 1	**AO3** 4.2.2.5 4.2.2.6
05.3	men and women are exposed to different environmental factors	accept that men and women have structural and genetic differences	1	**AO3** 4.2.2.5 4.2.2.6 4.2.2.7
05.4	eat fruit and veg lots of fibre low salt low processed / red meat low alcohol	must include low alcohol for **2** marks (to reward recognising alcohol / drinks are part of the diet) and at least two others	2	**AO2** 4.2.2.6 4.2.2.7
05.5	lung cancer	accept lung by itself	1	**AO1** 4.2.2.6
05.6	benign tumours are: any **one** of: • growths of abnormal cells • contained in one area • usually within a membrane • do not invade other parts of the body malignant tumour cells are cancers plus any **one** of: • invade neighbouring tissues • spread to different parts of the body • spread in the blood • form secondary tumours	must link malignant tumours to being cancers	1 2	**AO1** 4.2.2.7
06.1	white blood cells are producing antibodies in response to the presence of Lumpius / pathogen / vaccination	accept lymphocytes accept detect antigens on dead / inactive Lumpius	1	**AO2** 4.3.1.6 4.3.1.7

Question	Answer(s)	Extra info	Mark(s)	AO/Spec ref.
06.2	any **two** of: • white blood cells instantly recognise live Lumpius / pathogen (because it has the same antigens as the vaccine) • and respond **more quickly** to the infection by producing many specific antibodies • which lock onto the Lumpius / pathogen and kill them before the person becomes ill / person is immune / has immunity	accept lymphocytes must state 'more quickly' or equivalent	2	**AO2** 4.3.1.6 4.3.1.7
06.3	yes, **because** many specific antibodies are produced, more quickly when volunteers are infected with live Lumpius / pathogen	must state yes (no marks awarded if say no)	2	**AO3** 4.3.1.9
06.4	clinical trial many volunteers recruited / tested on many humans		1 1	**AO3** 4.3.1.9
06.5	infectious diseases allergies	accept skin rashes or asthma for second mark	1 1	**AO1** 4.2.2.5
07.1	oxygen		1	**AO1** 4.4.1.2
07.2	by counting the number of bubbles produced in 1 minute	accept other sensible period of time must mention time for second mark	2	**AO2** 4.4.1.2
07.3	graduated syringe	accept measuring syringe	1	**AO2** 4.4.1.2
07.4	any **two** of: • ruler / other measuring device • clock / watch • thermometer • gas syringe • measuring cylinder		2	**AO2** 4.4.1.2

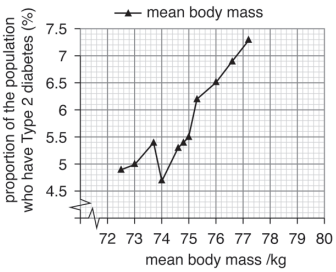
Question	Answer(s)	Extra info	Mark(s)	AO/Spec ref.
07.5	**Level 3:** A detailed and coherent explanation is provided with most of the relevant content, which demonstrates a comprehensive understanding of the investigation and the order in which it is carried out. The response gives logical steps, with reasons.		5–6	**AO2** 4.4.1.2
	Level 2: A detailed and coherent explanation is provided. The student has a broad understanding of the investigation. The response makes mainly logical steps with some reasoning.		3–4	
	Level 1: Simple descriptions of the investigation are made along with reference to photosynthesis. The response demonstrates limited logical linking of points.		1–2	
	No relevant content		0	
	Indicative content • set up apparatus as in diagram • make sure plant is photosynthesising (can see bubbles of oxygen) • measure and record the temperature of water in beaker; the water is intended to maintain a constant temperature, so the temperature should be taken periodically and kept constant; controlling other variables • measure and place lamp a specified distance from apparatus – control of light intensity related to distance of lamp from apparatus • carry out at several different distances of lamp (five distances) • allow plant to acclimatise to each new distance of the lamp / light intensity (2 mins) • record production rate of oxygen – count bubbles over given time period – 1 min / 5 mins, at each distance • repeat three times for each distance of the lamp / light intensity • calculate mean production oxygen rate			
07.6	lots of sunshine = lots of oxygen produced / high rate of photosynthesis	allow converse lack of sunshine / in shady area = lower rate of photosynthesis / less oxygen produced	1	**AO3** 4.4.1.2
	and therefore lots of oxygen = good for fish in pond	allow converse in shade = not so good for fish	1	

