This is a Class 1 exam

Lebanon Evangelical School
for Boys and Girls — Loueizeh - Baabda

Stage Exam 01
06NOV2023

Do NOT write in this box. Your MARK will be placed here.

Subject :	A Level : Biology 2
Class :	12A
Teacher :	Miss Rahmeh Hilal
Duration :	1 hour

Your name :		*Time taken to complete exam*
Your Class :		
Exam Room :		
How many sheets, including cover sheet :		

- Do not open this paper until the teacher in charge instructs you to do so.
- The most important thing to remember in taking an exam is NEVER PANIC.
- If you are caught cheating in this exam, you will be awarded zero for ALL exams that are taken on this day.

Q1.

Evidence from ecological field studies can be supported by laboratory investigations.

Stick insects can be kept in a school laboratory in a tank. Most stick insects are females and lay eggs readily in captivity.

The photograph below shows a stick insect. The diagram shows stick insects kept in a laboratory.



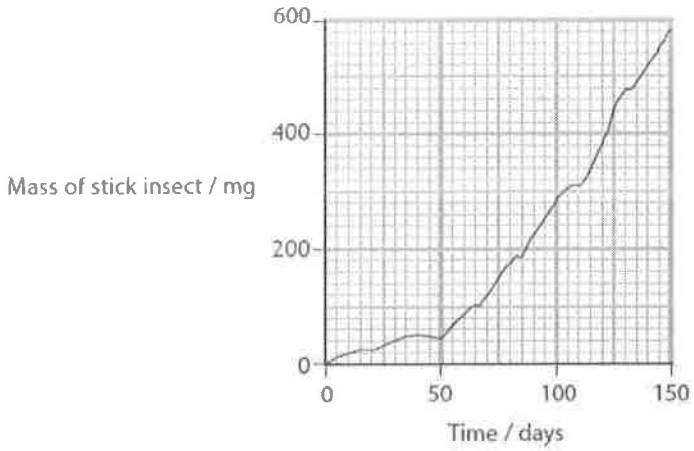


Magnification × 1

(Source: © Nature Picture Library/Alamy Stock Photo)

A student suggested that the increase in mass of a stick insect would be the same as the mass of leaves that it ate.

The graph below shows the mass of a stick insect recorded each day for 150 days.



(a) Calculate the mean daily increase in mass of this insect from day 10 to day 130.

(2)

Answer..... mg

(b) From day 10 to day 130, the stick insect ate 5 g of leaves.

Calculate the efficiency of mass transfer between trophic levels 1 and 2.

(2)

Answer..... %

(c) (i) Suggest **two** reasons why the increase in mass of this stick insect is less than the mass of leaves that it ate.

(2)

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(Total for question = 6 marks)

Q2.

Mount St. Helens is a volcanic mountain in the USA. The volcano erupted in 1980 and the mudflow and ash destroyed the surrounding countryside.

(a) The photographs below show Mount St. Helens before the eruption, the surrounding area after the eruption and 14 years later.



Mount St. Helens before the eruption

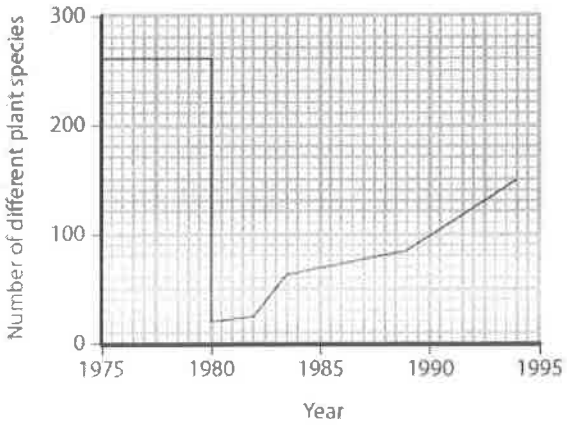


Surrounding area after the eruption



Surrounding area 14 years after the eruption

The graph below shows the number of different species of plants in the Mount St. Helens area before and after the eruption.



