Cambridge Assessment International Education

Cambridge IGCSE™

CANDIDATE NAME									
CENTRE NUMBER						CANDIDATE NUMBER				

4591243251

ENVIRONMENTAL MANAGEMENT **0680/11**

Paper 1 Theory **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 [ ].

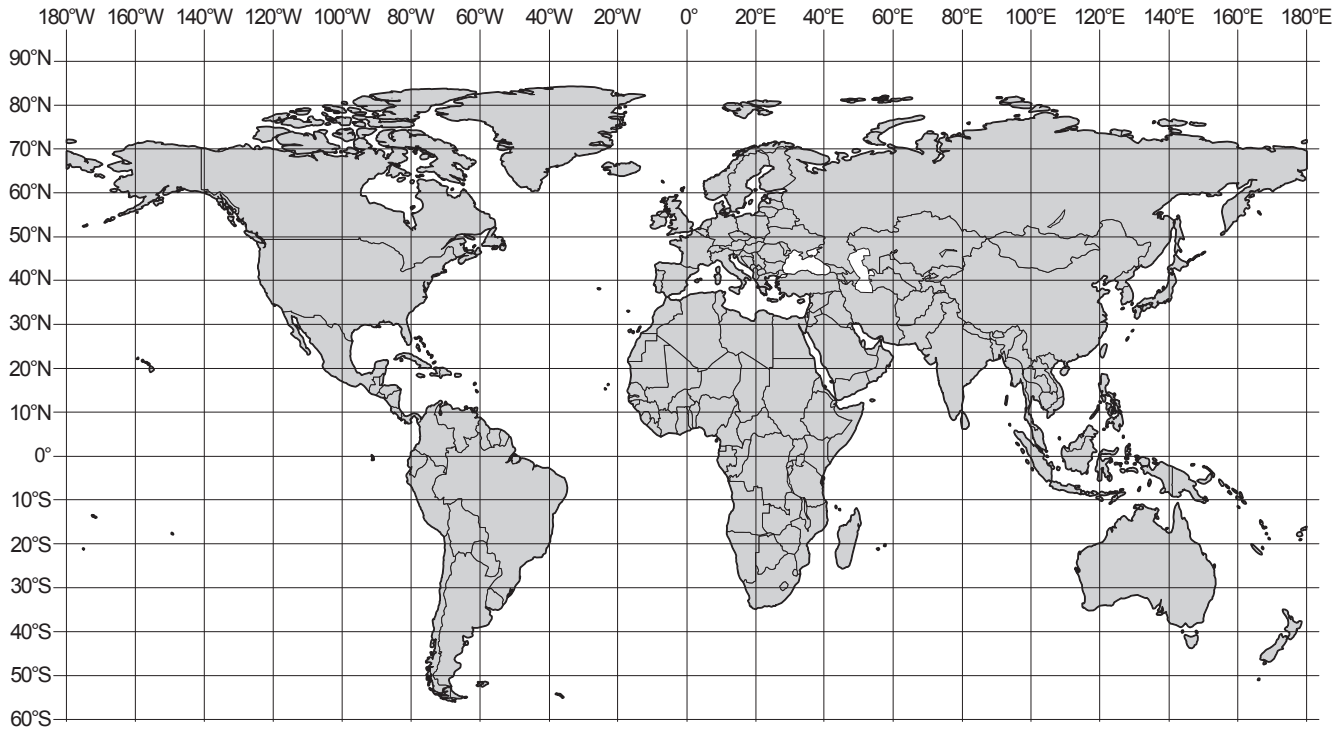
This document has **20** pages. Any blank pages are indicated.

DC (CJ) 331457

[Turn over

Section A

1 **(a)** Write the letter **T** on the map in **one** location where tropical cyclones form.



[2]

(b) State **one** condition needed for tropical cyclones to form.

..... [1]

(c) State **three** impacts of a tropical cyclone on a coastal city.

1 .....

2 .....

3 .....

[3]

[Total: 6]

2 **(a)** Malaria is caused by a parasite.

Explain how a human becomes infected with malaria.

.....

.....

.....

..... [2]

(b) **(i)** Governments use biological control as a method of reducing the spread of malaria.

State the meaning of biological control.

.....

..... [1]

(ii) State **three** ways individual people can protect themselves from being infected with malaria.

1 .....

.....

2 .....

.....

3 .....

.....

[3]

[Total: 6]

3 Some of the processes in the water cycle are shown.

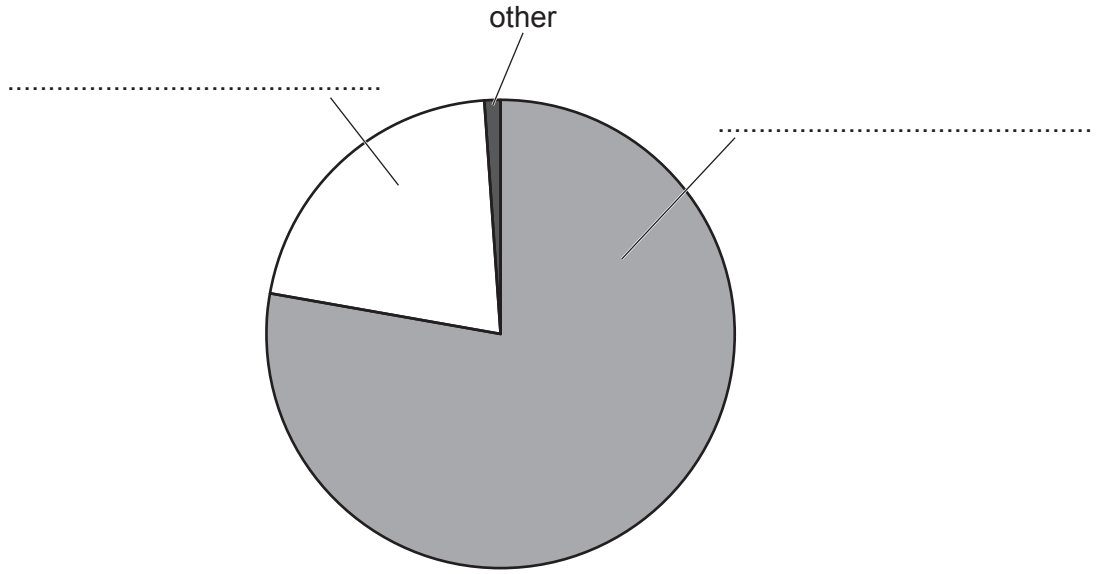
Draw **one** straight line from each name of the process to the correct description of the process.

name of process	description of process
condensation	the change in water from gas to liquid
evaporation	the change in water from liquid to gas
interception	the flow of water over the top of the soil
surface run-off	the movement of water through the lower soil layers
through-flow	the prevention of precipitation from immediately reaching the soil

[4]

4 The pie chart represents the composition of the **unpolluted** atmosphere.

The pie chart is **not** complete.



(a) Complete the pie chart with the names of the **two** gases. [2]

(b) State the names of **two** naturally occurring gases in the sector labelled 'other'.

1 .....

2 .....
[2]

[Total: 4]

Section B

5 A student reads an article about the European starling, a species of bird.

The European starling

In the 1890s, 110 European starlings were released into a park in New York, USA.

The starlings spread across the USA and now have a population of 200 million. They compete with local bird species and destroy crops.

Scientists estimate that European starlings cause $800 million of damage per year in the USA. This is $5 per hectare of agricultural land.

(a) A farm in the USA has 840 hectares of land.

(i) Calculate the cost of the damage caused by European starlings to this farm.

$ ..... per year [1]

(ii) Calculate the percentage increase in the population of European starlings.

.....% [2]

(b) (i) One method of reducing the impact of European starlings on crops is using pesticides.

Suggest **one** negative impact of using pesticides.

.....

..... [1]

(ii) Another method of controlling the population of European starlings is to play a recording of the sound of a bird suffering from stress.

Suggest why this method reduces the impact of European starlings on crops.

.....

..... [1]

(iii) European starlings fly together in large groups.

Suggest why these large groups are a hazard to aircraft.

.....

..... [1]

(c) Two food chains for the European starling are shown.

tomatoes → European starling → hawk

manure → earthworm → European starling → hawk

Explain why the European starling is a primary and secondary consumer.

primary consumer .....

.....

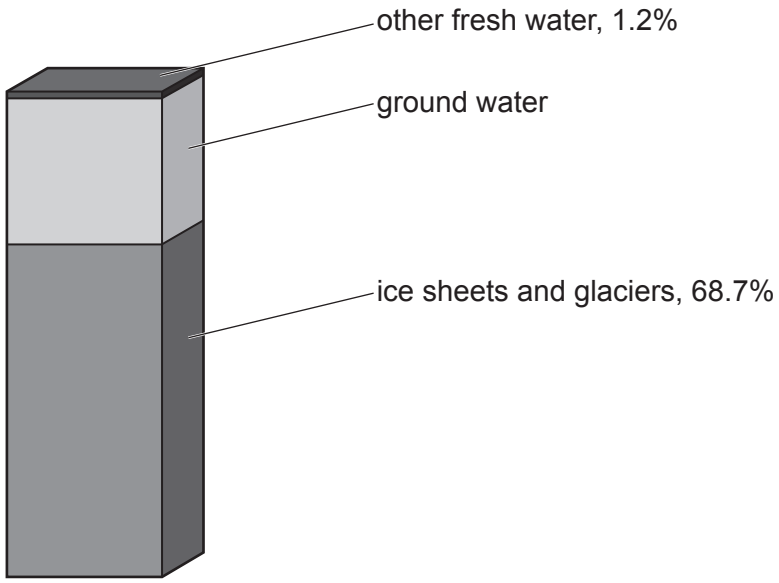
secondary consumer .....

