

APOLLO

Populations and communities

HL

Biology

First assessment 2025

14 questions | mark schemes

Mark-scheme answers

Biology HL | Paper 1A | May 2025 TZ1 | Q36 | 1 marks

36. B

2.	a	a. the crocodile feeds on three different species of animals / <i>OWTTE</i>; b. the crocodile can be a tertiary consumer while cormorant/tigerfish is a secondary consumer OR c. the crocodile has a <u>higher trophic level</u> than both the cormorant and tigerfish / <i>vice versa</i>; d. DDT doesn't break down/biodegrade/metabolize OR (bio)accumulates/builds up (in the fat/adipose tissues/crocodile); d. accumulation/biomagnification of DDT in the higher/across trophic levels;	c. Do not award this marking point for "accumulates in the food chain". d. Trophic levels required.	2 max
2.	b	a. kapenta; b. has the lowest levels of DDT;		2

– 7 –

2225 – 6014

Question	Answers	Notes	Total
2. c	a. use the <u>capture-mark-release-recapture</u> method OR use the Lincoln index method; b. (random) sample is captured and marked/tagged (in a manner that will not harm the fish/tilapia); c. captured sample is released (and allowed to mix with general population); d. (after a period of time) second sample is captured and both the total number and the number of marked fish/tilapia counted/<i>OWTTE</i>; e. correct formula / description of formula;		3 max
2. d	Impact: [2 max] a. overfishing can disrupt food chains/webs/ecosystems; b. named example from the diagram; c. decrease biodiversity / <i>OWTTE</i>; Assessing: [2 max] d. monitoring/measuring that the rate of harvesting of species is lower than the rate of replacement of species/<i>OWTTE</i>; e. monitoring/enforcing application of regulations; f. monitoring population size (over time) OR monitoring biodiversity (over time);	e. Accept monitoring of regulations, e.g., size/age of fish, number in a catch, mesh size of nets, quotas, etc., but not setting of regulations.	4 max

– 8 –

2225 – 6014

Question	Answers	Notes	Total
----------	---------	-------	-------

1.	a	250 mg L ⁻¹ ;	<i>Units required</i> <i>Accept values from 240 to 260 mg L⁻¹</i>	1
1.	b	when mussels are absent cyanobacteria increases over time and when they are present, they decrease;	<i>Or vice versa.</i>	1
1.	c	increasing in number as the cyanobacteria/phytoplankton were reproducing/growing;		1
1.	d	<i>Similarity</i> a. both cause a reduction in the amount of chlorophyll in the water OR after 12/24/value between 12 and 24 there is no/little removal of chlorophyll/similar chlorophyll concentration; <i>Difference</i> b. rate of removal increases more/ faster at 0.5 mgL⁻¹ between 4 and 8 hours /overall rate of removal in the first 8 hours is faster for 0.5 mgL⁻¹; OR rate of removal levels off earlier at 0.5 mgL⁻¹ / mussel filtration more effective in the first 8 hours at 0.5 mgL⁻¹ than filtration at 0.9 mgL⁻¹;	<i>or vice versa</i>	2

– 6 –

2225 – 6009M

Question		Answers	Notes	Total
1.	e	33(%);	<i>Accept 30 to 36</i>	1
1.	f.	a. 1964 as <i>A. anatine</i> is in similar percentages; b. 1964 as <i>P. complanate</i> are present; c. other valid reason;		1 max
1	g	a. the data does not provide population numbers / percentage does not represent population; b. the % has increased; c. the overall population may have decreased / even though the percentage is higher, there may have been a decrease in population;		2 max
1.	h	50(%);		1
1.	i	<i>Similarities</i> a. both showed a decrease in density (at all depths) from 1964 to 2020 OR both have the greatest decrease/change between 0-1m; <i>Differences</i> b. at all depths the decrease in <i>U. pictorum</i> density was greater than <i>U. tumidus</i> OR <i>U. tumidus</i> only shows major decrease at 0-1m depth /shows only small decreases at 1-4m while <i>U. pictorum</i> shows great change/almost 0 at all depths OR <i>U. tumidus</i> shows greater variation/possible overlap of values/range of error than <i>U. pictorum</i>;	<i>Award 1 mark for a similarity, another for a difference.</i>	2

Question			Answers	Notes	Total
1.	j		a. (the first piece of data shows) that mussels improved water quality because they <u>filtered</u> / quality goes down when mussels are absent <u>and cannot filter</u>; b. (the second piece of data) shows changes in the distribution of mussels over time so water quality may be changing OR the distribution changes indicate that the water quality became more suitable for some mussels and less suitable for others; c. (the third piece of data shows) shows a decrease in the number/density over time and that might indicate lower survival rates due to poor water quality OR decrease in the number/density of mussels over time indicates cleaner water/less food (because there is no need for filtering); d. other factors/legislation may lead to changes in water quality OR not only the quantity of mussels determines water quality;		2 max