(i) Put a cross ☒ in the box next to the term that completes the following sentence.
The increase in the number of different plant species in the Mount St. Helens area following the eruption is an example of

(1)

☐ **A** deforestation
☐ **B** evolution
☐ **C** natural selection
☐ **D** succession

(ii) Using the information in the photographs and the graph, explain the changes in the number of different plant species in the Mount St. Helens area.

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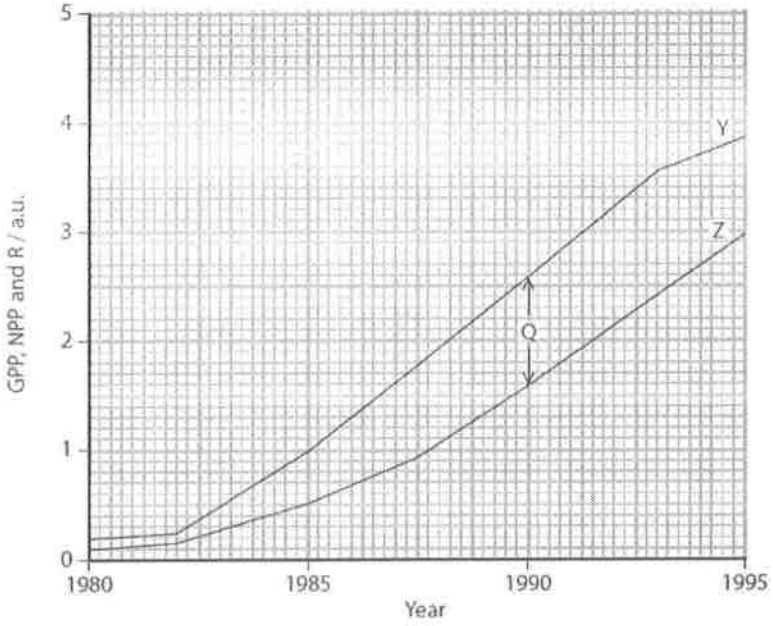
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(b) The graph below represents the changes in gross primary productivity (GPP), net primary productivity (NPP) and plant respiration (R) in the Mount St. Helens area following the eruption.



Put a cross ☒ in the box next to the values represented by the lines Y and Z and the value Q.

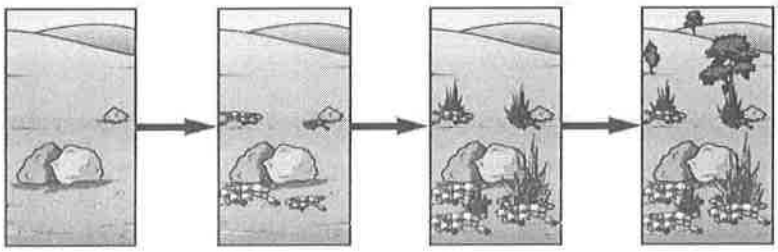
(1)

- ☐ **A** line Y is NPP, line Z is GPP, Q is R
- ☐ **B** line Y is NPP, line Z is R, Q is GPP
- ☐ **C** line Y is GPP, line Z is NPP, Q is R
- ☐ **D** line Y is GPP, line Z is R, Q is NPP

(Total for question = 6 marks)

Q3.

The diagrams below show some stages that take place when bare rock becomes a climax community.



(a) Explain the meaning of the term **climax community**.

(2)

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(b) Using the information in the diagrams, explain the changes between stage **1** and stage **3**.

(3)

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(c) Explain what would happen if herbivores were introduced into the area at stage **2**.

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(Total for question = 9 marks)

Q4.

Global warming is having a number of effects on the environment.

*(a) Describe how global warming may be caused.

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(b) Some scientists predict that by the year 2100 mean global temperatures could increase by 12°C.

Describe how scientists have made this prediction.