.....

[2]

[Total: 8]

6 **(a)** The diagram shows the distribution of the Earth's fresh water.



(i) Calculate the percentage of fresh water that is ground water.

.....% [1]

(ii) Streams, rivers and lakes are examples of 'other fresh water'.

State **one** other example of a natural source of fresh water.

..... [1]

(iii) Suggest **two** impacts that global warming will have on the availability of the fresh water sources shown in the diagram. Give a reason for each impact.

impact 1 .....

reason .....

.....

impact 2 .....

reason .....

.....
[2]

(b) Living organisms produce water by respiration.

Write the **word** equation for respiration.

..... [2]

(c) Many people in rural areas of Africa have poor sanitation.

Poor sanitation means drinking water is **not** safe and sewage is **not** treated.

Suggest the impacts of poor sanitation.

.....

.....

.....

.....

.....

.....

.....

.....

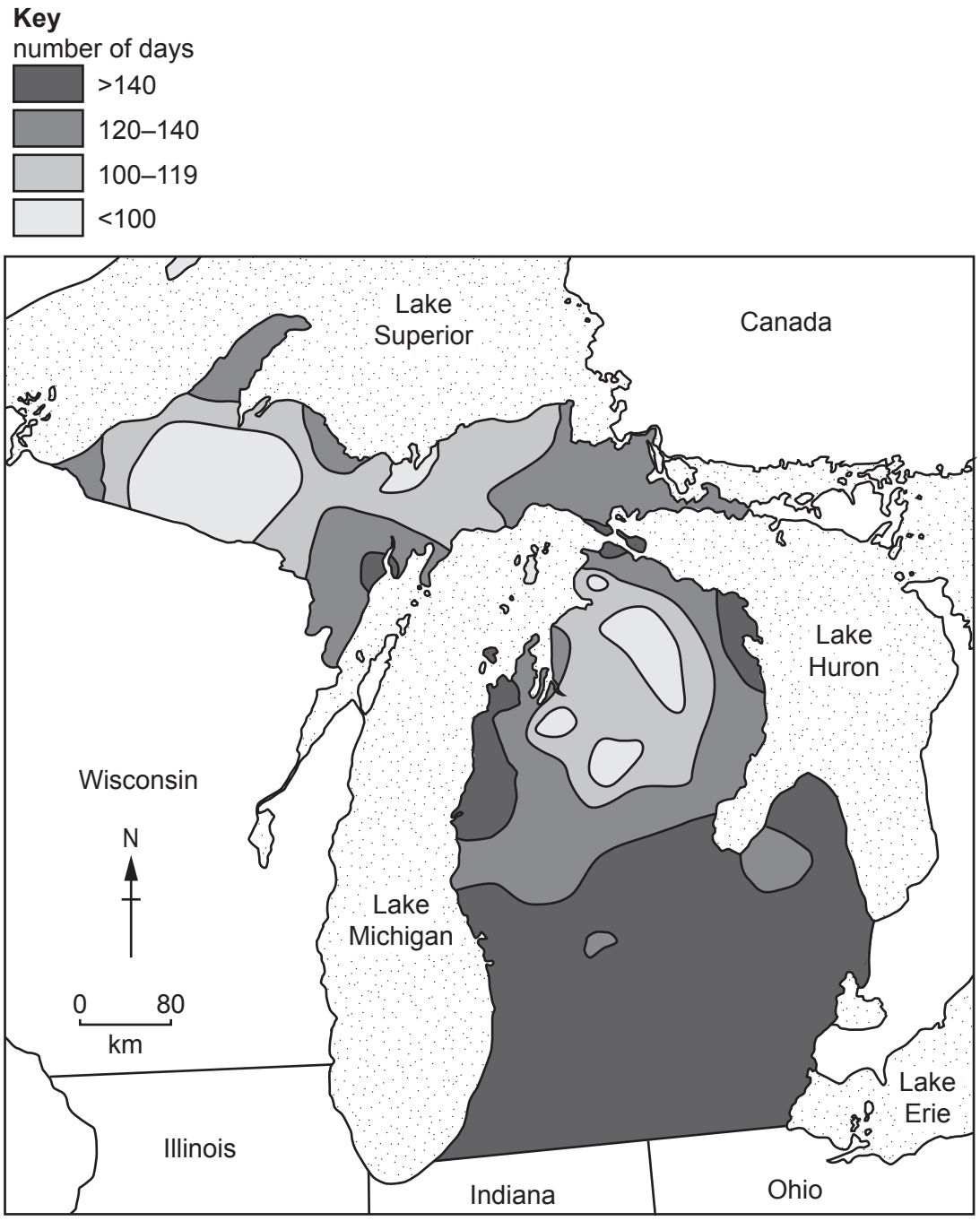
.....

..... [5]

[Total: 11]

7 **(a)** The map shows the growing season for one crop in Michigan, a state in the USA.

The growing season is the number of days that the crop can grow.



(i) Describe the pattern shown by the data on the map.

.....

.....

.....

..... [2]

(ii) Suggest reasons for the differences in the length of the growing season shown on the map.

.....

.....

.....

.....

.....

..... [3]

(b) Milk production from cows is important for commercial farms in Michigan.

(i) Cows release methane gas.

Explain why methane is an atmospheric pollutant.

.....

.....

.....

..... [2]

(ii) Describe **two** characteristics of commercial farming.

1 .....

.....

2 .....

.....
[2]

(c) A farmer plants a row of trees around the edge of a field.

Suggest the benefits of this agricultural practice.

.....

.....

.....

..... [2]

(d) A farmer uses rainwater harvesting for irrigation.

Describe **four** benefits of rainwater harvesting.

.....

.....

.....

.....

.....

.....

.....

..... [4]

[Total: 15]

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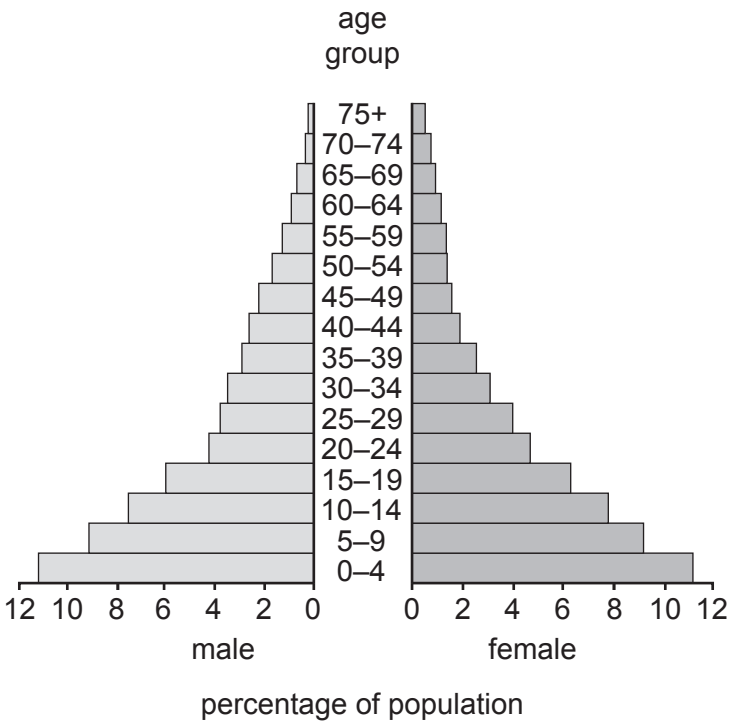
8 **(a)** The diagram shows a population pyramid for a less economically developed country (LEDC).



State what each of the following features indicate about the population of this less economically developed country (LEDC).

narrow top .....

.....

wide base .....

.....

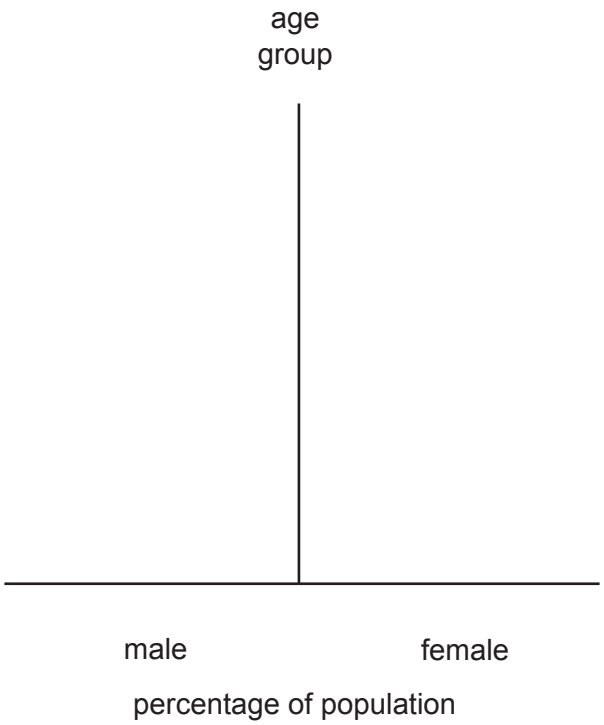
percentage of females compared to males in the 75+ age group .....

.....

.....

[3]

(b) Sketch the shape of the population pyramid for a more economically developed country (MEDC).



