



Additional Assessment Materials
Summer 2021

Pearson Edexcel GCE (Biology A)

Resource Set Topic 4: Biodiversity and Natural
Resources.

Question Paper

(Public release version)

Pearson: helping people progress, everywhere

Pearson aspires to be the world's leading learning company. Our aim is to help everyone progress in their lives through education. We believe in every kind of learning, for all kinds of people, wherever they are in the world. We've been involved in education for over 150 years, and by working across 70 countries, in 100 languages, we have built an international reputation for our commitment to high standards and raising achievement through innovation in education. Find out more about how we can help you and your students at: www.pearson.com/uk

General guidance to Additional Assessment Materials for use in 2021

Context

- Additional Assessment Materials are being produced for GCSE, AS and A levels (with the exception of Art and Design).
- The Additional Assessment Materials presented in this booklet are an **optional** part of the range of evidence teachers may use when deciding on a candidate's grade.
- 2021 Additional Assessment Materials have been drawn from previous examination materials, namely past papers.
- Additional Assessment Materials have come from past papers both published (those materials available publicly) and unpublished (those currently under padlock to our centres) presented in a different format to allow teachers to adapt them for use with candidate.

Purpose

- The purpose of this resource to provide qualification-specific sets/groups of questions covering the knowledge, skills and understanding relevant to this Pearson qualification.
- This document should be used in conjunction with the mapping guidance which will map content and/or skills covered within each set of questions.
- These materials are only intended to support the summer 2021 series.

3 Conservation programmes are used to save endangered species.

The Scottish wildcat, shown in the photograph, is a subspecies of the European wildcat, *Felis silvestris silvestris*.



The Cairngorms Wildcat Project estimates that there are 150 breeding pairs left, but the Scottish Wildcat Association believes that only 35 cats remain.

A conservation group proposed that a captive breeding programme, and the relocation of Scottish wildcats, would be necessary to prevent extinction.

(a) (i) State why the Scottish wildcat has been described as **endemic**.

(1)

.....

.....

.....

(ii) The Scottish wildcat can interbreed successfully with domestic cats.

Explain the effect this could have on the genetic diversity of the Scottish wildcat.

(2)

.....

.....

.....

.....

.....

.....

(b) Explain how molecular phylogeny could be used to determine the relationships between the Scottish wildcat and other subspecies of European wildcat.

(2)

.....

.....

.....

.....

.....

.....

.....

.....

.....

(c) Describe how the proposed conservation programme could prevent the Scottish wildcat from becoming extinct.

(4)

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

(Total for Question 3 = 9 marks)

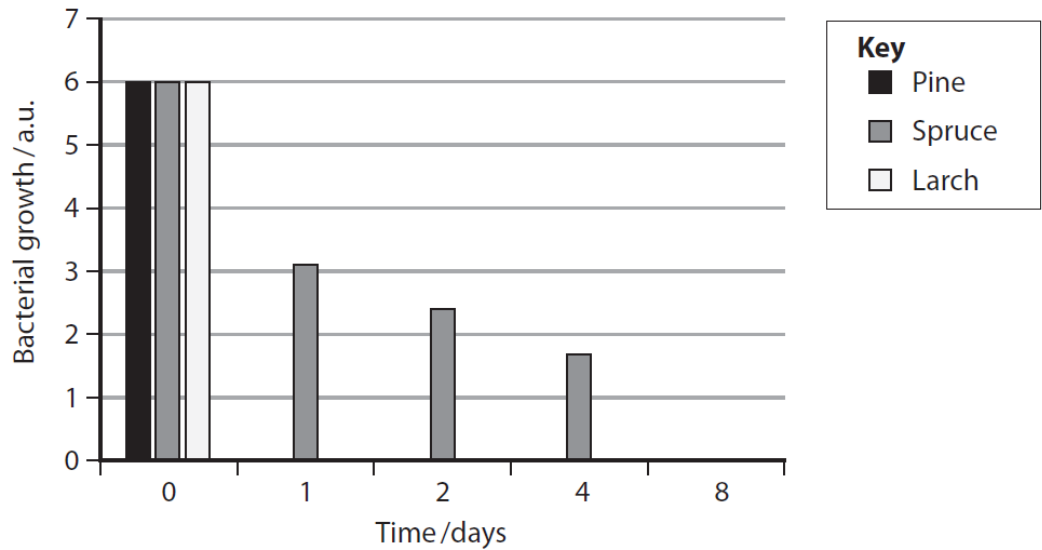
7 Many plants produce chemicals that have antimicrobial properties.