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(c) The photograph below shows a European great tit.



Magnification ×0.3

European great tits are predators of winter moth caterpillars. Winter moths lay eggs that hatch into caterpillars that feed on the leaves of trees in the spring season. Research has shown that European great tits now lay their eggs two weeks earlier than in 1970.
Suggest why this may be an advantage for European great tits.

(3)

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(d) The European blackcap is another species of bird that breeds in the UK, which has also changed its behaviour in response to global warming.

The majority of these birds fly long distances from Europe to North Africa. Recent studies have shown that some of these birds have now stopped making this migration and are breeding more successfully.

Suggest why this change in behaviour has resulted in more successful breeding of this species.

(3)

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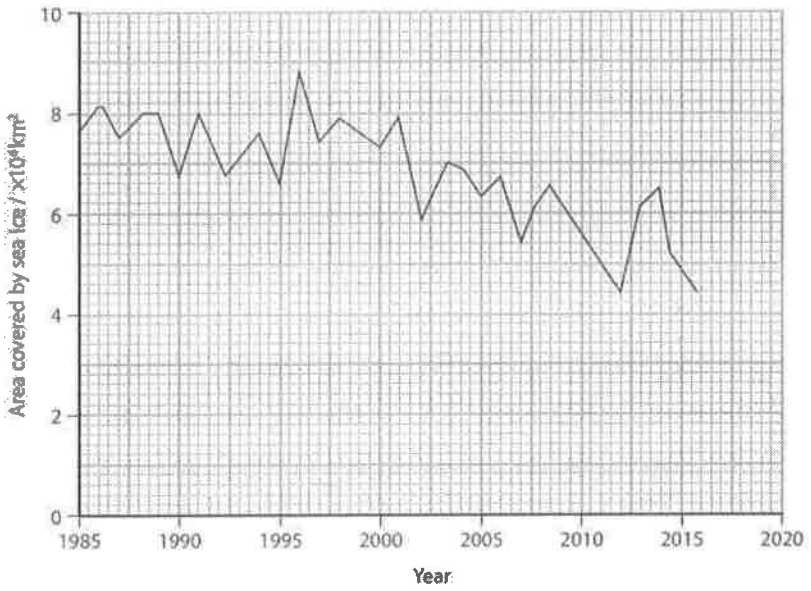
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(Total for question = 13 marks)

Q5.

Global warming is thought to be responsible for the decrease in area covered by sea ice.

(a) The graph below shows the changes in the area covered by sea ice in the Arctic between 1985 and 2016.



(i) Explain why global warming is thought to be responsible for this decrease.

(3)

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(ii) Describe how this graph could be used to estimate the area covered by sea ice in 2020.

(2)

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(iii) Explain why a prediction of the area covered by sea ice in 2020, using the data in this graph, could be wrong.

(3)

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(b) The reduction in area covered by sea ice is affecting the behaviour of polar bears.

Some polar bears are staying on the ice-free areas, feeding on goose eggs, berries and, occasionally, caribou. Previously, these polar bears fed on seal blubber.
The table below gives some information about these food sources.

Food source	Mean mass / kg	Fat content / g kg^{-1}	Energy content / J kg^{-1}
one seal	160.000	862	32 424
one goose egg	0.144	139	5397
one berry	0.003	3	1344
one caribou	140.000	34	5334

(i) Calculate how many berries have the same mass as one seal.

(1)

Answer .....

(ii) Using the information in the table, explain why scientists are concerned that this change in behaviour could result in a decrease in the number of polar bears.

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(Total for question = 13 marks)

Q1.