[1]

(c) The aim of the United Nations Population Fund (UNPF) is:

- to ensure that every pregnancy is wanted, every childbirth is safe and every young person's potential is fulfilled.

(i) Suggest how the UNPF can ensure every pregnancy is wanted.

.....

..... [1]

(ii) Governments around the world donate money to support the UNPF.

In 2020, the UK pledged $213 million to the UNPF. In April 2021, the UK government announced it was reducing this to $32 million.

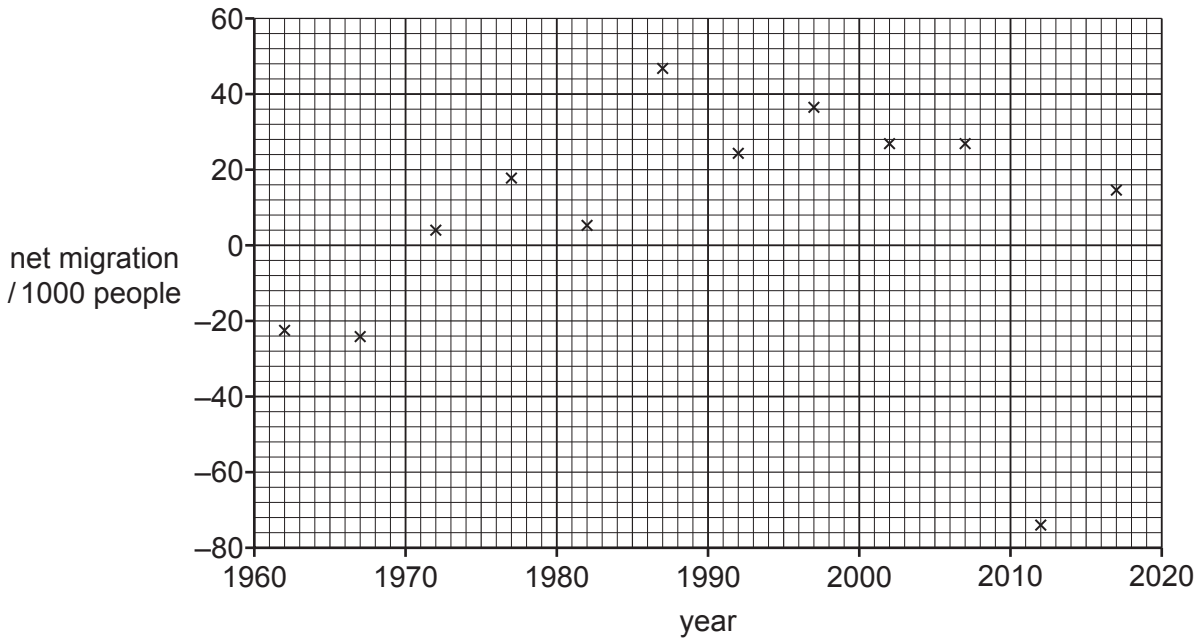
Suggest **one** impact of this change.

.....

..... [1]

(d) The graph shows net migration for Botswana between 1962 and 2017.

A negative value means the number of people leaving the country is greater than the number of people entering the country.



(i) Describe the pattern of net migration for Botswana.

.....

.....

.....

..... [2]

(ii) State **three** reasons for migration.

1 .....

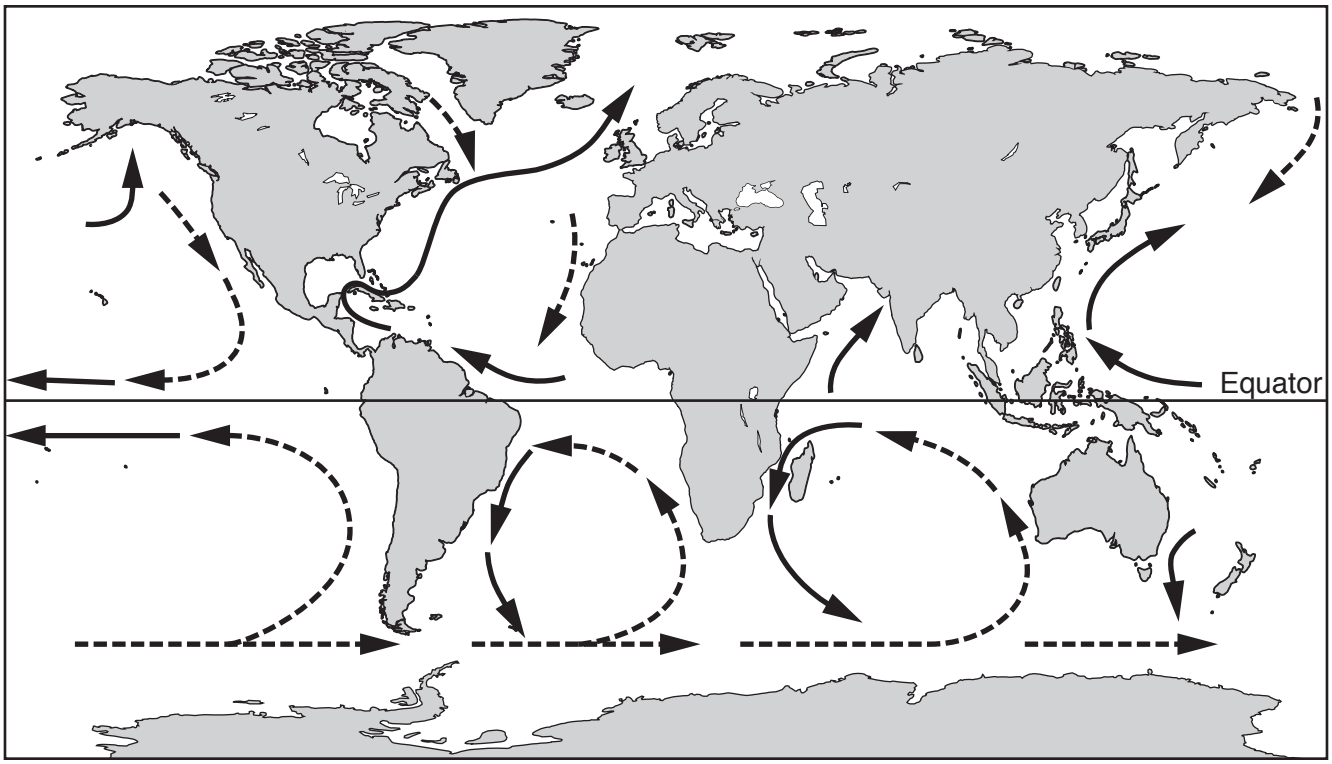
2 .....

3 .....

[3]

[Total: 11]

9 **(a)** The map shows the distribution of some of the major ocean currents.



(i) Complete the key to identify cold currents and warm currents.

Key

..... cold current

..... warm current

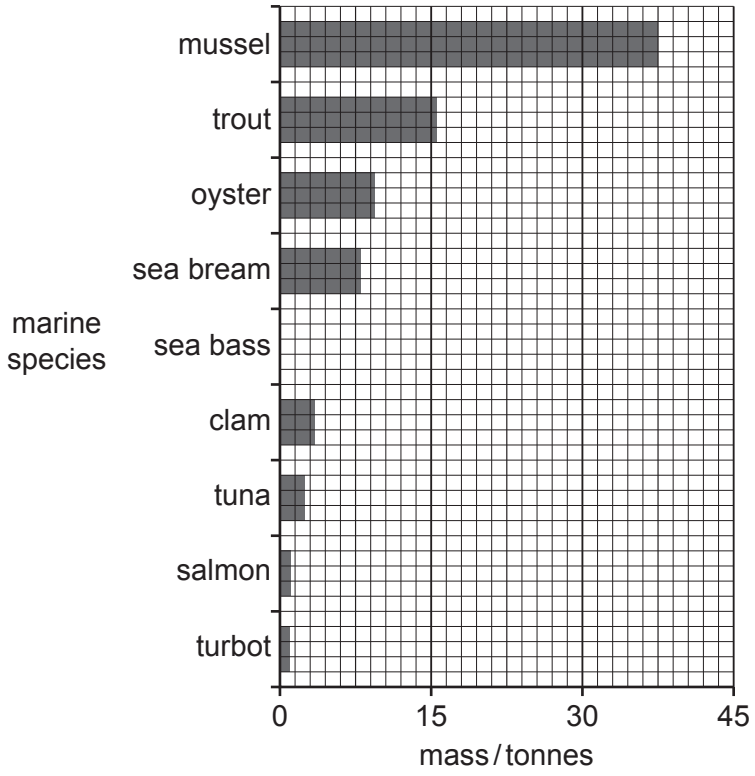
[2]

(ii) State the direction of movement of ocean currents south of the Equator.

.....

..... [1]

(b) The bar chart shows the main marine species farmed by some countries in Europe in 2018.



(i) Complete the bar chart to show that 5 tonnes of sea bass were farmed in 2018. [1]

(ii) Spain produced 7 tonnes out of every 10 tonnes of mussels farmed in Europe in 2018.

Determine the mass of mussels farmed by Spain in 2018.

..... tonnes [2]

(c) Providing a source of food is one way the oceans are a resource.

State **three** other ways the oceans are a resource.

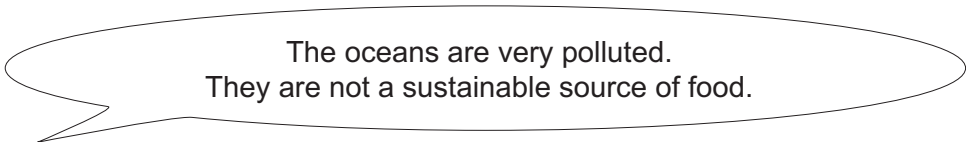
1 .....