Question	Answer(s)	Extra info	Mark(s)	AO/Spec ref.
08.1	heart rate increasing		2	**AO2** 4.4.2.2
08.2	breath volume increasing		2	**AO2** 4.4.2.2
08.3	oxygenated blood supply to muscles increasing		2	**AO2** 4.4.2.2
08.4	anaerobic		1	**AO1** 4.4.2.1
08.5	lactic acid		1	**AO1** 4.4.2.2 4.4.2.1
08.6	person B		1	**AO3** 4.4.2.2
08.7	any **two** of: for person B: • heart rate increases more slowly / doesn't increase as fast • heart rate reaches a lower steady state • decreases more quickly after exercise / recovers more quickly / returns to resting rate quicker	allow converse for person A allow reaches a lower maximum allow converse for person A allow converse for person A must be clear which person is being referred to	2	**AO3** 4.4.2.2
09.1	chloroplast		1	**AO2** 4.1.1.2
09.2	**Level 3:** A detailed and coherent description is provided with most of the relevant content, which demonstrates a comprehensive understanding of photosynthesis. The response is logical.		5–6	**AO1** 4.4.1.1 4.4.1.2 4.4.1.3
	Level 2: A detailed and coherent description is provided. The student has a broad understanding of photosynthesis. The response makes mainly logical steps with some linkage.		3–4	
	Level 1: Simple descriptions of photosynthesis are made. The response demonstrates limited logical linking of points.		1–2	
	No relevant content		0	

Question	Answer(s)	Extra info	Mark(s)	AO/Spec ref.
	Indicative content describe photosynthesis: • carbon dioxide + water light → glucose + oxygen • endothermic reaction • energy is transferred from the environment • to the chloroplasts by light the factors that affect it: • rate of photosynthesis affected by: ○ temperature ○ light intensity ○ carbon dioxide concentration ○ amount of chlorophyll and how plants use the products: • glucose produced converted to starch, fats and oils for storage • used for respiration • used to produce cellulose, which strengthens the cell wall • used to produce amino acids for protein synthesis.	accept CO_2, H_2O, O_2 and $C_6H_{12}O_6$		
09.3	independent variable: salt concentration dependent variable: (change in) mass of potato cylinder		1 1	**AO2** 4.1.3.2
10.1	accept answers in order of 25 cm^2	second mark for correct units	2	**AO3** 4.1.3.1
10.2	(228/25) × 100 = 912% allow error carried forward from 10.1	**2** marks for calculation (ecf) third mark for 3 significant figures	3	**AO3** 4.1.3.1
10.3	Fennec foxes have larger ears so there is a larger surface area to lose heat from	allow converse (Arctic foxes have small ears (small surface area) to conserve heat) for 1 mark	2	**AO3** 4.1.3.1

Paper 2

Question	Answer(s)	Extra info	Mark(s)	AO/Spec ref.
01.1	abiotic		1	**AO 1** 4.7.1.1
01.2	any two from: • light • space • water • mineral ions	do not accept food	2	**AO 1** 4.7.1.1
01.3	any two from: • food • territory • water	do not accept space	2	**AO 1** 4.7.1.1
01.4	interdependence		1	**AO 1** 4.7.1.1
01.5	a community in which all the species and environmental factors are in balance so that population sizes remain fairly constant		1 1	**AO 1** 4.7.1.1
01.6	methane		1	**AO1** 4.7.2.3
01.7	carbon dioxide mineral ions		2	**AO1** 4.7.2.2
02.1	nerves: • fast acting • acts for short time • acts in a specific area • electrical hormones: • slow acting • acts for long time • acts more generally • chemical	for each mark, a line must be drawn from each of the opposing descriptions; i.e. for first mark one line drawn from fast acting to nervous system and one line drawn from slow acting to hormonal system (1 mark)	4	**AO1** 4.5.2.1 4.5.3.1
02.2	85 + 87 + 83 + 81 = 336 336/4 = 84 ms	must state units for third mark	1 1 1	**AO3** 4.5.2.1
02.3	as more alcohol is consumed, reaction times increase, e.g. with 0.5 units / half a can, mean reaction time is 33 ms, increasing to 84 ms with 6 units / cans of beer	reference must be made to figures / results for second mark, as candidates asked to use the results	2	**AO3** 4.5.2.1
02.4	2000 people used as part of the study, increases repeatability (in 2nd study) / too few volunteers (in first study) lack of repeats in first study = less repeatable		1 1	**AO3** 4.5.2.1

