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1540052094

ENVIRONMENTAL MANAGEMENT **0680/21**

Paper 2 Management in Context **May/June 2023**

1 hour 45 minutes

You must answer on the question paper.

No additional materials are needed.

INSTRUCTIONS

- Answer **all** questions.
- Use a black or dark blue pen. You may use an HB pencil for any diagrams or graphs.
- Write your name, centre number and candidate number in the boxes at the top of the page.
- Write your answer to each question in the space provided.
- Do **not** use an erasable pen or correction fluid.
- Do **not** write on any bar codes.
- You may use a calculator.
- You should show all your working and use appropriate units.

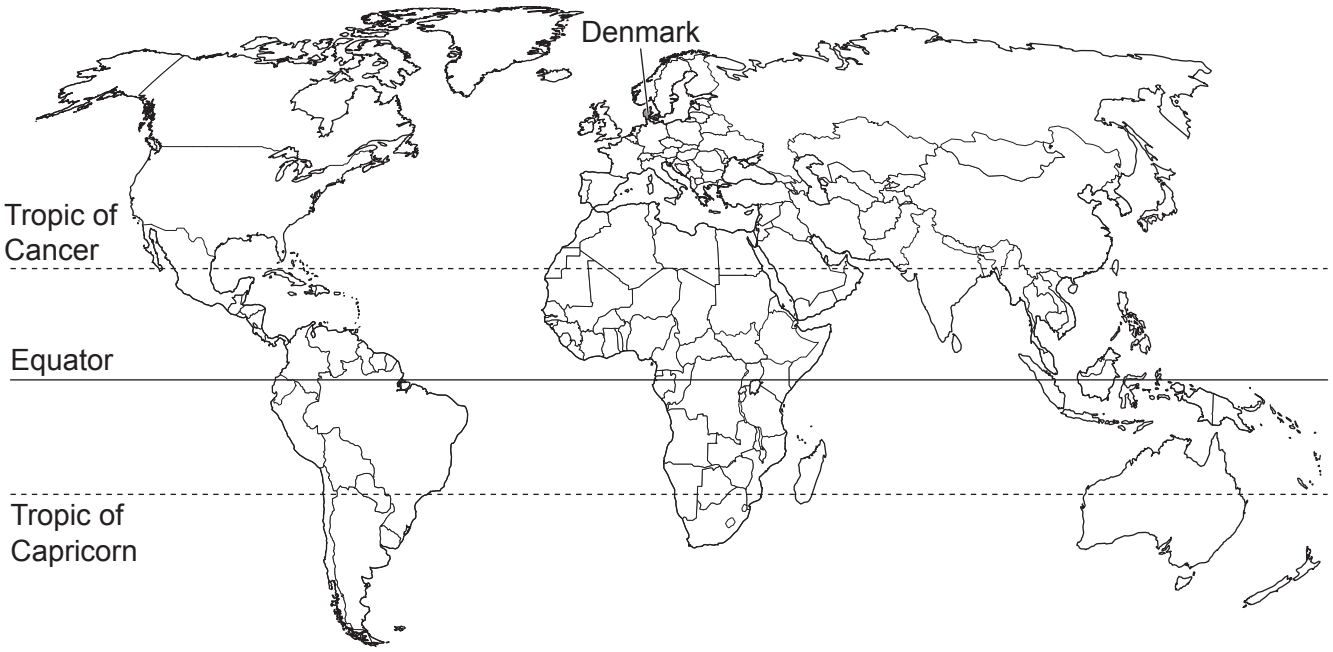
INFORMATION

- The total mark for this paper is 80.
- The number of marks for each question or part question is shown in brackets [ ].

This document has **20** pages. Any blank pages are indicated.

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world map showing the location of Denmark



map of Denmark

Key

★ capital city

• urban areas



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Area of Denmark: 43 094 km^2

Population: 5.8 million (in 2021)

Children per woman: 1.77

Life expectancy: 81.4 years

Currency: euro

Language: Danish

Climate of Denmark: temperate with windy winters and cool summers

Terrain of Denmark: low-lying and flat with 7300 km of coastline

Main economic activities of Denmark: pharmaceuticals, maritime shipping, renewable energy and agricultural production

Denmark is a more economically developed country (MEDC). All sectors of the economy are growing. 88% of the population live in urban areas.