2 .....

3 .....

[3]

(d) A student says:



To what extent do you agree with this statement? Give reasons for your answer.

.....

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.....

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.....

.....

..... [6]

[Total: 15]

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Cambridge Assessment International Education

Cambridge IGCSE™

ENVIRONMENTAL MANAGEMENT **0680/11**

Paper 1 Theory **May/June 2023**

MARK SCHEME

Maximum Mark: 80

Published

This mark scheme is published as an aid to teachers and candidates, to indicate the requirements of the examination. It shows the basis on which Examiners were instructed to award marks. It does not indicate the details of the discussions that took place at an Examiners' meeting before marking began, which would have considered the acceptability of alternative answers.

Mark schemes should be read in conjunction with the question paper and the Principal Examiner Report for Teachers.

Cambridge International will not enter into discussions about these mark schemes.

Cambridge International is publishing the mark schemes for the May/June 2023 series for most Cambridge IGCSE, Cambridge International A and AS Level and Cambridge Pre-U components, and some Cambridge O Level components.

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PUBLISHED

Generic Marking Principles

These general marking principles must be applied by all examiners when marking candidate answers. They should be applied alongside the specific content of the mark scheme or generic level descriptors for a question. Each question paper and mark scheme will also comply with these marking principles.

GENERIC MARKING PRINCIPLE 1:

Marks must be awarded in line with:

- the specific content of the mark scheme or the generic level descriptors for the question
- the specific skills defined in the mark scheme or in the generic level descriptors for the question
- the standard of response required by a candidate as exemplified by the standardisation scripts.

GENERIC MARKING PRINCIPLE 2:

Marks awarded are always **whole marks** (not half marks, or other fractions).

GENERIC MARKING PRINCIPLE 3:

Marks must be awarded **positively**:

- marks are awarded for correct/valid answers, as defined in the mark scheme. However, credit is given for valid answers which go beyond the scope of the syllabus and mark scheme, referring to your Team Leader as appropriate
- marks are awarded when candidates clearly demonstrate what they know and can do
- marks are not deducted for errors
- marks are not deducted for omissions
- answers should only be judged on the quality of spelling, punctuation and grammar when these features are specifically assessed by the question as indicated by the mark scheme. The meaning, however, should be unambiguous.

GENERIC MARKING PRINCIPLE 4:

Rules must be applied consistently, e.g. in situations where candidates have not followed instructions or in the application of generic level descriptors.

GENERIC MARKING PRINCIPLE 5: Marks should be awarded using the full range of marks defined in the mark scheme for the question (however; the use of the full mark range may be limited according to the quality of the candidate responses seen).
GENERIC MARKING PRINCIPLE 6: Marks awarded are based solely on the requirements as defined in the mark scheme. Marks should not be awarded with grade thresholds or grade descriptors in mind.

Science-Specific Marking Principles

1	Examiners should consider the context and scientific use of any keywords when awarding marks. Although keywords may be present, marks should not be awarded if the keywords are used incorrectly.
2	The examiner should not choose between contradictory statements given in the same question part, and credit should not be awarded for any correct statement that is contradicted within the same question part. Wrong science that is irrelevant to the question should be ignored.
3	Although spellings do not have to be correct, spellings of syllabus terms must allow for clear and unambiguous separation from other syllabus terms with which they may be confused (e.g. ethane / ethene, glucagon / glycogen, refraction / reflection).
4	The error carried forward (ecf) principle should be applied, where appropriate. If an incorrect answer is subsequently used in a scientifically correct way, the candidate should be awarded these subsequent marking points. Further guidance will be included in the mark scheme where necessary and any exceptions to this general principle will be noted.
5	‘List rule’ guidance For questions that require ***n*** responses (e.g. State **two** reasons …): • The response should be read as continuous prose, even when numbered answer spaces are provided. • Any response marked *ignore* in the mark scheme should not count towards ***n***. • Incorrect responses should not be awarded credit but will still count towards ***n***. • Read the entire response to check for any responses that contradict those that would otherwise be credited. Credit should **not** be awarded for any responses that are contradicted within the rest of the response. Where two responses contradict one another, this should be treated as a single incorrect response. • Non-contradictory responses after the first ***n*** responses may be ignored even if they include incorrect science.

6 Calculation specific guidance

Correct answers to calculations should be given full credit even if there is no working or incorrect working, **unless** the question states 'show your working'.

For questions in which the number of significant figures required is not stated, credit should be awarded for correct answers when rounded by the examiner to the number of significant figures given in the mark scheme. This may not apply to measured values.

For answers given in standard form (e.g. $a \times 10^n$) in which the convention of restricting the value of the coefficient (a) to a value between 1 and 10 is not followed, credit may still be awarded if the answer can be converted to the answer given in the mark scheme.

Unless a separate mark is given for a unit, a missing or incorrect unit will normally mean that the final calculation mark is not awarded. Exceptions to this general principle will be noted in the mark scheme.

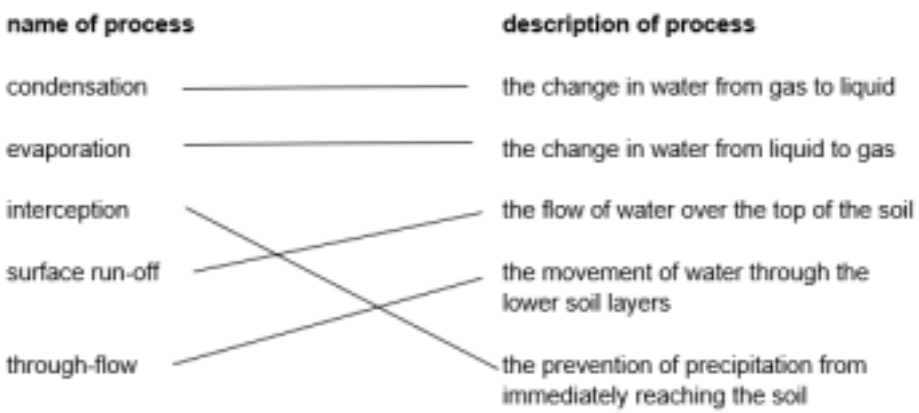
7 Guidance for chemical equations

Multiples / fractions of coefficients used in chemical equations are acceptable unless stated otherwise in the mark scheme.

State symbols given in an equation should be ignored unless asked for in the question or stated otherwise in the mark scheme.

Question	Answer	Marks
1(a)	**T** located in the sea / ocean; between 5° and 20° North OR South of the equator;	**2**
1(b)	ocean (surface) temperature of (at least) 27 (°C) / ocean depth of (at least) 60 m;	**1**
1(c)	*any three from:* flooding; loss of life / injuries; loss of livestock / crops; financial losses / jobs; damage to, buildings / infrastructure; contamination of water supplies / water-related diseases; food shortages / starvation;	**3**

Question	Answer	Marks
2(a)	**bitten** by (female) mosquito; transfers the (malaria) **parasite**	**2**
2(b)(i)	idea of using a natural predator / organism to control a population / pest;	**1**
2(b)(ii)	*any three from:* (insecticide treated) mosquito net; use insecticide; use mosquito repellents; drain stagnant water; spray (standing) water with oil; take antimalarial drugs; vaccination; stay inside from dusk to dawn (to avoid being bitten); wear, long sleeves / trousers;	**3**

Question	Answer	Marks
3	 1 correct; 2 correct; 3 correct; 5 correct;	**4**

Question	Answer	Marks
4(a)	*clockwise in order:* 78%: nitrogen; 21%: oxygen;	**2**
4(b)	*two from:* argon; carbon dioxide; water (vapour);	**2**

Question	Answer	Marks
5(a)(i)	$4200;	1
5(a)(ii)	**M1** 200 000 000 – 110 **OR** 199 999 890; **M2** (M1 ÷ 110 × 100 =) 1.8×10^8(%);	2
5(b)(i)	kills non-target species; bioaccumulation / described (build up of toxin within an organism);	1
5(b)(ii)	creates a sense of danger / birds perceive threat / scares birds away;	1
5(b)(iii)	fly into engines / blocks (the pilot's) vision;	1
5(c)	primary consumer because it, feeds at second trophic level / eats producers / eats tomatoes; secondary consumer because it, feeds at third trophic level / eats primary consumers; / eats earthworms;	2

Question	Answer	Marks
6(a)(i)	30.1(%);	1
6(a)(ii)	atmosphere;	1
6(a)(iii)	*any two from:* decrease in ice sheets and glaciers due to melting; increase (in ground)water due to, ice sheets / permafrost, melting; increase in atmosphere content due to evaporation of, surface water / groundwater; decrease in (ground)water / water levels in rivers / lakes due to evaporation at the surface; increase in sea levels as ice sheets / glaciers melt ;	2
6(b)	glucose + oxygen; → carbon dioxide + water;	2

Question	Answer	Marks
6(c)	*any five from:* spread of / increase in water borne disease / illness; named bacterial disease, e.g. typhoid, cholera; loss of earnings / too ill to work / loss of time (to do other things); loss of human life; lower life expectancy; maintains poverty/ lower living standards / conditions; places demands on government (to improve sanitation); AVP;	**5**