Question Number	Answer	Additional Guidance	Mark
(a)	1. 480 - 20 / 460 (mg) ; 2. (460 ÷ 120 =) 3.8 / 3.83 (mg) ;	2 CE from mp 1	(2)

Question Number	Answer	Additional Guidance	Mark
(b)	1. 5 × 1000 ÷ 120 / 41.67 (mg) ; 2. (3.83 × 100 ÷ 41.67 =) 9 / 9.19 / 9.2 (%)	2 CE from (a) CE from mp 1 if dp in wrong place	(2)

Question Number	Answer	Additional Guidance	Mark
(c)(i)	1. idea of loss of mass in faeces ; 2. idea of loss of mass in urine ; 3. idea of loss of mass in eggs laid ; 4. idea of loss of mass due to {respiration/ movement} ; 5. resulting in {heat loss / water vapour production / eq} ; 6. loss of skin / moulting / ecdysis ;	1 **ACCEPT** not fully digested **NB ACCEPT** excretion if neither mp 1 or 2 awarded 4 **ACCEPT** used for	(2)

Q2.

Question Number	Answer	Mark
(a)(i)	D succession	(1)

Question Number	Answer	Additional Guidance	Mark
(a)(ii)	1. reference to succession ; 2. idea of (large) decrease in number of plants because they are { being burnt / covered by ash / eq } ; 3. idea of soil improved ; 4. idea of {pioneer species / lichens / mosses / eq} growing first ; 5. then {low-growing plants / ferns / small bushes / grass} ; 6. therefore increasing the number of {plants / (plant) species} ; 7. idea that the seeds of pre-existing plants {persisted / germinated / blown in / brought in by animals / eq } ;	1 **IGNORE** primary / secondary 2 **ACCEPT** mud / lava / strong winds 5 **ACCEPT** small plants **DO NOT ACCEPT** trees / large plants	(4)

Question Number	Answer	Additional Guidance	Mark
(b)	C line Y is GPP, line Z is NPP, Q is R		(1)

Q3.

Question Number	Answer	Additional Guidance	Mark
(a)	1. (climax) {final stage of / end of / after / eq} succession ; 2. (community) {populations / species / biodiversity / eq} remain stable / eq ;	**2 IGNORE** NPP	**(2)**

Question Number	Answer	Additional Guidance	Mark
(b)	1. {lichens / pioneer species} break rock down {into soil) / eq ; 2. {small plants / grass} (decompose) {adding nutrients / adding humus}(to the soil); 3. {larger plants / bushes) (decompose) increasing the {depth of /nutrients in} the soil / eq ; 4. idea that trees (and large plants) appear last ;	**2 ACCEPT** lichens / pioneer species **3 ACCEPT** small plants / grasses if lichens / pioneer species given in mp 2 **ACCEPT** a correct description of the sequence of events (3) with no explanation for 1 mark, if no other marks awarded	**(3)**

Question Number	Answer	Additional Guidance	Mark
(c)	1. herbivores would eat the {pioneer species / mosses /grass / (small)plants} ; 2. so there would be {smaller / fewer / less growth of} plants ; 3. therefore the soil will not be improved / eq ; 4. herbivores would eat the shoots of the {bushes / larger plants } ; 5. so there would be fewer {bushes / larger plants / trees} ; 6. idea that a different climax community would be reached ;	**3 ACCEPT** herbivore faeces will improvethe soil **5 ACCEPT** no trees **6 ACCEPT** {climax community / stage 3}will take longer stay in stage 2 longer **IGNORE** no climax community would be reached	**(4)**

Q4.

Question Number	Answer	Additional Guidance	Mark
*(a)	1. reference to {greenhouse gases / named greenhouse gas} ; 2. credit example of how these gases {are produced / increase} ; 3. idea that (greenhouse) gases {accumulate / increase / eq} in the (upper) atmosphere ; 4. idea that {UV light / short wave lengths} pass through the (greenhouse) gases ; 5. but {(infra red) radiation / IR / long wave lengths / heat energy / eq} are {absorbed / trapped / eq} (by the greenhouses gases) ; 6. reflected from the earth's surface ; 7. idea that (mean) temperature of earth's {surface / atmosphere} increases ;	**QWC emphasis clarity of expression** 1. e.g. water vapour, carbon dioxide ; methane **NOT** carbon monoxide, sulfur dioxide 2. e.g. burning of fossil fuels, deforestation	(5)