The suitability of using wood from three types of tree to make kitchen chopping boards was investigated.

In this investigation, 50 cm³ of a bacterial culture was added to 100 g of wood chippings from each of three types of tree.

The growth of bacteria was measured at the start (Day 0), and then after 1, 2, 4 and 8 days.

The results are shown in the graph.



(a) (i) Describe the antimicrobial properties of these three types of wood.

(2)

.....

.....

.....

.....

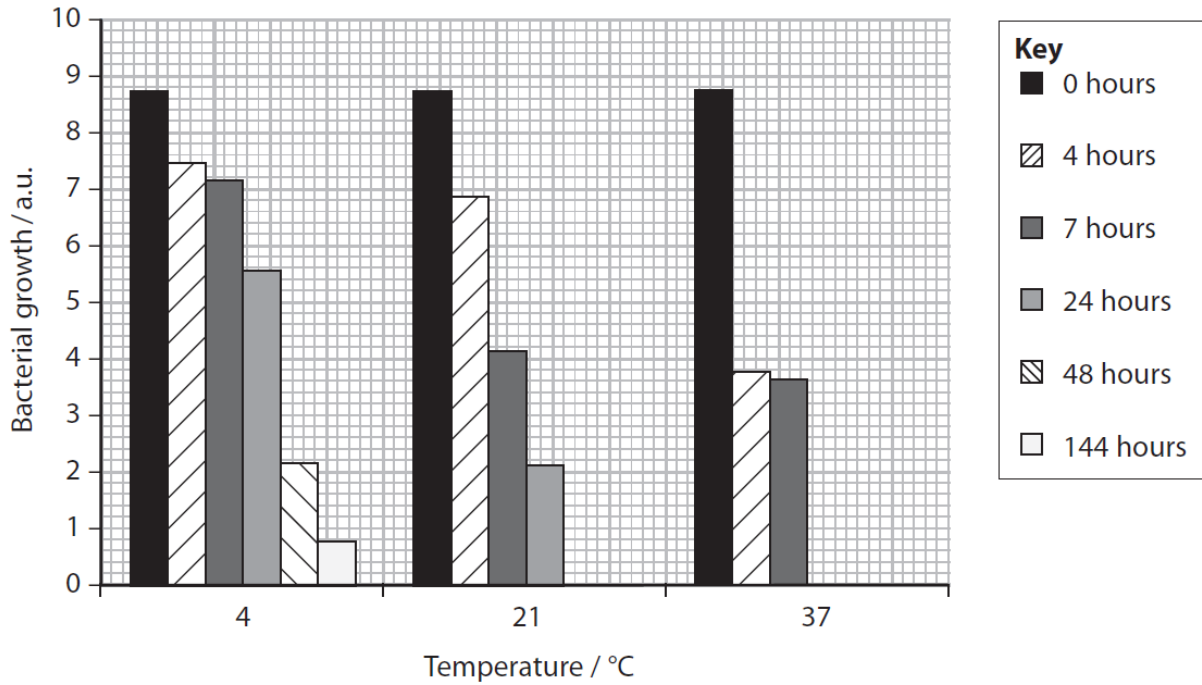
.....

.....

.....

