

A-Level Biology

Edexcel A (Salters Nuffield)

2025 Predicted Paper

Paper 1

The Natural Environment and Species Survival



Name:.....

Date:.....

2 hours allowed

You may use a calculator

Rough Grade Boundaries

These do not guarantee you the same mark in the exam.

A* - 70%

A - 60%

B - 50%

C - 45%

D - 35%

E - 30%

| Question | Possible Marks | Marks Gained |
|--------------|----------------|--------------|
| 1 | 9 | |
| 2 | 12 | |
| 3 | 10 | |
| 4 | 13 | |
| 5 | 9 | |
| 6 | 11 | |
| 7 | 8 | |
| 8 | 10 | |
| 9 | 10 | |
| 10 | 8 | |
| Total | 100 | |





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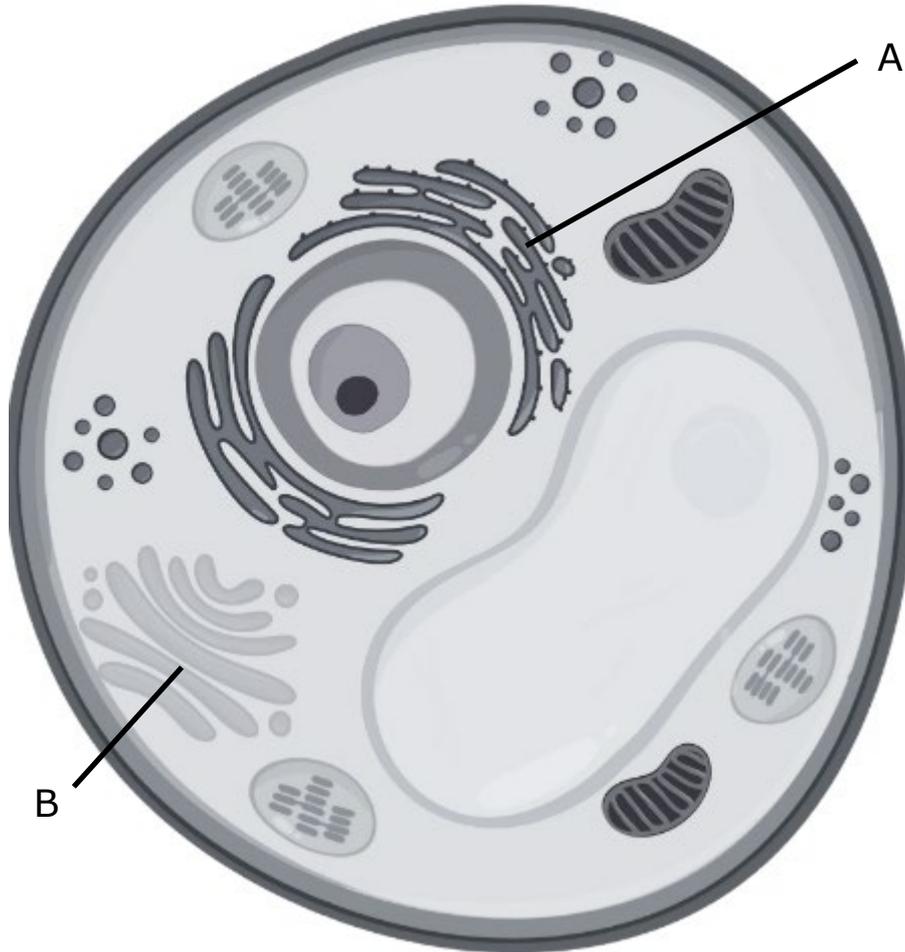
- Live revision tutorials
 - Easter Exam Prep Live tutorials with exam skills focus
 - Teaching videos
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- Previous years predicted papers and walkthroughs (not all subjects)
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01 The diagram below shows a eukaryotic cell.



a) Name the two labelled organelles.

[2 marks]

A:

B:



- b)** Give **two** features that scientists could use to identify this cell as a eukaryotic cell and not a prokaryotic cell.

[2 marks]

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- c)** Ribosomes produce polypeptides.

- i)** Name the location in the cell where ribosomes are produced.

[1 mark]

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- ii)** Describe how organelles A and B are involved in the production and transport of proteins.

[4 marks]

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02 Lactose is a disaccharide found in milk and other dairy products.

a) Name the **two** monosaccharides that make up lactose.

[1 mark]

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b) Describe how a disaccharide is formed from two monosaccharides.