Question	Answer	Marks
7(a)(i)	*any two from:* longer growing season in South / shorter growing season in North; specific area described; longer growing season near lakes;	**2**
7(a)(ii)	*any three from:* temperature; amount / availability of water / rainfall; amount of sun / light; terrain / elevation; effect of lake on local climate;	**3**
7(b)(i)	*any two from:* greenhouse gas; heat / infra-red radiation emitted from the Earth is trapped by greenhouse gases in the atmosphere contributes to, global warming / (enhanced) greenhouse effect;	**2**

Question	Answer	Marks
7(b)(ii)	*any two from:* farming for a profit / produce sold; large scale; mechanised / use of technology; very few workers;	**2**
7(c)	*any two from:* wind break; shelter / shade for, livestock / crops; roots binds soil; prevents wind / soil erosion; provides habitat; for, pollinators / beneficial insects; increases biodiversity; provides corridor for wildlife; dead leaves provide organic matter;	**2**
7(d)	*any four from:* water / rain, easily available / specialist expertise not required; sustainable; free from chemicals that may be in, groundwater / surface water; reduces use of, groundwater / water in aquifers / other sources; may reduce, floods/waterlogging / soil erosion / impacts of drought; saves money / free; money saved can be used for another named purpose, e.g. education, buying seeds; suitable for trickle drip irrigation;	**4**

Question	Answer	Marks
8(a)	*narrow top:* low proportion of people live into old age / high death rate; *wide base:* large number of children / high birth rate; *percentage of females compared to males in the 75+ age group:* women live longer than men;	**3**
8(b)	base narrower than middle AND male and female approximately equal;	**1**
8(c)(i)	availability of family planning / education;	**1**
8(c)(ii)	*any one from:* no funding for projects; the UNPF will not fulfil its aim; increased (unwanted) pregnancies; more deaths in childbirth; example of how young persons' potential in not fulfilled;	**1**
8(d)(i)	*Any two from;* general trend of overall increase (in population)(between 1962 and 2017); net migration fluctuates; correct use of data;	**2**
8(d)(ii)	*any three from:* economic / jobs; education; social ties / closer to family; escape from, political persecution / war / ethnic or religious intolerance or persecution; environmental / natural hazards / drought; food or water insecurity ;	**3**

Question	Answer	Marks
9(a)(i)	dashed line arrow = cold current solid line arrow = warm current correct symbols that match the diagram; symbols match correct current;	**2**
9(a)(ii)	circular / anticlockwise;	**1**
9(b)(i)	bar to 5 tonnes, same width as existing bars;	**1**
9(b)(ii)	37.5 (tonnes); (7 ÷ 10 × 37.5 =) 26.25;	**2**
9(c)	*any three from:* chemicals / salt / minerals; building materials; wave / tidal, energy; tourism; transport; desalination (for drinking water);	**3**

Question	Answer	Marks
9(d)	*Level of response marked question:* Level 3 [5–6 marks] **A coherent response is given that develops and supports the candidate's conclusion using relevant details and examples.** Indicative content and subject-specific vocabulary are generally used precisely and accurately. Good responses are likely to present a balanced evaluation of the statement. Level 2 [3–4 marks] **Development and support of the conclusion is evident, though the response may lack some coherence and/or detail.** Irrelevant detail may be present. Indicative content and subject-specific vocabulary are used but may lack some precision and / or accuracy. Responses contain evaluation of the statement, but this may not be balanced. Level 1 [1–2 marks] **The response may be limited in development and / or support.** Contradictions and / or irrelevant detail may be present. Indicative content and subject-specific vocabulary may be limited or absent. Responses may lack structure or be in the form of a list. Evaluation may be limited or absent. No response or no creditable response [0 marks] *indicative content discussion of:* The oceans are too polluted to be a source of safe food. *agree:* many types of pollution, e.g. plastic, oil, sewage, chemical description of how pollution gets into the sea, e.g. leaching, illegal dumping, poor waste disposal effects of pollution, e.g. eutrophication, bioaccumulation, food chains and food web destruction, reduction of marine populations (even) fish farming can pollute currents carry pollution all round world increasing population means we must use ocean as resource overfishing	**6**

Question	Answer	Marks
9(d)	*do not agree:* most fish / sources of food are not (yet) polluted many different types of food source in oceans oceans are very large pollution often localised / coastal (rather than worldwide) current fisheries industry is strong in many countries it is possible to maintain fishing sustainably using close seasons, net design etc. fish farming where water quality can be controlled and monitored international treaties to reduce waste disposal into ocean, improvement in legislation public awareness of single use plastics	

Cambridge Assessment International Education

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CANDIDATE NAME									
CENTRE NUMBER						CANDIDATE NUMBER				

3894183077

ENVIRONMENTAL MANAGEMENT **0680/12**

Paper 1 Theory **May/June 2023**

1 hour 45 minutes

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INSTRUCTIONS

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INFORMATION

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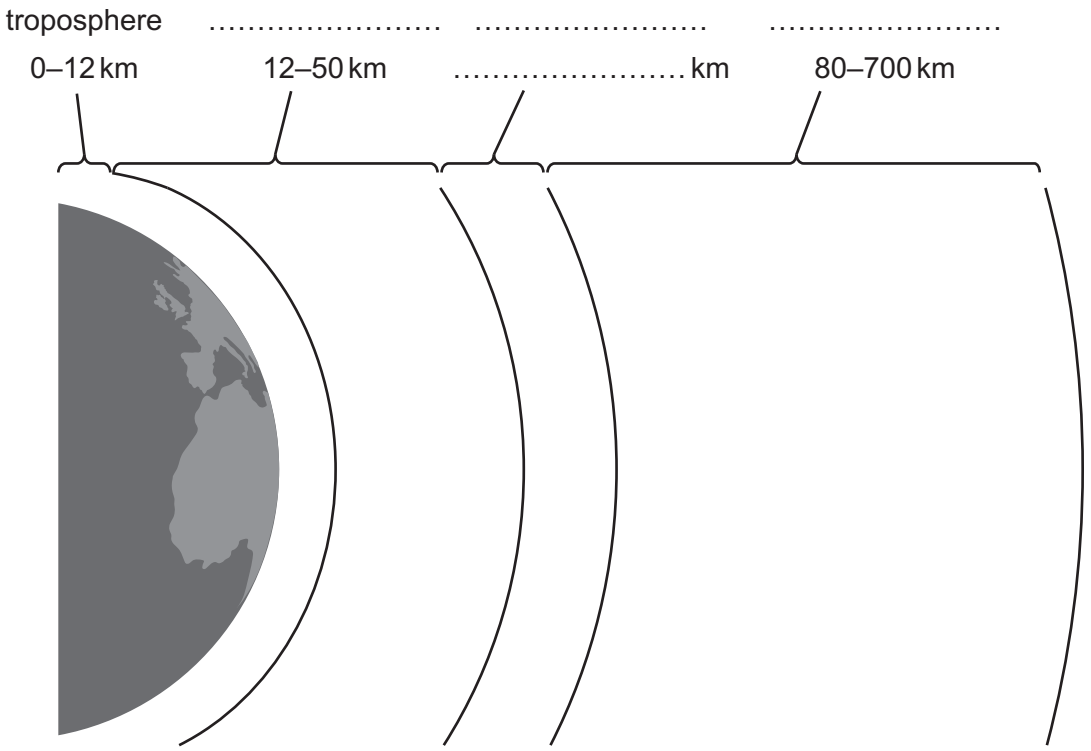
Section A

1 The diagram shows the layers in the atmosphere.



(a) Complete the diagram to show the layers in the atmosphere. [3]

(b) Add a letter **O** to the diagram to show the position of the ozone layer. [1]

(c) Explain why the ozone layer is important to life on Earth.

.....

.....

.....

..... [2]

[Total: 6]

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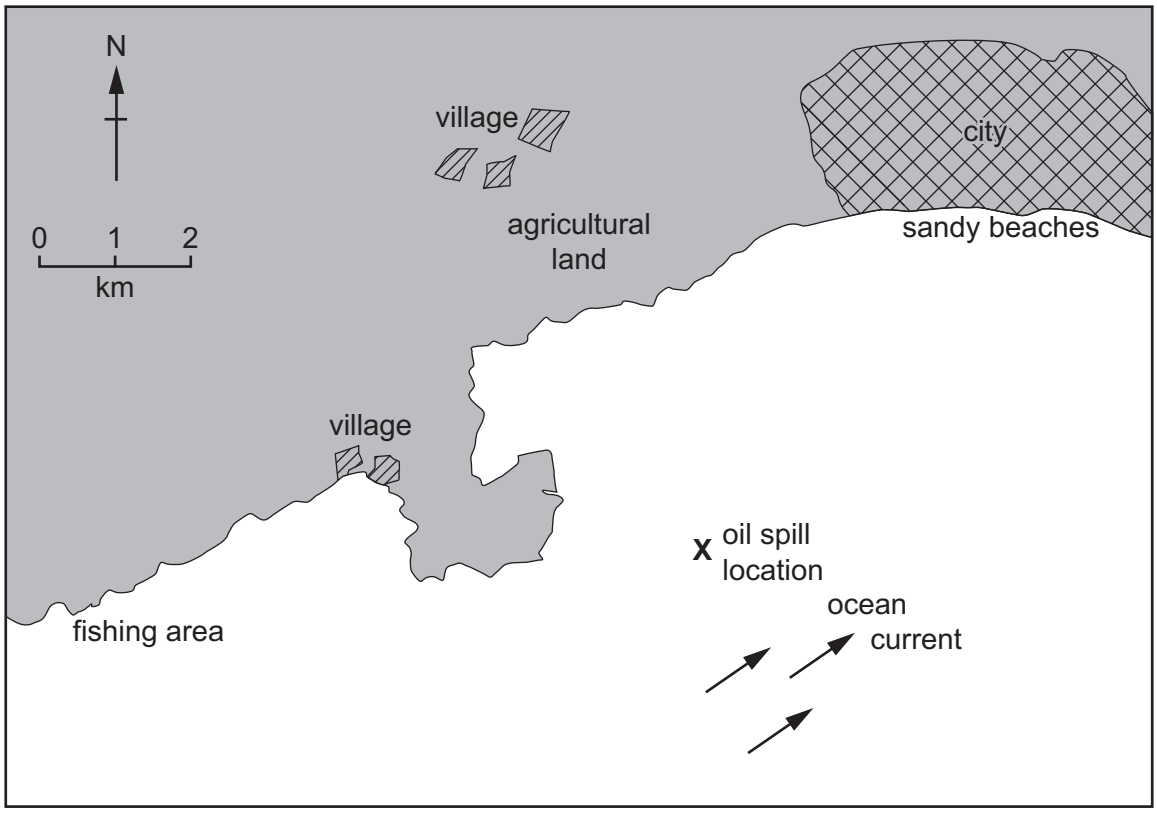
2 The map shows some features of a coastal area of a country.