Question	Answer(s)	Extra info	Mark(s)	AO/Spec ref.
03.1	sensible scales on correct axis correctly plotting points drawing line – joining points or line of best fit labels on axis – y axis – percentage of population who have Type 2 diabetes (%), and x axis – mean body mass (kg)  		1 1 1 1	**AO3** 4.5.3.2
03.2	correlation / positive correlation, as mean body mass increases so does percentage / incidence of type 2 diabetes		1	**AO3** 4.5.3.2
03.3	C – during exhalation – water leaves the body via the lungs A – when you sweat – water, ions and urea leave the body via the skin B – when you urinate – water, ions and urea are removed via the kidneys		1 1 1	**AO1** 4.5.3.3
03.4	kidney		1	**AO1** 4.5.3.3
03.5	either: **oral** contraceptives that contain hormones to **inhibit FSH production** so that **no eggs mature** or **Oral contraceptives / Injection /** implant / skin patch of slow release **progesterone / oral contraceptive of oestrogen and progesterone** to maintain the uterus lining and so prevent the menstrual cycle, therefore **inhibiting the maturation / release of eggs**	must state two of three emboldened text (or equivalent) must relate to only **one** method (i.e. not a mix of methods)	2	**AO1** 4.5.3.5
04.1	zebrafish		1	**AO3** 4.6.4
04.2	fugu and green spotted puffer		1	**AO3** 4.6.4

Question	Answer(s)	Extra info	Mark(s)	AO/Spec ref.
04.3	167.7 million years ago	must give units accept mya	1	**AO3** 4.6.4
04.4	insufficient evidence currently to be more accurate		1	**AO3** 4.6.3.2 4.6.4
04.5	either: fossils or DNA profiling or antibiotic resistance (in case of bacteria)		1	**AO1** 4.6.3.4 4.6.3.5
04.6	**Level 3:** A detailed and coherent explanation is provided with most of the relevant content, which demonstrates a comprehensive understanding of speciation and how medaka and stickleback may have become separate species. The response gives logical steps, with reasons.		5-6	**AO2** 4.6.2.1 4.6.2.2 4.6.3.1 4.6.3.2
	Level 2: A detailed and coherent explanation is provided. The student has a broad understanding of speciation and refers to medaka and stickleback. The response makes mainly logical steps with some reasoning.		3-4	
	Level 1: Simple descriptions of speciation are made along with reference to the medaka and stickleback. The response demonstrates limited logical linking of points.		1-2	
	No relevant content		0	
	Indicative content • definition of species as organisms that are able to interbreed to produce fertile offspring • barriers separate ancestral species so they are no longer able to breed • most commonly physical / geological, can also be reproductive or ecological, examples given should be in relation to fish, e.g. river split course, courtship behaviour, changes in pH or salinity • 96-150 mya stickleback and medaka had a common ancestor that was a different species from either of them • this fish species got separated into two groups • random mutations occur in each isolated group of fish / different mutations in each group • the fish best suited to the environment survive and pass on their genes			

Question	Answer(s)	Extra info	Mark(s)	AO/Spec ref.
	• if the environment is different, for each group of fish, selection pressure means that different mutations are favoured by natural selection • over a long period of time • different characteristics will develop in the different fish groups • if the barrier were removed / the fish were able to mix again, they would no longer be able to breed and so are considered separate species			
05.1	cerebral cortex		1	**AO1** 4.5.2.2
05.2	cerebellum		1	**AO1** 4.5.2.2
05.3	medulla		1	**AO1** 4.5.2.2
05.4	A – complex functions e.g. learning, memory, emotion and conscious thought B – unconscious / automatic functions e.g. movement and balance C – unconscious / automatic (and homeostatic), e.g. swallowing, digestion and vomiting, breathing and heart rate	allow specific example of complex function **1** mark for general function plus second mark for example, for each area	2 2 2	**AO2** 4.5.2.2
05.5	as animal increases in weight so does the size of their brain	accept bigger animals have bigger brains accept reverse	1	**AO3** 4.5.1 4.5.2.1
05.6	either: • a larger animal requires a bigger brain to control / coordinate its living processes or • metabolism of animal / energy demands of brain limits brain size so if the animal is larger it is able to support the energy requirements of a larger brain		1	**AO2** 4.5.1 4.5.2.1
06.1	heterozygous		1	**AO2** 4.6.1.6
06.2	mice A and B		1	**AO2** 4.6.1.6
06.3	brown		1	**AO2** 4.6.1.6