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[Turn over

1 **(a)** **(i)** Calculate the number of people living in **rural** areas in 2021.

..... [2]

(ii) Suggest **two** reasons why only a small number of people live in **rural** areas.

1 .....

.....

2 .....

.....
[2]

(b) The photograph shows a wheat field near the capital city, Copenhagen.



The table shows climate data for the location.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
average temperature /°C	0	1	3	6	12	15	17	17	14	10	5	2
average rainfall /mm	88	86	85	79	70	70	74	78	83	86	88	89
average number of wet days	17	13	12	13	11	13	14	14	15	16	16	17

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(i) State the type of farming shown in the photograph.

..... [1]

(ii) The wheat in the photograph is planted in April. It is harvested in August.

Wheat needs a minimum average temperature of 12 °C to grow.

State the number of months wheat grows in this field.

..... [1]

(iii) Give **two** reasons why most farmers near Copenhagen do **not** use irrigation methods to grow crops.

Use information from the table in your answer.

.....

.....

.....

..... [2]

(iv) Describe the **environmental** impacts of mismanagement of irrigation.

.....

.....

.....

.....

.....

..... [3]

(c) Farmers use fertilisers containing nitrate ions to improve wheat yields.

(i) State the names of the **two** other main ions present in fertilisers.

1 .....

2 .....

[2]

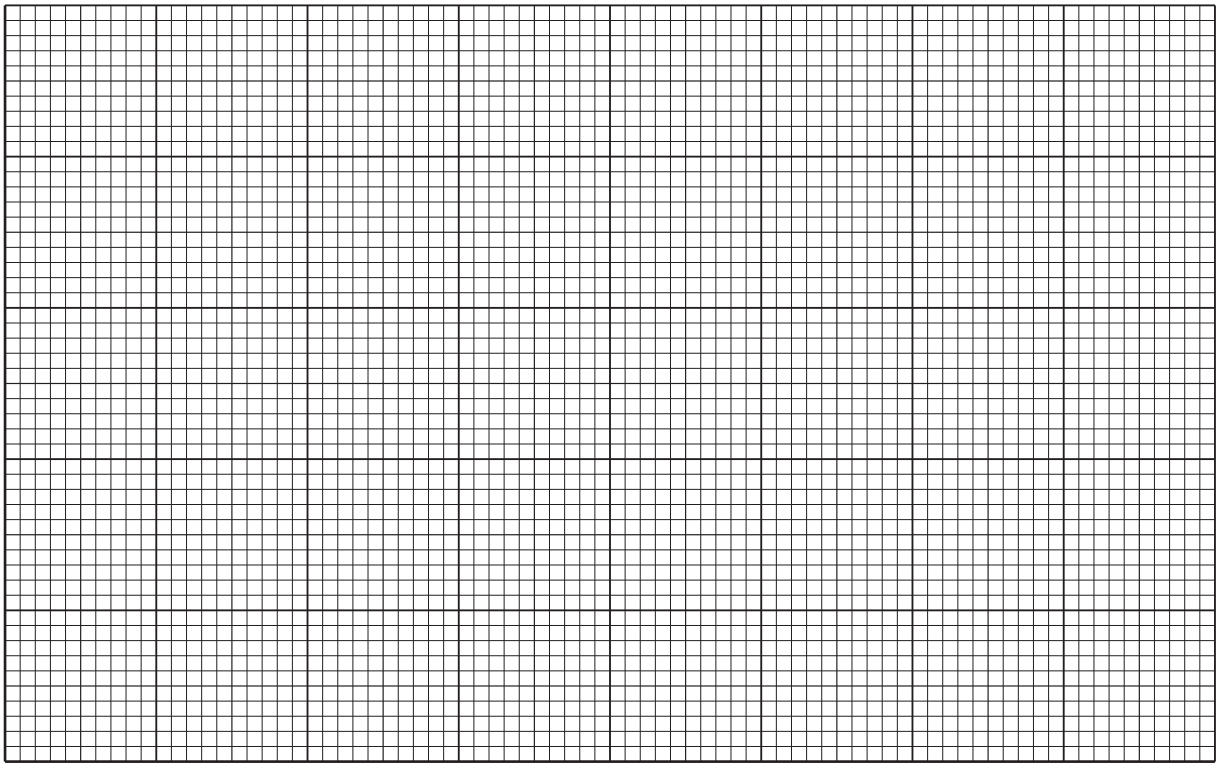
(ii) Nitrous oxide is released when bacteria break down nitrogen compounds in the soil.