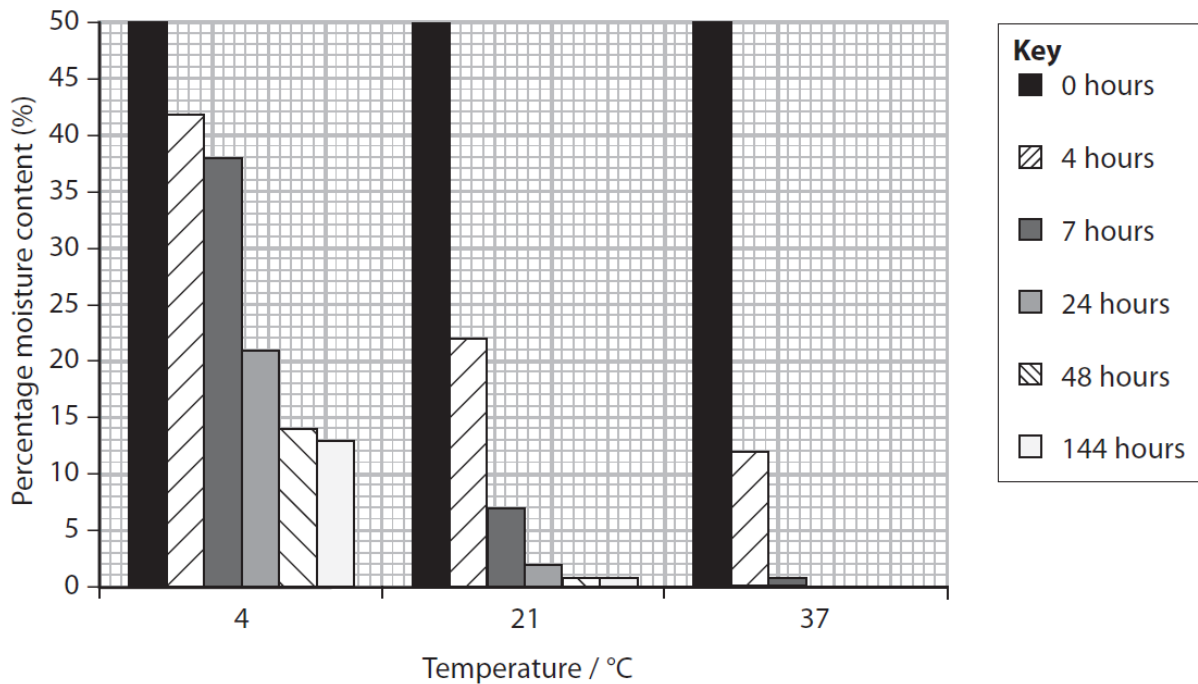
(b) Temperature and the moisture content of wood from pine trees can affect bacterial growth.

Graph 1 shows the effect of temperature on bacterial growth.



Graph 1

Graph 2 shows the effect of temperature on the moisture content of wood.



Graph 2

Analyse the data to deduce the effects of these two factors on bacterial growth on wood from pine trees.

(4)

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

(Total for Question 7 = 12 marks)

8 The fibres from different species of plants have different properties. Therefore, plant fibres can be used in the manufacture of a variety of materials.

(a) Describe the importance of magnesium ions in the production of plant fibres.

(2)

.....

.....

.....

.....

.....

.....

(b) Sisal fibres are extracted from the stems of the plant *Agave sisalana*.

The tensile strength of sisal fibres was investigated and calculated using two methods:

- calculation using the mean diameter of a number of fibres
- calculation using the actual diameter of each fibre

Both methods calculated a relative standard deviation by comparing the standard deviation to the mean tensile strength.

Calculation using	Mean tensile strength / MPa	Standard deviation / MPa	Relative standard deviation (%)
Mean diameter	308.9		58.5
Actual diameter	329.5	180.9	54.9

(i) Calculate the standard deviation when using the mean diameter.

(2)

Answer.....

(ii) Explain why the standard deviations were calculated for these data.

(2)

.....

.....

.....

.....

.....

.....

.....

.....

(c) Kapok (*Ceiba pentandra*) is a tree.

Kapok produces seed pods containing waxy fibres made of cellulose covered in lignin. These fibres are used as fillings for cushions.

(i) Describe the arrangement of glucose monomers in a cellulose molecule.

(2)

.....

.....

.....

.....

.....

.....

.....

.....

.....

(ii) Devise a method to find the relationship between the actual diameter and the tensile strength of kapok fibres.

(6)

.....
.....
.....
.....
.....
.....
.....
.....
.....
.....
.....
.....
.....
.....
.....
.....
.....
.....
.....
.....
.....