Question	Answers	Notes	Total
----------	---------	-------	-------

3.	a	i	mutualism;		1
3.	a	ii	a. (fungi provide) nutrients/water/C resources/P/N; b. (fungi required for) seed germination as orchid seeds lack stored resources;		1
3.	b		a. allelopathy uses secondary metabolites/chemicals/allelopathic agents to impact other (nearby) plants; b. named plant with action; c. prevents germination/growth/reproduction of other plants / is toxic to other plants / other verified result; d. increases the resources (soil/water/sunlight/etc.) available for growth/survival/reproduction; e. may impact plant community structure / become invasive;	Question asks for a named example. Maximum of 2 marks if an example is not given.	3 max

Question	Answers	Notes	Total
----------	---------	-------	-------

5.	a		population;		1
5.	b		a. competition for/taking/blocking/limiting access to light/sun; b. competition for/taking/limiting supplies of water/nutrients (from the soil); c. allelopathy/release of toxins;		2 max
5.	c	i	mutualism;		1
5.	c	ii	herbivory / heterotrophic nutrition / (primary) consumer;		1

Question	Answers	Notes	Total
----------	---------	-------	-------

Mark-scheme answers

Biology HL | Paper 1A | Nov 2025 TZ1 | Q36 | 1 marks

36. A

Biology HL | Paper 1A | Nov 2025 TZ1 | Q39 | 1 marks

39. D

Biology HL | Paper 1A | Nov 2025 TZ3 | Q36 | 1 marks

36. B

1.	a	2016;		1
1.	b	<i>Similarities</i> a. the numbers fluctuate/vary for each species from year to year; b. both ended with a higher number of nests compared to the initial value/first year of survey; <i>Differences 2 max</i> c. every year there are more loggerhead nests than green turtle nests; d. the (overall) trend for green turtles is an increase and for loggerhead turtles (a relatively) constant number of nests (with a dip in the middle years)/ small fluctuations/changes over the years OR green turtles had a greater increase (in number of nests) during the survey than loggerhead turtles; e. green turtles tend to come ashore (roughly) every other year to nest but no trend for loggerhead turtles OR in some years / named years there were no nests at all for green turtles only;	<i>Comparative terms are expected. Do not award points for just stating values.</i>	3 max

– 6 –

8825 – 6021M

Question		Answers	Notes	Total
1.	c	a. (may be inaccurate as) it does not include male turtles; b. (young or old) turtles which are not nesting are not counted / not all turtles are at reproductive age; c. no information is provided about how often they nest / criteria for selecting beaches; d. not all nests are counted/found/identified; e. unknown number of eggs / neonatal mortality / not all newborn turtles survive / make it to the ocean;	<i>Do not award a marking point for vague statements such as turtles at sea not being counted.</i>	2 max
1.	d	<i>Chelonia mydas</i> /Green;		1
1.	e	a. occupy different habitats / live in different areas / different migration patterns OR swim/forage at different depths; b. some samples are small, so not representative OR the larger the population may lead to more chances of VSI;		1 max
1.	f	as (mean annual) number of vessels increase (the proportion of stranded sea turtles with a) VSI increase / positive correlation;	<i>Do not accept “directly proportional” or “positive relationship”</i>	1

Question			Answers	Notes	Total
1.	g		a. too many turtles with VSI for (low) number of vessels; b. too few vessels for the (high) number of turtles with VSI;	<i>Do not accept outlier on its own or just values. Clear indication to relationship between vessels and turtles with VSI required.</i>	1 max
1.	h		a. (evidence shows that) increased number of vessels increases turtle injuries; b. no evidence that VSI results in death / vessel injuries (VSI) may not result in death; c. no information is given about other reasons turtles die (in Florida) / causes of death; d. no information provided on total number / percentage of deaths; e. evidence from the table shows that vessel injury accounts for damage to less than half/50% of (stranded) turtles OR evidence from the table shows that vessel injury accounts for maximum 34.4% (of stranded turtles);	<i>For c. do not accept that other factors ARE the main cause of death (no evidence for this). Stranded includes dead, sick or injured.</i> <i>For e. (first strand) allow any value between 50% and 34.4%.</i>	3 max