Question Number	Answer	Additional Guidance	Mark
(b)	1. idea of using computer models ; 2. idea of using graphs ; 3. idea of extrapolation of data ;		(2)

Question Number	Answer	Additional Guidance	Mark
(c)	1. idea that there is more food available ; 2. as a result of less competition (from other animals that eat the caterpillars) / eq ; 3. idea that {chicks / birds after hatching / eq} {have a longer period of time to develop / grow faster / more likely to survive} ; 4. idea that great tits have more energy {to breed / for courtship /eq} ; 5. idea that if there are more great tits then there will be {more eggs / more chicks / greater genetic diversity} ; 6. idea that there may be time for a second brood ;	3. **ACCEPT** idea adults more likely to survive 5. **ACCEPT** larger gene pool	(3)

Question Number	Answer	Additional Guidance	Mark
(d)	1. idea that fewer birds are {dying in / exhausted from / eq} the migration ; 2. so there are more birds to breed / eq ; 3. idea that energy is not being used in {flying / migrating / eq }; 4. idea of more energy to {attract mate / courtship / build nests / protect chicks / lay more eggs / produce healthier chicks /eq}; 5. idea that time is not spent migrating ; 6. idea that more time is available to {find a mate / build a nest / eq} ;	1. **ACCEPT** idea that migrating birds die 3. **ACCEPT** energy is {conserved / saved} 4. **IGNORE** breed / reproduce unqualified **ACCEPT** to find food 5. **ACCEPT** idea that time is spent in migration 6. **IGNORE** breed / reproduce unqualified	(3)

Q5.

Question Number	Answer	Additional Guidance	Mark
(a)(i)	1. global warming is the {average / mean} increase in the temperature of the {atmosphere / earth's surface} : 2. which correlates with a decrease in the area covered by sea ice ; 3. {warmer / increase in} temperature melts the ice ; 4. because the temperature is higher than the melting point of the ice (for long periods of time) :		(3)

Question Number	Answer	Additional Guidance	Mark
(a)(ii)	1. idea of drawing a line of best fit through the (known) data : 2. and extending it to 2020 ;	ACCEPT by extrapolation for 1 mark if neither mp 1 or 2 awarded	(2)

Question Number	Answer	Additional Guidance	Mark
(a)(iii)	1. idea that the {area of ice / data / eq} fluctuates ; 2. idea of {factor / named factor} that decreases {global warming / greenhouse gases / eq} could change ; 3. idea of {factor / named factor} that increases {global warming / greenhouse gases / eq} could change ; 4. idea that trend could change ; 5. idea that data collected a long time ago may not be accurate due to technology ;	1 ACCEPT 2020 might be on a {peak / trough / eq} 2 ACCEPT idea that efforts are being made to decrease global warming 3 e.g. volcanic eruptions, forest fires, albedo effect 4 e.g. the ice melts (even) faster / the prediction assumes that the trend will not change	(3)

Question Number	Answer	Additional Guidance	Mark
(b)(i)	1. 53333 ;	ACCEPT 53 334 DO NOT ACCEPT with units	(1)

Question Number	Answer	Additional Guidance	Mark
(b)(ii)	1. {energy / fat} content of {eggs / berries / caribou} is low compared to the seals ; 2. idea that a lot of {eggs / berries} have to be eaten ; 3. idea that there will not be enough {eggs / berries / food} to sustain the bears ; 4. bears will starve ; 5. idea that bears {will not build fat reserves / will freeze to death in the cold / eq} ; 6. idea that foraging for food might use more energy than it supplies ; 7. idea that bears will have less energy for reproduction ; 8. idea that caribou may have sufficient {energy / fat} content maybe sufficient but bears do not eat many of them ;	1 **ACCEPT** these food sources 3 **ACCEPT** competition / fighting / moving out of area	(4)