Question	Answer(s)	Extra info	Mark(s)	AO/Spec ref.
06.4	any three of: gamete would contain brown fur allele from Mouse B and white fur allele from Mouse C offspring would receive one of each / one brown fur allele and one white fur allele a dominant allele is always expressed, even if only one copy is present brown fur gene is dominant and therefore expressed / offspring are brown furred a recessive allele is only expressed if two copies are present (therefore no dominant allele present)		3	**AO2** 4.6.1.6
06.5	**Level 3:** A detailed and coherent explanation is provided with most of the relevant content, which demonstrates a comprehensive understanding of the structure of DNA. The response gives logical steps, with reasons.		5-6	**AO1** 4.6.1.4 4.6.1.5
	Level 2: A detailed and coherent explanation is provided. The student has a broad understanding of the structure of DNA. The response makes mainly logical steps with some reasoning.		3-4	
	Level 1: Simple descriptions of the structure of DNA are made. The response demonstrates limited logical linking of points.		1-2	
	No relevant content		0	
	Indicative content • DNA is found in the cell nucleus • DNA is a polymer made up of two strands forming a double helix • the DNA is contained in structures called chromosomes • a gene is a small section of DNA on a chromosome • each gene codes for a particular sequence of amino acids, to make a specific protein • DNA is made from four different nucleotides • each nucleotide consists of a common sugar and phosphate group with one of four different bases attached to the sugar • the order of bases controls the order in which amino acids are assembled to produce a particular protein • three bases code for a particular amino acid • bases always pair C and G, A and T • the long strands of DNA consist of alternating sugar and phosphate sections			

Question	Answer(s)	Extra info	Mark(s)	AO/Spec ref.
07.1	any one from: • green plants • algae / weed • producers / primary producers		1	**AO2** 4.7.2.1 4.7.4.1
07.2	*T. sarasinorum* numbers increase and they eat lots of fish eggs therefore fewer fish survive from the eggs and there are fewer to eat, so 'elongated' eats more shrimp 'thicklip' numbers decrease as they are now in direct competition for shrimp, not enough shrimp for all		1 1 1	**AO2** 4.7.1.1 4.7.1.3 4.7.2.1
07.3	live in different habitats (1 mark only) *T. opudi* lives in bush cover and rocks, whereas *T. wahjui* lives on the muddy bottom		1 1	**AO2** 4.7.1.1 4.7.2.1
07.4	any one from: • sewage • fertilizer run-off • toxic chemicals		1	**AO1** 4.7.3.2
07.5	energy (/stored in biomass) is lost at each stage through waste products, respiration, movement and maintaining a constant body temperature therefore there is insufficient energy to maintain another population at the top		1 1 1	**AO1** 4.7.4.2 4.7.4.3
08.1	A – nucleus containing DNA removed from egg cell B – electric pulse causes skin cell to fuse with egg cell C – cell fusion D – cell division E – (early-stage) embryo is implanted into surrogate		5	**AO2** 4.6.2.5
08.2	variation		1	**AO2** 4.6.2.1
08.3	any one from: • Aphids / other named insect that reproduces asexually • Malarial parasite in human host • Fungi • Bulbs eg daffodils • Runners eg strawberries • Any other correct example		1	**AO1** 4.6.1.1
08.4	any two from: • only one parent needed • more time and energy efficient as do not need to find a mate • faster than sexual reproduction • many identical offspring can be produced when conditions are favourable • genetically identical, so if parent is well adapted to environment offspring will be too		2	**AO1** 4.6.1.3

Question	Answer(s)	Extra info	Mark(s)	AO/Spec ref.
08.5	selective breeding		1	**AO2** 4.6.2.3
08.6	genetic engineering		1	**AO2** 4.6.2.4
08.7	the gardener's method: • is the traditional method of breeding together individuals with desired characteristics • is the more natural method • takes a long time (many generations); offspring won't definitely have trait the gardener wants the farmer's method: • is more technical • is faster by transplanting specific genes for desired characteristics • is more expensive • offspring will definitely have the desired traits		1 (one point required) 1 (one point required)	**AO2** 4.6.2.3 4.6.2.4
09.1	population size means the number of individuals of a species that live in a habitat (number) population density is the number of individuals in a given / specific area		1 1	**AO1** 4.7.1.1
09.2	transect		1	**AO2** 4.7.1.1
09.3	systematic sampling: at regular intervals (e.g. every 50 cm) intervals must be sufficient to capture the changes in vegetative cover		1 1	**AO2** 4.7.1.1
09.4	construct further transects at 10m intervals / other sensible distance down the path take quadrats at the same distances as before (as suggested in Q09.3) along these transects calculate the means at each quadrant place along the length of the path (add up all the plantains and divide by number of quadrants along the length of the path) to give mean number across the path		1 1 1	**AO2** 4.7.1.1
09.5	plants complete with each other for limited resources / many plants at verge, lots of competition plantain leaves are tough / have adapted to being trampled and may out-compete more delicate plants, which are trampled in the middle of the path		1 1	**AO3** 4.7.1 4.7.1.3 4.7.1.4