Nitrous oxide is a greenhouse gas.

The table shows the nitrous oxide emissions from farming in Denmark over a 20-year period.

year	nitrous oxide emissions / 1000 tonnes
1	25
5	23
9	20
13	18
17	16
21	16

Plot a bar chart of the data in the table.



[4]

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(iii) Describe the trend shown by the data.

.....

.....

.....

..... [2]

(iv) Suggest **two** reasons why nitrous oxide emissions from farming in Denmark will **not** reach zero tonnes in the future.

1 .....

.....

2 .....

.....

[2]

(d) Greenhouse gas emissions contribute to climate change.

Suggest reasons why the population of Denmark may be impacted by climate change.

.....

.....

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.....

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.....

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..... [4]

[Total: 25]

2 The photograph shows a field in Denmark planted with apple trees.



(a) (i) This field has a soil containing three particle sizes.

Circle the smallest particle size.

sand **clay** **silt**

[1]

(ii) A fertile soil contains a balance of mineral ions.

State **three** other components of a fertile soil.

1 .....

2 .....

3 .....

[3]

(iii) Apples are grown as a cash crop.

State what is meant by cash crop.

.....

..... [1]

(b) A student wants to investigate the yield of apples from the field.

The student considers two plans to find the total number of apples in the field.

Plan A

step 1 Count the total number of trees in the field.
step 2 Count the total number of apples on one tree.
step 3 Multiply the total number of apples on one tree by the total number of trees in the field.

Plan B

step 1 Count the total number of trees in the field.
step 2 Count the total number of apples on one tree.
step 3 Repeat step 2 for another nine trees selected at random.
step 4 Multiply the average number of apples on one tree by the total number of trees in the field.

(i) Suggest why the student decides to use **Plan B**.

.....

..... [1]

(ii) Suggest a method the student can use to select the nine trees at random.

.....

.....

.....

..... [2]

(iii) Draw a table the student can use to record all the data from **Plan B**.

[3]

(iv) Scientists are breeding new varieties of apple trees to increase future yields.

Describe **one** method the scientists can use to produce new varieties of apple trees.

.....

.....

.....

.....

.....

..... [3]

[Total: 14]

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3 The photograph shows part of a forest in Denmark being harvested.



The forests in Denmark are managed to promote biodiversity.

(a) (i) The management aims to maintain the forest ecosystem.

State what is meant by the term ecosystem.

.....

..... [1]

(ii) Describe how timber extraction can be done to maintain biodiversity.

.....

.....

.....

..... [2]

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(iii) The wood on the trailer is 3.0 m long, 2.5 m wide and 2.5 m in height.

1.0 m^3 of wood has a mass of 1.25 tonnes.

Calculate the total mass of wood on the trailer.

..... tonnes [2]

(iv) The wood is processed into wood chips. The wood chips are burned instead of coal in power stations to generate electricity.

Explain **two** differences between wood chips and coal as an energy resource.

.....

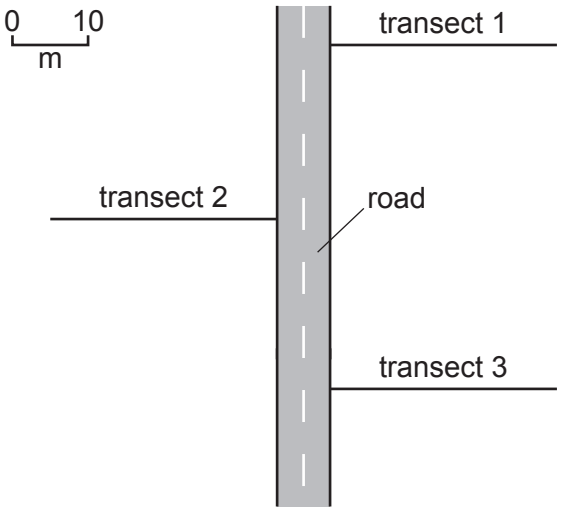
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..... [2]

(b) A student uses transect lines to survey the plant species, other than trees, in the forest shown in the photograph.

