

Answer ALL questions.

Write your answers in the spaces provided.

- 1 One of the first plant species to colonise some habitats is thale cress (*Arabidopsis thaliana*).

The plant hormone IAA (auxin) is produced in the growing tips of plants such as thale cress.



(Source: Nigel Cattlin / Alamy Stock Photo)

- (a) State what is meant by the term **colonisation of a habitat**.

(1)

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- (ii) Explain the importance of enzyme and substrate concentrations when comparing the initial rates of reaction of different enzymes.

(3)

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(Total for Question 5 = 10 marks)

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(iv) Explain why vasoconstriction will result in the death of brain cells.

(2)

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(Total for Question 6 = 16 marks)

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Pearson Edexcel Level 3 GCE

Wednesday 19 June 2024

Morning (Time: 2 hours)

Paper
reference

9BN0/03

Biology A (Salters Nuffield)

Advanced

PAPER 3: General and Practical Applications in Biology

Scientific article for use with Question 8

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Question number	Answer	Additional guidance	Mark
1(c)(i)	An explanation that makes reference to two of the following: - to ensure any response is due to the mutated or non-mutated allele (1) - because heterozygotes have the non-mutated and the mutated allele (1) - one of the alleles may be recessive (and will not be expressed in heterozygous plants) / one allele may be dominant hiding effect of recessive allele (1) - the alleles may be {codominant / incompletely dominant} (1)	ALLOW they are a controlled variable / to make results valid / increases validity ALLOW gene for allele in MP2 ALLOW heterozygotes have two different (tir1) alleles ALLOW so effect of each allele can be investigated ALLOW (heterozygotes) may still make enough tir1 protein	Choose an item. (2)

Question number	Answer	Additional guidance	Mark
2(a)	- correct diameter measured (1) - correct area calculated and recorded as a whole number (1)	<u>Example of calculation</u> 19 / 19.0 283 / 284 ALLOW 18.5 / 19.5 for diameter ALLOW area calculated from 18.5 / 19.5 given as a whole number IGNORE units in table Correct answer with no working gains full marks	(2)

Question number	Answer	Additional guidance	Mark
2(b)	A description that makes reference to three of the following: - wear gloves (that can be disposed of) (1) - after transfer of disk sterilise tweezers (1) - keep exposure of bacteria in Petri dish to environment to a minimum (1) - after transferring disks clean workspace (1)	ALLOW wash hands after transferring the disk ALLOW description of method e.g. flaming of forceps e.g. only lift lid slightly / keep time lid is removed (from Petri dish) to a minimum ALLOW work in a containment cabinet	Choose an item. (3)

Question number	Answer	Additional guidance	Mark
2(c)	An explanation that makes reference to the following: - plot a graph (1) - results {not close to the line of best fit / that do not fit the trend} (could be) anomalous (1) OR - repeat (the experiment) (1) - results outside standard deviation (could be) anomalous (1)		Choose an item. (2)

Question number	Answer	Additional guidance	Mark
3(a)(i)	An answer that makes reference to the following: thylakoid (membrane) (1)	ALLOW grana / granum / thylakoids ALLOW on thylakoids DO NOT ACCEPT thylakoid space	Choose an item. (1)

Question number	Answer	Additional guidance	Mark
3(a)(ii)	- correct calculation of gradient (1) - correct answer to two significant figures (1)	Answer between 25 and 28 to any number of significant figures 25 / 26 / 27 / 28 Correct answer without working gains both marks	Choose an item. (2)

Question number	Answer	Additional guidance	Mark
4(c)(ii)	An answer that makes reference to two of the following: • more {oxygen taken up /carbon dioxide released} at lower temperature (1) • {more / higher rate of} respiration at {lower temperature / 14 °C} (1) • (mostly) aerobic respiration taking place (1) • using respiratory substrates other than {carbohydrates / glucose} (1)	ALLOW ratio of carbon dioxide produced to oxygen consumed is constant /carbon dioxide produced directly proportional to oxygen consumed / positive correlation between oxygen uptake and carbon dioxide production ALLOW example e.g. using fats / proteins as respiratory substrates ALLOW incomplete {aerobic respiration / oxidation of glucose}	Choose an item. (2)

Question number	Answer	Additional guidance	Mark
6(b)(iv)	An explanation that makes reference to the following: • reduced blood flow to (brain) cells (1) • therefore reducing the supply of {oxygen / glucose} required for respiration (1)		Choose an item. (2)

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Level	Mark	Descriptor
0	0	No awardable content
1	1 – 3	Limited scientific judgement made with a focus on mainly just one method, with a few strengths/weaknesses identified. A conclusion may be attempted, demonstrating isolated elements of biological knowledge and understanding but with limited evidence to support the judgement being made.
2	4 – 6	A scientific judgement is made through the application of relevant evidence, with strengths and weaknesses of each method identified. A conclusion is made, demonstrating linkages to elements of biological knowledge and understanding, with occasional evidence to support the judgement being made.
3	7 – 9	A scientific judgement is made which is supported throughout by sustained application of relevant evidence from the analysis and interpretation of the scientific information. A conclusion is made, demonstrating sustained linkages to biological knowledge and understanding with evidence to support the judgement being made.

Question number	Answer	Additional guidance	Mark
8(c)	A description that makes reference to four of the following: • use of carbon dioxide absorber (1) • control temperature (1) • record spirometer trace (1) • description of how to obtain rate of oxygen consumption from trace (1) • reference to (using) mass of sloth (1) • comment on need to convert oxygen consumption to kilo joules (1)	e.g. NaOH / KOH / soda lime ALLOW spirometer produces a {trace / graph} ALLOW description of trace e.g. peaks and troughs / graph of tidal volume e.g. find slope of peaks / change in height of peaks divided by time	Choose an item. (4)