(a) An oil spill occurs in the sea at location **X**.

(i) Determine the distance between the oil spill and the nearest land.

..... km [1]

(ii) Suggest which local industry will be affected first by the oil spill.

Give a reason for your answer.

.....

.....

.....

..... [2]

(b) Describe how each of the following equipment reduces the impact of an oil spill.

booms .....

.....

detergent sprays .....

.....

skimmers .....

.....

[3]

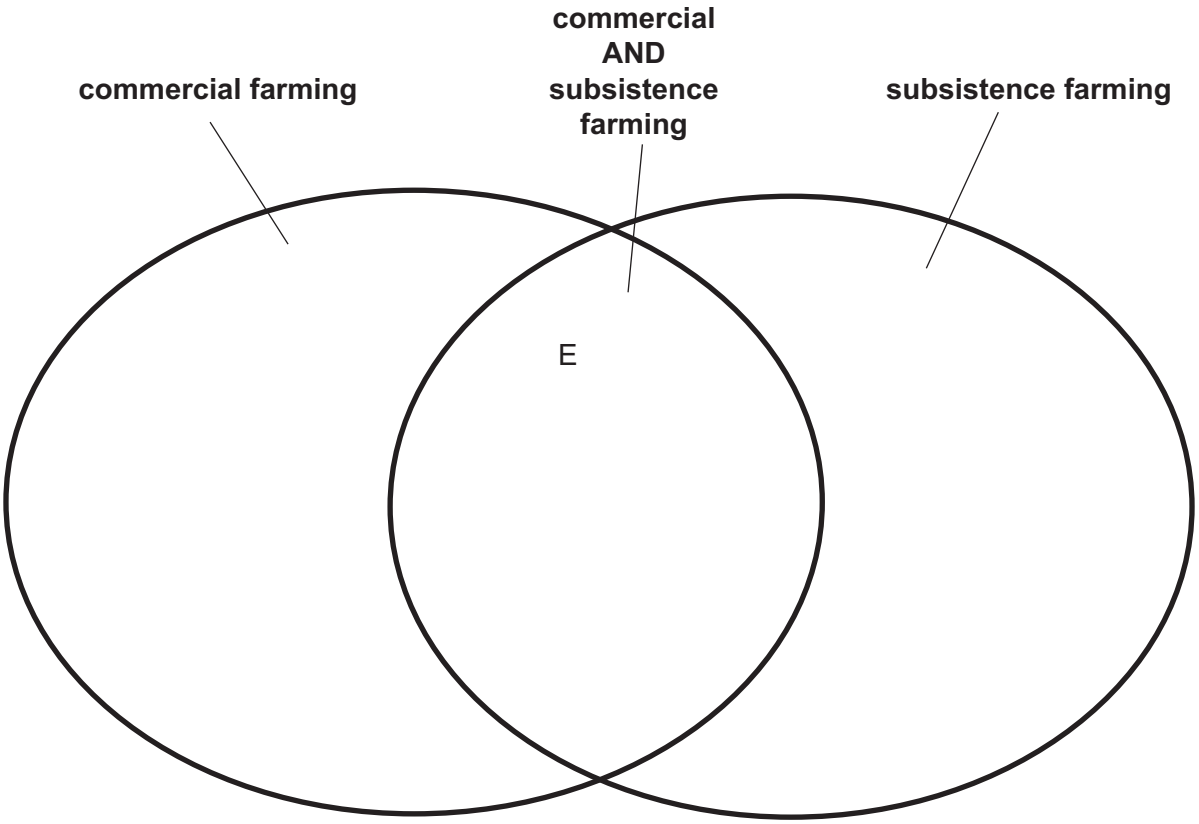
[Total: 6]

3 The table describes different farming activities.

farming activity	description
A	production mainly for selling
B	production mainly for own use
C	growing crops
D	using machinery
E	using irrigation

(a) Use the table to complete the diagram.

One has been completed for you.



[4]

(b) Explain how the overuse of insecticides impacts biodiversity.

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..... [3]

(c) State **one** alternative to using insecticides to control pests.

.....

..... [1]

[Total: 8]

Section B

4 A student reads a newspaper article about natural disasters.

Recent natural disasters prove that the climate crisis is getting worse

In 2019, there were many natural disasters around the world.

According to the United Nations, there was a climate crisis disaster reported each week in the month of July.

In the first six months of 2019, 7 million people lost their homes.

The World Bank estimated that three regions, South America, sub-Saharan Africa and southeast Asia, will have 143 million climate migrants by 2050.

(a) (i) The student concludes that the article does **not** prove the climate crisis is getting worse.

Suggest why.

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..... [3]

(ii) One of the natural disasters in 2019 was drought.

State the causes of drought.

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..... [2]

(iii) Explain how droughts can cause soil erosion.

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..... [2]

(b) Natural disasters often cause people to lose their homes.

Suggest how the loss of homes can increase the number of deaths due to a natural disaster.

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..... [3]

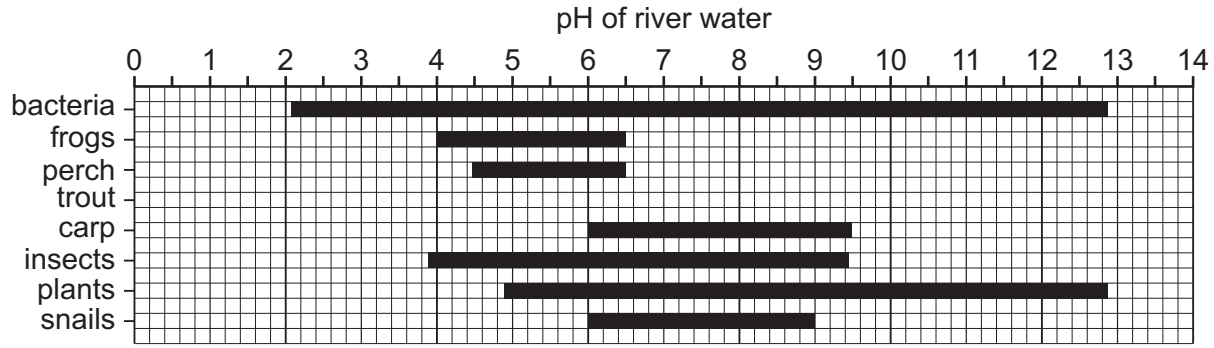
[Total: 10]

5 A scientist investigates the pH range of rivers that aquatic organisms can live in.

The results are shown in the diagram.

Key

pH range of rivers where organism found



(a) (i) Trout can live in rivers with a pH range of 5.0 to 6.5.

Plot the data for trout on the diagram. [1]

(ii) State which organism can live in rivers with the greatest pH range.

..... [1]

(iii) Suggest what would happen to the populations of aquatic organisms in a river if the pH changes from 6.0 to 5.0.

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..... [4]

(b) (i) Acid rain is a cause of pH change in rivers and lakes.

Explain how acid rain is formed.

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..... [5]

(ii) Describe strategies a country can use to reduce its contribution to the problem of acid rain.

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..... [3]

[Total: 14]

6 The map shows countries where people are at risk of malaria.

(a) (i) Describe the distribution of countries where people are at risk of malaria.

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.....

..... [3]

(ii) Suggest a reason why some countries are **not** affected by malaria.

.....

..... [1]

(b) (i) Describe how malaria is spread from one person to another.

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..... [4]

(ii) Scientists in some countries have identified that insecticides are no longer effective in the control of malaria.

State **two** other control methods that can be used.

1 .....

.....

2 .....

.....