Question	Answers	Notes	Total
----------	---------	-------	-------

7.	a		a. X is more closely related to <i>M. luminyensis</i>; b. smaller number of nodes/closer node between two clades/ species OR more <u>recent</u> common ancestor (with <i>M. luminyensis</i>) / common ancestor between X and <i>E. faecalis</i> is more <u>distant</u> (than with <i>M. luminyensis</i>) OR X and <i>E. faecalis</i> belong to different clades / X and <i>M. luminyensis</i> belong to the same clade;	<i>For b. OWTTE.</i> <i>For b. accept 'branching point' for node.</i>	2
7.	b	i	a. has a disproportionate/large effect (on the community); b. they maintain/regulate populations of other species OR they maintain species diversity/biodiversity OR the removal of the keystone species decreases species diversity/biodiversity of the ecosystem; c. the removal of the keystone species can lead to collapse of the ecosystem;	<i>Do not accept examples.</i>	2 max

– 16 –

8825 – 6021M

Question			Answers	Notes	Total
7.	b	ii	a. climax community occurs after succession has ended / the gut community has all its characteristics/stabilized / a stable/persistent ecosystem has been reached; b. antibiotics stop division/kill some <u>species</u> of gut bacteria OR antibiotics can kill beneficial as well as harmful bacteria OR antibiotics reduce bacterial population sizes; c. antibiotics decrease biodiversity/species richness; d. competition occurs to establish a new climax community; e. variation in antibiotic resistance among (gut) bacteria / some species may develop tolerance/resistance to the antibiotic;	<i>For b. do not award points for simple statements of antibiotics killing bacteria.</i> <i>For e. do not accept "immunity".</i>	2 max
7.	c		bacteria reproduce asexually/by binary fission OR (different species of) bacteria can exchange genetic material by horizontal gene transfer OR genes can be transferred from one species to another;	<i>Accept bacteria do not reproduce sexually or do not interbreed.</i>	1

– 17 –

8825 – 6021M

Mark-scheme answers

Biology HL | Paper 1A | Specimen 2025 | Q37 | 1 marks

37. A

Biology HL | Paper 1A | Specimen 2025 | Q38 | 1 marks

38. C

3.	a	a. symbiotic relationship between two (unrelated) species OR to the benefit of both species; b. bacteria get organic molecules AND plant gets nitrates;			2											
3.	b	<table><tr><td><i>Rhizobium</i></td><td>Fabaceae</td></tr><tr><td>prokaryote</td><td>eukaryote;</td></tr><tr><td>circular DNA</td><td>linear DNA/chromosomes;</td></tr><tr><td>membrane bound organelles absent (accept a specific example)</td><td>membrane bound organelles present; (accept a specific example)</td></tr><tr><td>70S ribosomes</td><td>80S ribosomes;</td></tr><tr><td>small</td><td>large;</td></tr></table>	<i>Rhizobium</i>	Fabaceae	prokaryote	eukaryote;	circular DNA	linear DNA/chromosomes;	membrane bound organelles absent (accept a specific example)	membrane bound organelles present; (accept a specific example)	70S ribosomes	80S ribosomes;	small	large;	<i>Some form of distinction MUST be made. e.g. '<u>Rhizobium</u> is small' would be insufficient. However, 'smaller' implies a distinction</i>	2
<i>Rhizobium</i>	Fabaceae															
prokaryote	eukaryote;															
circular DNA	linear DNA/chromosomes;															
membrane bound organelles absent (accept a specific example)	membrane bound organelles present; (accept a specific example)															
70S ribosomes	80S ribosomes;															
small	large;															
3.	c	distantly related species are more likely to have different characteristics/metabolisms (so are more likely to provide for each others' requirements)			1											
3.	d	a. with additional nitrate, nodule size does not change/remains small; b. without additional nitrate, nodule size increases (over time); c. (suggests that) nitrate inhibits nodule growth; d. when nitrate is scarce, nodule growth ensures nitrate supply from a larger bacterial population; e. (suggests that) mutualism is affected by environmental conditions;			3											

Question	Answers	Notes	Total
----------	---------	-------	-------

5.	a		ensures a habitat is sustainable for the prey/limits damage to the ecosystem (as a result of overpopulation)/removes genetically weaker individuals/prevents overgrazing/prevents overpopulation		1
5.	b		a. the size of the predator population (influences the prey population); b. resources/food may be limiting; c. transfer of pathogens/pests/disease (influences the prey population);		2
5.	c	i	a. sample captured, marked and released; b. ratio of marked individuals in a second sample determined; c. equals ratio of marked sample to entire population/use Lincoln index;		2
5.	c	ii	a. low levels of immigration/emigration between sampling events; b. distribution/mortality/survival not affected by capture/markings; c. trap avoidance minimal; d. reproduction patterns/rates not affected;		1

Question	Answers	Notes	Total
----------	---------	-------	-------