[3 marks]

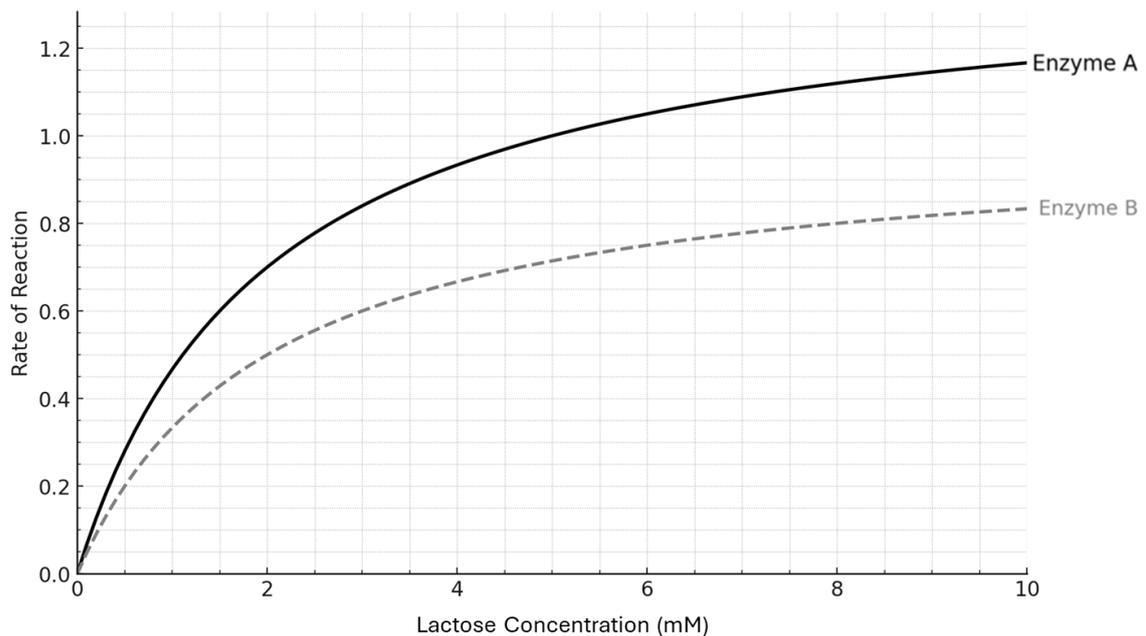
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Some people cannot digest lactose because they are not able to produce lactase. Lactose intolerant people can take tablets before eating that can contain lactase enzymes. The enzymes used to make these tablets can be harvested from different species of yeasts or bacteria.

A scientist wanted to test two different lactase enzymes (A and B) being considered for use in a new supplement. They measured the rate of reaction for each enzyme at different lactose concentrations.

The graph below shows their results.



- c) State **two** variables that the scientist should have controlled during the experiment.

[2 marks]

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- d)** Explain the effect of changing substrate concentration on the rate of reaction for enzyme A.

[3 marks]

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- e)** Explain which enzyme the scientist should use in the new supplement.

[3 marks]

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03 Some marine biology students were tasked with studying how species diversity of algae changed along a rocky shore. The students used sampling methods to collect data on numbers of different algal species in two zones of the rocky shore.

a) Explain what is meant by the term species richness.

[1 mark]

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The students collected the following data.

| Zone | Algae Species | Mean number of Individuals |
|-------------|-------------------------------|-----------------------------------|
| High shore | Spiral Wrack | 40 |
| | Channel Wrack | 35 |
| | Green String Lettuce | 25 |
| | Index of Diversity (D) | 2.96 |
| Low shore | Oarweed | 20 |
| | Knotted Wrack | 50 |
| | Sea oak | 30 |
| | Bladder Wrack | 25 |
| | Spiral Wrack | 15 |
| | Index of Diversity (D) | |



- b)** Describe a method the students could have used to collect the data on numbers of different algal species in two zones of the rocky shore.

[4 marks]

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- c)**
i) Calculate the index of diversity of the low shore.

Use the following formula:

$$D = \frac{N(N - 1)}{\sum n(n - 1)}$$

Where N = total number of organisms
And n = total number of organisms of each species

[3 marks]

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ii) State **two** abiotic factors that could affect the number of seaweed species observed in the different zones.

[2 marks]

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- 04** The image below shows cross sections of two blood vessels taken under a light microscope.



- a)** State what type of vessel is represented by each letter and explain your answer using evidence from the diagram.

[2 marks]

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- b)** Explain how the structure of an artery is adapted to carry out its function.

[4 marks]

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Apolipoprotein A-1 (apoA-1) is a major component of high-density lipoproteins (HDLs).