The transect lines are placed as shown.



(i) Describe how the student can use a quadrat to record the number of different plant species.

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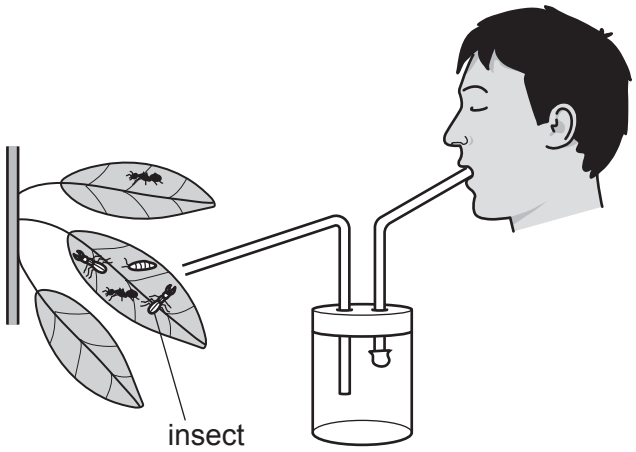
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..... [5]

(ii) The student decides to investigate the number of different types of insect living on plants along the transects.

The student uses the equipment shown in the diagram.



State the name of the equipment used by the student.

..... [1]

(iii) The student wants to compare the number of different types of insect on the leaves of plants at the beginning and end of each transect.

Suggest how the student can ensure that the comparison is fair.

.....

.....

.....

..... [2]

(iv) The results of the investigation are shown in the table.

	beginning of transect	**end of transect**
average number of different types of insect	9	14
average total number of insects	26	49

Suggest a suitable conclusion for these results.

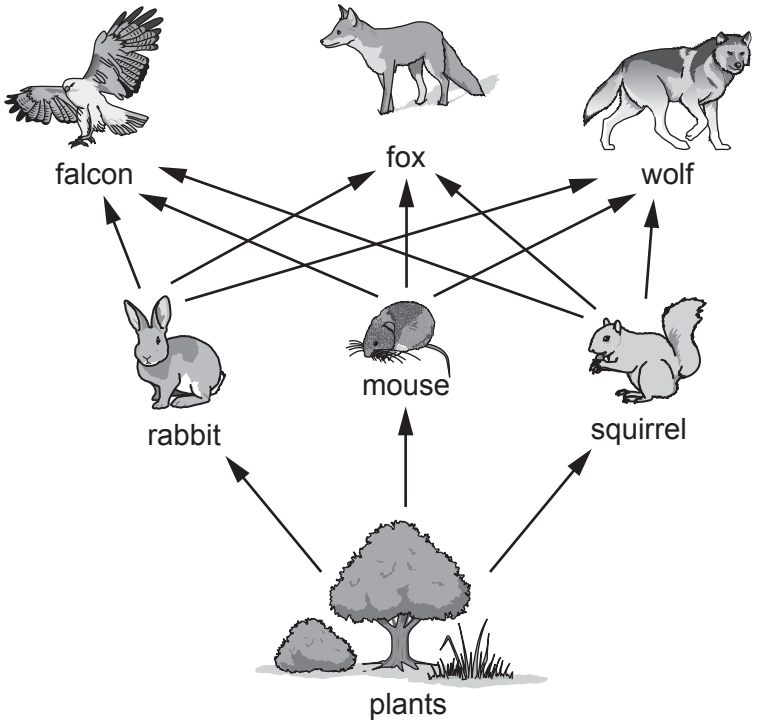
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..... [2]

(c) The diagram shows a food web in a forest.



(i) Explain why plants are called producers.

.....

.....

.....

..... [2]

(ii) Explain the flow of energy through this food web.

.....

.....

.....

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.....

..... [3]

(d) Explain how seed banks and zoos can help to maintain biodiversity.

seed banks .....

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zoos .....

