

- 3 New drugs are tested in clinical trials before they can be used in treatments on patients.

One of the first people to isolate and test a drug was William Withering.

- (a) Give the name of the drug he tested.

(1)

- (b) Complete the table with a (✓) or a (×) to show which of the stages that take place in contemporary drug trials were carried out by William Withering.

(2)

Procedure	Type of trial	
	William Withering	Contemporary drug trial
Use of a placebo		✓
Testing of dose		✓
Tested on healthy volunteers		✓
Double blind trial		

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- (b) (i) Give the names of **two** products of the light-dependent reactions of photosynthesis.

(1)

- (ii) The rate of light-dependent reactions can be measured in isolated chloroplasts.

Environmental temperature may affect the rate of these reactions.

Describe how DCPIP can be used to measure the effect of temperature on the rate of the light-dependent reactions in isolated chloroplasts.

(4)

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(Total for Question 5 = 8 marks)



(ii) Global warming can result in climate change.

Describe how climate change could affect the distribution of plants in woodlands in North America.

(2)

(c) To conserve plant species, seeds may be stored in seed banks.

Explain why cold and dry conditions are required for the storage of these seeds.

(3)

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(Total for Question 6 = 11 marks)

- (i) The colour of the coats of deer is controlled by a single gene.

The allele for brown coats is dominant and the allele for white coats is recessive.

Calculate the number of heterozygotes in this population using the Hardy–Weinberg equation.

$$p^2 + 2pq + q^2 = 1.0$$

(3)

Answer

- (ii) It may be beneficial for a population to contain a higher percentage of heterozygote individuals.

Which of the following statements correctly explain why this is the case?

1. Heterozygotes may have an allele which allows for adaptation if conditions change.
2. Heterozygotes reduce genetic diversity.
3. A beneficial allele could be recessive and heterozygotes breeding together may produce a homozygous recessive offspring.

(1)

- ☐ A 1 only
- ☐ B 1 and 2
- ☐ C 1 and 3
- ☐ D 2 and 3

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P 7 4 4 5 6 A 0 1 7 2 8

- (b) In most mammals, the production of lactase enzyme decreases when the offspring stop feeding on milk.

In Europe, a single mutation resulted in the continued production of lactase enzyme by children and adults.

The study recorded changes in the frequency of this mutation over the past 4000 years.

Time, years ago	Frequency of mutation allowing lactase production into adulthood	
	UK	Central Europe
4000	0.096	0.079
3000	0.280	0.093
2000	0.680	0.250
1000	0.770	0.590
0 (Present)	0.740	0.440

- (i) The frequency of this mutation in Central Europe has increased by 457% in the last 4000 years.

Calculate the percentage increase in the frequency of this mutation in the UK in the last 4000 years.

(2)

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.....%



Discuss the use of these different hepatitis B treatments.

(6)

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

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(Total for Question 9 = 15 marks)





Mark Scheme (Results)

Summer 2024

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Pearson Edexcel Advanced Level
In Biology A Salters – Nuffield (9BN0)
Paper 01: The Natural Environment and
Species Survive

Question Number	Answer	Mark
2(b)(ii)	The only correct answer is B to determine the repeatability of the data A is not correct because a chi-squared test- does not require repeats C is incorrect because this does not improve the accuracy D is not correct because this does not increase validity	(1)

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Question Number	Answer	Additional guidance	Mark
2(c)	An explanation that makes reference to three of the following - all the active sites (of the enzymes) are occupied (1) - enzyme concentration is limiting / no more enzyme-substrate complexes can be formed (1) - RUBISCO cannot fix carbon dioxide any faster (1) (therefore) limiting the rate (of photosynthesis) (1)	ALLOW named enzyme e.g. RUBISCO ALLOW reference to other named limiting factors such as light { intensity / wavelength }, temperature or water availability	(3)

Question Number	Answer	Additional guidance	Mark
9(a)(i)	An explanation that makes reference to two of the following: - increase in (core) body temperature (1) - it is part of the non-specific immune response / increases efficiency of immune response (1) - the high temperature in a fever destroys the { pathogen / viruses } (1)	ALLOW part of the inflammatory response ALLOW high temperature denatures enzymes of pathogens / prevents replication of viruses	(2)

Question Number	Answer	Additional guidance	Mark
9(a)(ii)	A description that makes reference to the following (activated) T (helper) cells release cytokines (1) - B cells stimulated to produce B effector cells (1) (B effector) cells differentiate into plasma cells (1) - antibodies are released (by plasma cells) (1)	ALLOW activated B cells	(4)