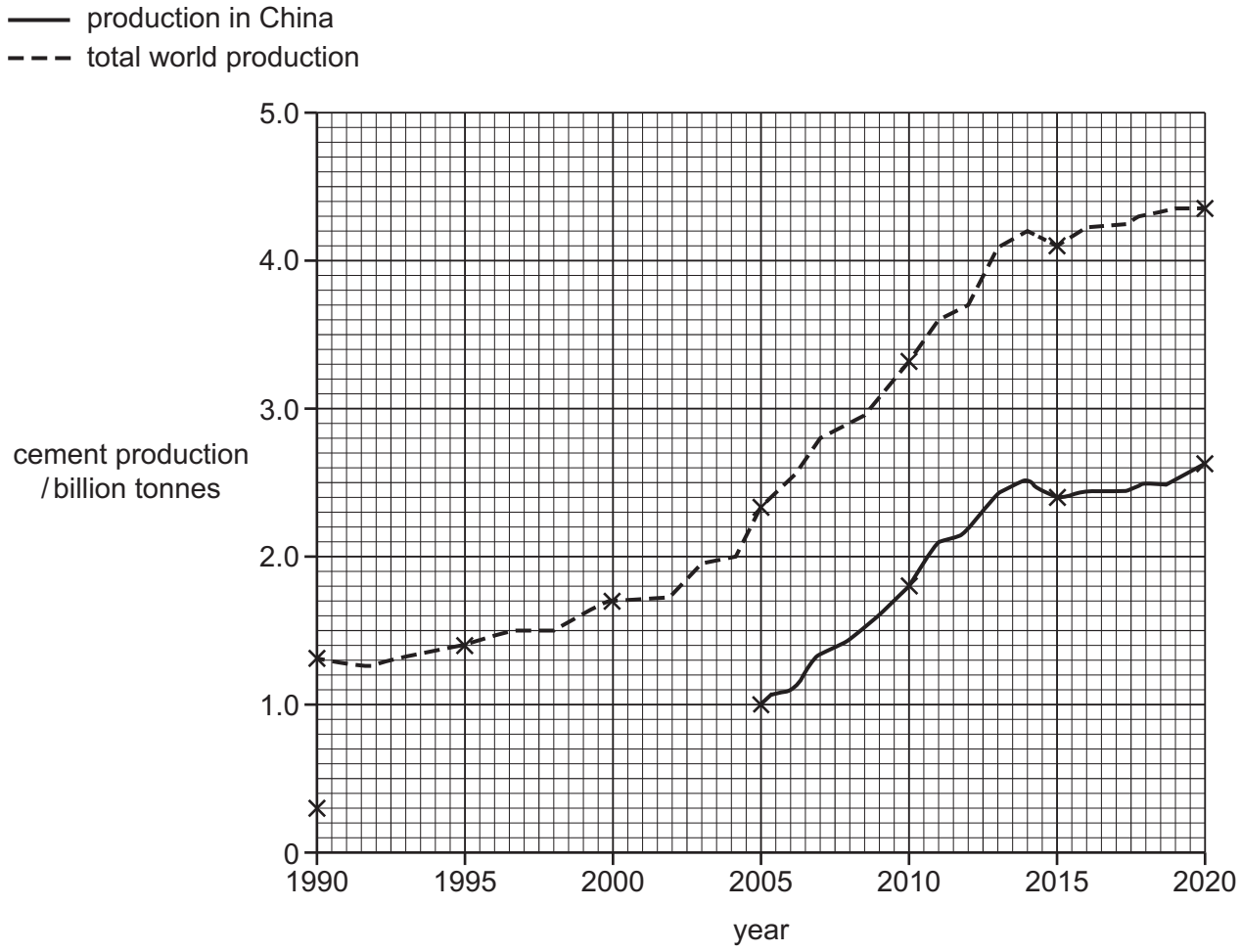
[2]

[Total: 10]

7 Many modern buildings are made of concrete.

Concrete is made from cement, sand, gravel and water.

(a) The graph shows cement production between 1990 and 2020.



(i) Complete the line graph for China using the data in the table.

year	cement production / billion tonnes
1995	0.4
2000	0.6

[2]

(ii) Describe the trend in world cement production between 1990 and 2020.

.....

.....

.....

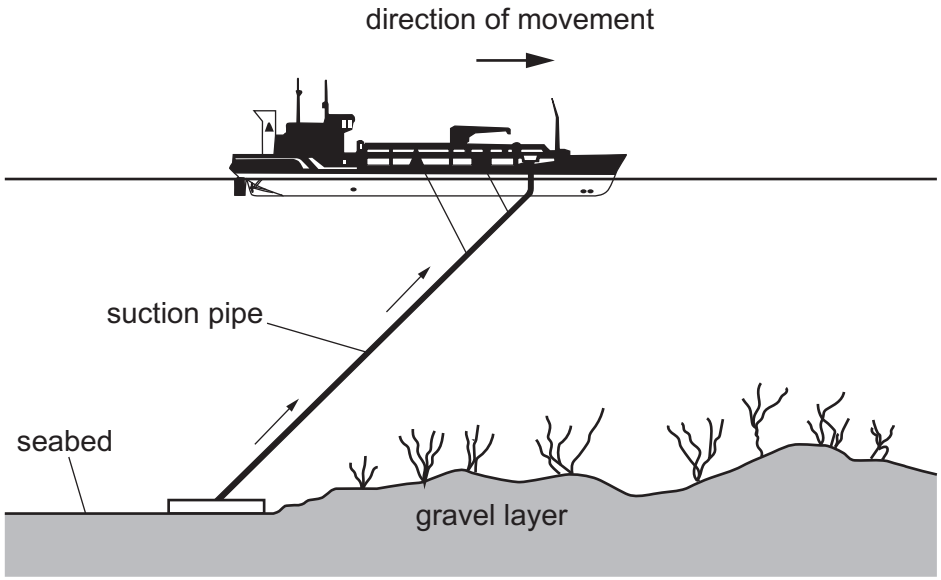
..... [2]

(iii) Calculate the percentage of world production of cement that was produced in China in 2015.

..... % [1]

(b) Gravel is used in the production of concrete.

The diagram shows how gravel is extracted from the seabed.



(i) Suggest the effect this gravel extraction has on the marine ecosystem.

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..... [3]

(ii) Suggest why it is difficult for governments to control the extraction of gravel from the seabed.

.....

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..... [2]

(c) State **three** strategies to make mineral extraction more sustainable.

1 .....

.....

2 .....

.....

3 .....

.....

[3]

[Total: 13]

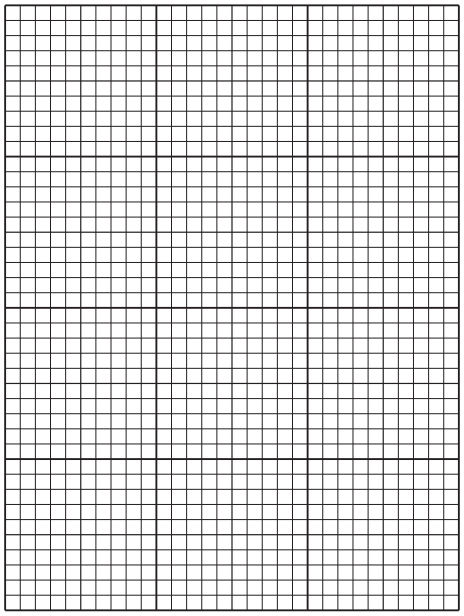
8 The northern white rhinoceros is an endangered species of animal.

The table shows population data about this rhinoceros.

year	wild population	captive population	total population
1939	2500	8	2508
1959	2000	7	2007
1979	500	15	515
1999	.....	11	41
2019	0	2	2

(a) (i) Complete the table for the **wild** population in 1999. [1]

(ii) Plot a bar chart for the **captive** population between 1939 and 2019.



[4]

(iii) Suggest why keeping the northern white rhinoceros in captivity has **not** increased its population.

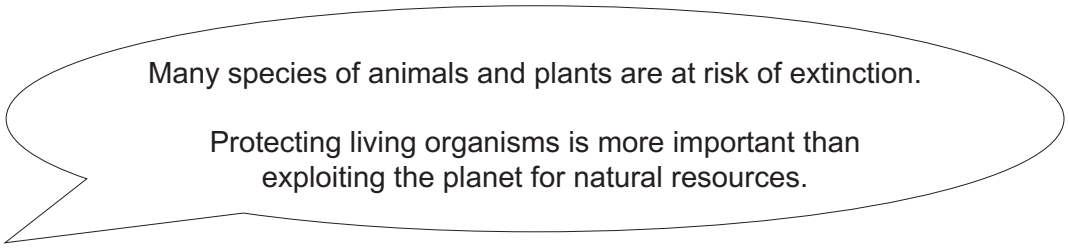
.....

.....

.....

..... [2]

(b) A scientist says:



To what extent do you agree with this statement? Give reasons for your answer.

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..... [6]

[Total: 13]

Cambridge Assessment International Education

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ENVIRONMENTAL MANAGEMENT **0680/12**

Paper 1 Theory **May/June 2023**

MARK SCHEME

Maximum Mark: 80

Published

This mark scheme is published as an aid to teachers and candidates, to indicate the requirements of the examination. It shows the basis on which Examiners were instructed to award marks. It does not indicate the details of the discussions that took place at an Examiners' meeting before marking began, which would have considered the acceptability of alternative answers.

Mark schemes should be read in conjunction with the question paper and the Principal Examiner Report for Teachers.

Cambridge International will not enter into discussions about these mark schemes.

Cambridge International is publishing the mark schemes for the May/June 2023 series for most Cambridge IGCSE, Cambridge International A and AS Level and Cambridge Pre-U components, and some Cambridge O Level components.

PUBLISHED

Generic Marking Principles

These general marking principles must be applied by all examiners when marking candidate answers. They should be applied alongside the specific content of the mark scheme or generic level descriptors for a question. Each question paper and mark scheme will also comply with these marking principles.

GENERIC MARKING PRINCIPLE 1:

Marks must be awarded in line with:

- the specific content of the mark scheme or the generic level descriptors for the question
- the specific skills defined in the mark scheme or in the generic level descriptors for the question
- the standard of response required by a candidate as exemplified by the standardisation scripts.