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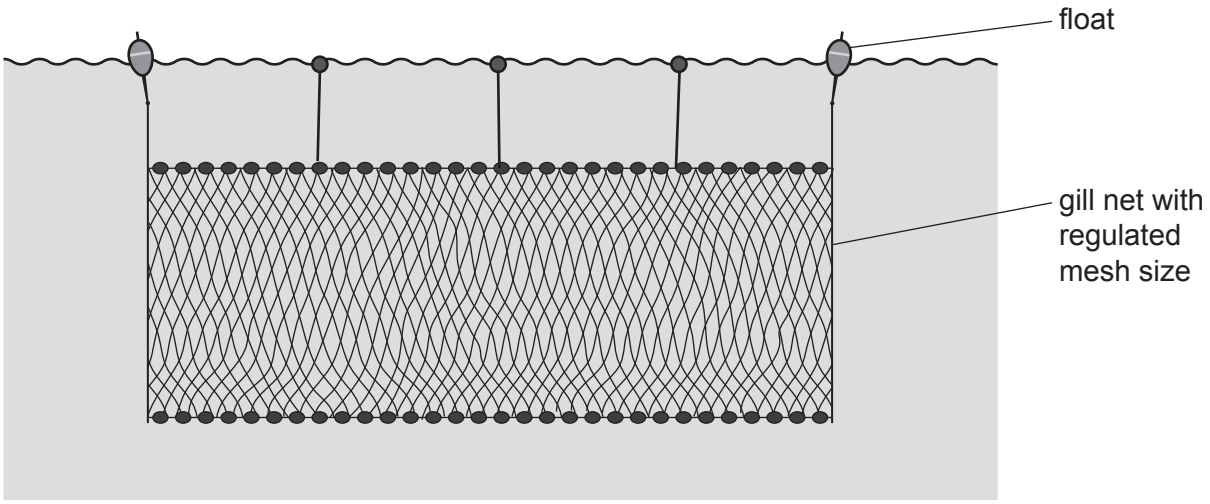
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[6]

[Total: 28]

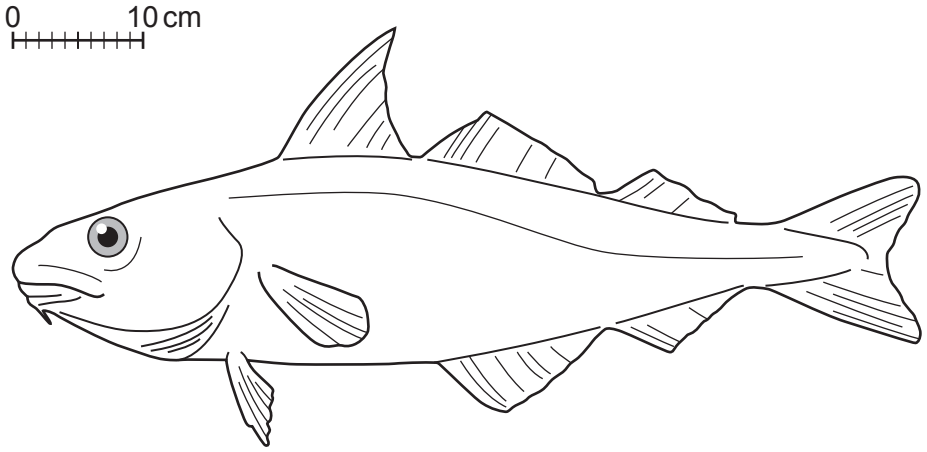
4 Many small fishing boats in Denmark use a gill net to catch fish. The mesh size of the gill net is regulated.

The diagram shows a gill net.



(a) Haddock are caught for human consumption using gill nets.

The diagram shows an adult haddock.



(i) Estimate the length of the haddock.

..... cm [1]

(ii) Explain what may happen to the haddock population if the mesh size of the gill net is **not** regulated.

.....

.....

.....

.....

.....

..... [3]

(iii) State **three** strategies, other than regulating mesh size, that can be used to control fishing in Denmark.

1 .....

2 .....

3 .....

[3]

(b) Some fish are processed into fish meal.

Fish meal has a high protein content. It is used to feed animals on farms to help them grow quickly.

Give **two** reasons why some people think this is **not** a sustainable activity.

1 .....

.....

2 .....

.....

[2]

(c) There are several fish farms around the coast of Denmark.

Describe the benefits and limitations of fish farms.

benefits .....

.....

.....

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limitations .....

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[4]

[Total: 13]

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