A controlled study looked at the effects of smoking and coronary artery disease on the concentration of apoA-1 in blood plasma. Their results are shown in the table.

| | | apoA-1 protein concentration in plasma (g/L) | | |
|---|----------|---|-------------------------------------|---|
| Group | n | Before Taking Part in Study | After no smoking for 90 days | After resuming smoking for 90 days |
| Non-smoker | 17 | 1.58 | | |
| Smoker with no coronary artery disease | 30 | 1.38 | 1.58 | 1.42 |
| Smoker with coronary heart disease | 28 | 1.33 | 1.47 | 1.40 |

- c) Give **one** factor that should have been kept consistent across the groups.

[1 mark]

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- 05** Male pigeons have two Z chromosomes (ZZ), and female pigeons have one Z and one W chromosome (ZW).

Feather colour in pigeons is determined by a gene on the Z chromosome that has three alleles. The W chromosome has no gene for feather colour.

| Feather Colour | Possible Male Genotypes |
|----------------|-------------------------|
| Ash-red (A) | AA, AB, AW |
| Blue (B) | BB, BC |
| Brown (C) | CC |

- a)** State the type of inheritance demonstrated by feather colour in pigeons.

[1 mark]

- A** Incomplete dominance
- B** Dihybrid
- C** Sex-linkage
- D** Autosomal-linkage

- b)** Give the genotypes of the following:

[2 marks]

A homozygous blue male:

A brown feathered female:



- c) A pigeon breeder mates a homozygous ash-red male with a blue female.

Complete the genetic diagram to show the probability of getting an ash-red female.

[4 marks]

| | | |
|------------------------------|--------------|-------------|
| Phenotypes of parents | Ash-red male | Blue female |
| Genotypes of parents | Z^AZ^A | |

- d) Female pigeons are more likely than male pigeons to show a phenotype produced by a recessive allele carried on the Z chromosome. Explain why.

[2 marks]

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06 The image below is an electron micrograph of a chloroplast.



- a)** The actual size of the scale bar in the image is 1.4×10^{-6} m.
Calculate the magnification that was used to produce the image.
Give your answer to 2 significant figures.

[3 marks]

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Students extracted chloroplasts from some plant tissue and added a cold buffer solution containing sucrose to form a chloroplast suspension. They used DCPIP as an indicator.

To investigate the light dependent reactions of photosynthesis, the following experiment was conducted.

The student set up the test tubes as follows:

- Tube A – buffer with no chloroplasts and DCPIP under a lamp
- Tube B – chloroplast suspension and DCPIP under a lamp
- Tube C – chloroplast suspension and DCPIP wrapped in black paper

The colour of the mixture in the tube was recorded after 30 minutes. The results are shown in the table below.

| | Colour of solution in tube after 30 minutes |
|--------|--|
| Tube A | Blue |
| Tube B | Green |
| Tube C | Blue |

- b)** Explain why a cold sucrose solution was used to make the chloroplast suspension.

[2 marks]

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- c)** Use your knowledge of the light dependent reactions to explain the results in **Tube B**.

[2 marks]

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- d)** DCMU is used as a weed killer as it inhibits electron transfer. The student set up another tube in the same way as Tube B but added some DCMU.

Predict what colour the solution would be after 30 minutes and explain your answer.

[2 marks]

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- e)** Explain how DCMU works to prevent the growth of weeds.

[2 marks]

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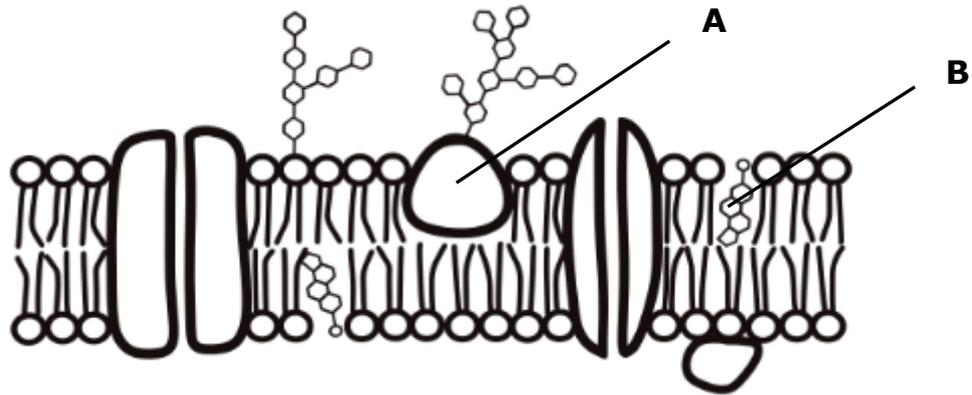
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07 The diagram below shows the fluid mosaic model of the plasma membrane.



a) Identify the structures labelled A and B on the diagram.