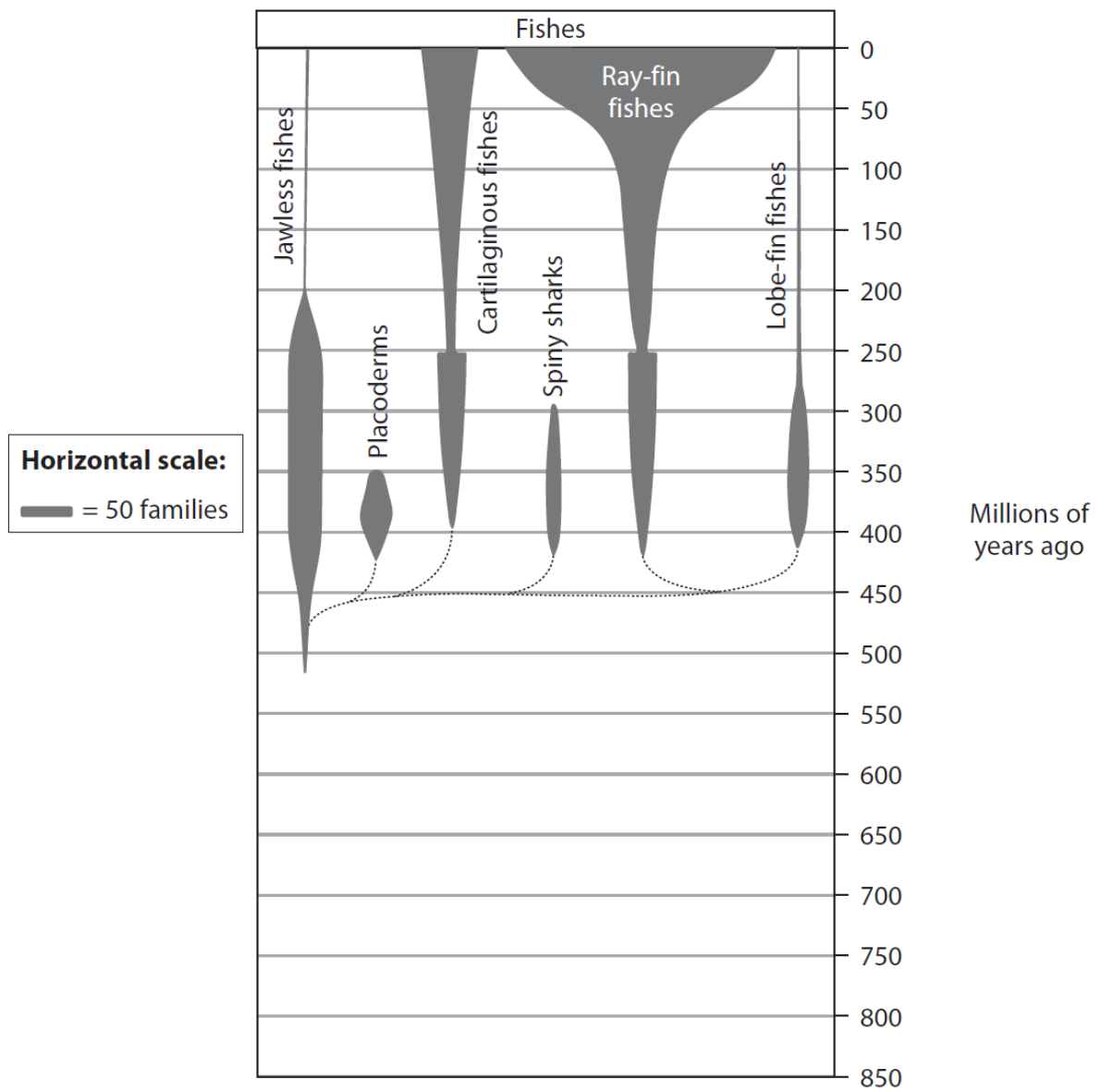
(Total for Question 8 = 14 marks)

(d) Sea ice forms only during ice ages.

The table shows Earth's ice ages over the last 1000 million years.

Ice age	Time / millions of years ago
Quaternary	0 to 2.6
Karoo	260 to 360
Andean-Saharan	420 to 460
Cryogenian	630 to 850

The diagram shows how the number of families of fishes has changed over time.



(i) At which time does the diagram show a major loss of biodiversity?

(1)

- A** 65 million years ago
- B** 252 million years ago
- C** 359 million years ago
- D** 419 million years ago

(ii) Many different types of anti-freeze protein are produced by ray-fin fishes.

Analyse the data to explain when these ray-fin fish are likely to have evolved the ability to produce anti-freeze proteins.

(3)

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

(Total for Question 7 = 13 marks)

TOTAL FOR TEST = 48 MARKS