[2 marks]

A:

B:



A student investigated the movement of molecules across the plasma membrane. They used two different substances and measured their uptake by cells over time. The results are shown in the table below.

| Substance | Molecular Size (nm) | Lipid Solubility | Uptake Rate (mmol min ⁻¹) |
|-----------|---------------------|------------------|---------------------------------------|
| X | 0.8 | High | 2.5 |
| Y | 1.4 | Low | 0.7 |

- b)** Explain why substance X has a higher uptake rate into the cell than substance Y.

[4 marks]

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- c)** Explain how the partial permeability of the plasma membrane also allows osmosis to take place between cells.

[2 marks]

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08 Tuberculosis (TB) is a disease caused by bacteria infecting phagocytes in the lungs. The following points describe how the disease progresses in the body:

- The first infection may not cause symptoms or only simple cold-like symptoms.
- The bacteria are sealed inside structures called tubercles in the lungs and lie dormant, protected by a thick waxy coating.
- The bacteria can become active when the immune system is weak, and they slowly destroy the lung tissue and spread in the blood to damage other tissues.

a) Give **one** similarity and **one** difference between the modes of infection of tuberculosis and HIV.

[2 marks]

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- b)** In 2023, 8 million people were recorded as being infected with TB and 1.25 million people died from the disease.

The BCG vaccine was routinely given to children and has helped to significantly reduce TB in some countries so that routine vaccinations are no longer needed.

Explain how the BCG vaccine makes children immune if they get reinfected with tuberculosis.

[3 marks]

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Tuberculosis does not just infect humans; a strain of the bacteria has been found in cows.

Drinking unpasteurised milk from cows infected with bacteria can spread the infection to humans.

Pasteurisation involves heating the milk to 72°C for 15 seconds.

c) Both human and cow's milk have been shown to contain a globular glycoprotein called lactoferrin. It is part of the body's non-specific defence system and has many antimicrobial and anti-inflammatory properties.

i) Explain what is meant by a globular protein.

[2 marks]

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ii) Name the type of immunity that infant mammals receive from drinking milk produced by their mothers.

[1 mark]

- A** Natural Active
- B** Artificial Active
- C** Natural Passive
- D** Artificial Passive



iii) Explain why pasteurisation can significantly reduce the concentration of functioning lactoferrin in cow's milk.

[2 marks]

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- 09** A team of conservation biologists is studying the genetic diversity of the critically endangered Panamanian golden frog, which is found in South American rainforests.



- a)** The Panamanian golden frog is endemic to Panama.

Explain what is meant by the term **endemic**.

[1 mark]

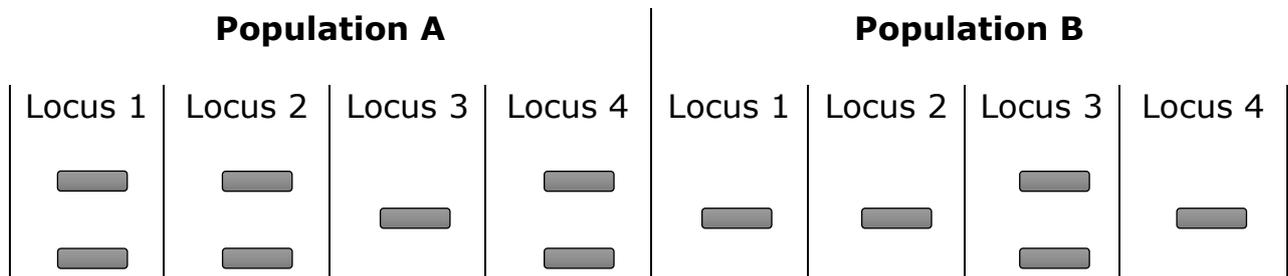
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Due to habitat destruction the populations have become small and isolated. Scientists trying to support their conservation have assessed the genetic diversity of two populations: A and B.

DNA samples from frogs from Population A and Population B were taken, treated and then used to make a DNA profile. They compared the number of short tandem repeats (STRs) at four specific gene loci between the two populations. The results are shown in a diagram of the DNA profile below:



- b)** Describe the method the scientists would have used to produce the DNA profile shown in the diagram.

[4 marks]

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- c) The conservation team want to try and start a captive breeding programme to help prevent the extinction of the frogs.
- i) Explain how the scientists used these results to determine which population is more genetically diverse to use for the programme.

You should include calculations in your answer.

[3 marks]

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- ii) Give **two** ways that captive breeding programmes can help to maintain the genetic diversity of small populations.

[2 marks]

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10 Both insects and microorganisms contribute to the decomposition of organic materials.

a) Describe the role of microorganisms in decomposition.

[2 marks]

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