GENERIC MARKING PRINCIPLE 2:

Marks awarded are always **whole marks** (not half marks, or other fractions).

GENERIC MARKING PRINCIPLE 3:

Marks must be awarded **positively**:

- marks are awarded for correct/valid answers, as defined in the mark scheme. However, credit is given for valid answers which go beyond the scope of the syllabus and mark scheme, referring to your Team Leader as appropriate
- marks are awarded when candidates clearly demonstrate what they know and can do
- marks are not deducted for errors
- marks are not deducted for omissions
- answers should only be judged on the quality of spelling, punctuation and grammar when these features are specifically assessed by the question as indicated by the mark scheme. The meaning, however, should be unambiguous.

GENERIC MARKING PRINCIPLE 4:

Rules must be applied consistently, e.g. in situations where candidates have not followed instructions or in the application of generic level descriptors.

GENERIC MARKING PRINCIPLE 5: Marks should be awarded using the full range of marks defined in the mark scheme for the question (however; the use of the full mark range may be limited according to the quality of the candidate responses seen).
GENERIC MARKING PRINCIPLE 6: Marks awarded are based solely on the requirements as defined in the mark scheme. Marks should not be awarded with grade thresholds or grade descriptors in mind.

Science-Specific Marking Principles

1	Examiners should consider the context and scientific use of any keywords when awarding marks. Although keywords may be present, marks should not be awarded if the keywords are used incorrectly.
2	The examiner should not choose between contradictory statements given in the same question part, and credit should not be awarded for any correct statement that is contradicted within the same question part. Wrong science that is irrelevant to the question should be ignored.
3	Although spellings do not have to be correct, spellings of syllabus terms must allow for clear and unambiguous separation from other syllabus terms with which they may be confused (e.g. ethane / ethene, glucagon / glycogen, refraction / reflection).
4	The error carried forward (ecf) principle should be applied, where appropriate. If an incorrect answer is subsequently used in a scientifically correct way, the candidate should be awarded these subsequent marking points. Further guidance will be included in the mark scheme where necessary and any exceptions to this general principle will be noted.
5	‘List rule’ guidance For questions that require ***n*** responses (e.g. State **two** reasons …): • The response should be read as continuous prose, even when numbered answer spaces are provided. • Any response marked *ignore* in the mark scheme should not count towards ***n***. • Incorrect responses should not be awarded credit but will still count towards ***n***. • Read the entire response to check for any responses that contradict those that would otherwise be credited. Credit should **not** be awarded for any responses that are contradicted within the rest of the response. Where two responses contradict one another, this should be treated as a single incorrect response. • Non-contradictory responses after the first ***n*** responses may be ignored even if they include incorrect science.

6 Calculation specific guidance

Correct answers to calculations should be given full credit even if there is no working or incorrect working, **unless** the question states 'show your working'.

For questions in which the number of significant figures required is not stated, credit should be awarded for correct answers when rounded by the examiner to the number of significant figures given in the mark scheme. This may not apply to measured values.

For answers given in standard form (e.g. $a \times 10^n$) in which the convention of restricting the value of the coefficient (a) to a value between 1 and 10 is not followed, credit may still be awarded if the answer can be converted to the answer given in the mark scheme.

Unless a separate mark is given for a unit, a missing or incorrect unit will normally mean that the final calculation mark is not awarded. Exceptions to this general principle will be noted in the mark scheme.

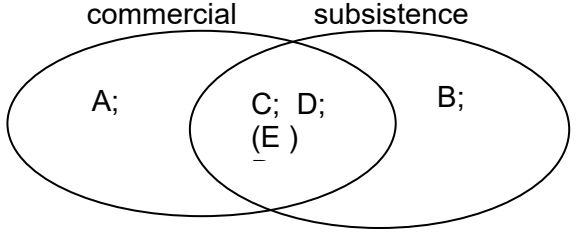
7 Guidance for chemical equations

Multiples / fractions of coefficients used in chemical equations are acceptable unless stated otherwise in the mark scheme.

State symbols given in an equation should be ignored unless asked for in the question or stated otherwise in the mark scheme.

Question	Answer	Marks
1(a)	(troposphere) stratosphere mesosphere thermosphere two layers correct / all three correct; all three correct in correct order; 50-80 (km);	3
1(b)	letter **O** labelled in stratosphere layer / 2nd layer from Earth;	1
1(c)	*any two from:* absorbs (harmful) UV (radiation); prevents cataracts; prevents skin cancer; prevents damage to plants; enables the natural greenhouse effect / maintains temperature of Earth;	2

Question	Answer	Marks
2(a)(i)	2.0 (km);	1
2(a)(ii)	tourism; ocean current will take oil to sandy beaches; 1 mark for industry 1 mark for valid reason for the industry stated	2
2(b)	booms: stop oil from spreading; detergent sprays: break down oil / disperse oil; skimmers: remove oil from water surface;	3

Question	Answer	Marks
3(a)		**4**
3(b)	*any three from:* kills, beneficial / other, insects; (which) affects the food, chain / web; idea that insects are eaten by organisms in higher trophic levels; bioaccumulation; insecticide resistance in organisms; explanation of pest-resurgence; leaching/run off into water sources kills aquatic life	**3**
3(c)	use of: pest-resistant varieties (of plants) / biological control / picking off by hand / use of nets / barriers / genetically modified organisms (GMOs) / traps / crop rotation;	**1**

Question	Answer	Marks
4(a)(i)	*any three from:* data only given for, one year / 2019; lack of historic data to compare; data does not indicate whether the figures are an increase / single year doesn't show a trend; some natural disasters are not caused by climate change; AVP, e.g. loss of homes might (also) be due to other reasons rather than natural disasters, article not (necessarily) written by scientists;	**3**

Question	Answer	Marks
4(a)(ii)	*any two from:* lack of rain; (prolonged) high pressure; effect of, El Nino Southern Oscillation / La Nina, (on ocean temperatures and evaporation); effect of climate change; deforestation; change in the water cycle;	**2**
4(a)(iii)	*any two from:* (lack of rain causes) plant death; reduced number of roots to hold soil; lack of vegetation to slow wind speed; lighter soil blown by wind; bare soil easily washed away when rain eventually falls;	**2**
4(b)	*any three from:* overcrowded / unplanned, emergency accommodation; lack of clean water; lack of sanitation; poor diet; less access to medical facilities; lack of shelter / exposure to weather; AVP;	**3**

Question	Answer	Marks
5(a)(i)	bar for trout plotted from 5.0 to 6.5 with same width as other bars;	**1**
5(a)(ii)	bacteria;	**1**

Question	Answer	Marks
5(a)(iii)	*any four from:* fewer types of organisms / some organisms die / less biodiversity; population of carp decreases; population of snails decreases; population of, bacteria / frogs / perch / insects / plants, unchanged / increased; trout may decrease (as at edge of pH range); AVP;	**4**
5(b)(i)	*any five from:* oxides of nitrogen; released into air (by reaction at high temperatures)from engines/ vehicles/ cars; sulfur dioxide; released into air by combustion of fossil fuels; by named source, e.g. vehicles, factories, industry; dissolves in water (in atmosphere); reduces pH (of rain); precipitation as (dilute), sulfuric / nitric, (acid rain);	**5**
5(b)(ii)	*any three from:* reduce vehicle emissions; introduce transport policies/ use of electric vehicles/ examples e.g. car pooling; use catalytic converters on vehicles; reduce combustion of fossil fuels; use renewable energy; conserve energy / reduce energy waste; use flue-gas desulfurisation in chimneys/ low sulfur fuels; follow international agreements/ emissions legislation; AVP;	**3**

Question	Answer	Marks
6(a)(i)	ref to, equator / tropics, e.g. mostly between the tropics; *plus any two further details:* South / (&) Central America; most of Africa; (South) Asia / Middle East;	**3**
6(a)(ii)	cooler climates / better control methods / AVP;	**1**
6(b)(i)	*any four from:* infected person bitten; by female (anopheles) mosquito; parasite / plasmodium, transmitted to mosquito; mosquito acts as a vector; mosquito bites new person; (parasite / plasmodium) transmitted to new person;	**4**
6(b)(ii)	*any two from:* use mosquito nets; drain swamps / breeding grounds; cover water sources; introduce fish into lakes to eat mosquito larvae; introduce sterile male mosquitoes into population; use antimalarial drugs; education of population (regarding vector control);	**2**

Question	Answer	Marks
7(a)(i)	0.4 and 0.6 plotted correctly; lines drawn to complete line graph;	**2**
7(a)(ii)	overall increase; from 1.3 to 4.35 billion tonnes / increase of 3.05 billion tonnes / levelling off from 2015 / increased production after 2004 / slow increase 1990 to 2004;	**2**
7(a)(iii)	(2.4 ÷ 4.1 × 100) = 58.5(%);	**1**

Question	Answer	Marks
7(b)(i)	*any three from:* damage to seabed; loss of habitat; death of / damage to, marine plants / (named) marine organism; disruption to food chain; noise / activity, scares off some organisms;	**3**
7(b)(ii)	*any two from:* difficult to, police / monitor / enforce; seas are large; high, demand / pressure, for, gravel / cement; limited supplies on land;	**2**
7(c)	*any three from:* increase recycling of existing materials; increase extraction efficiency; increase efficiency of use; use legislation;	**3**

Question	Answer	Marks
8(a)(i)	30;	**1**
8(a)(ii)	correct labelling of axes; suitable linear scale such that data occupy over half of grid; correct bars plotted; bars of equal width;	**4**

Question	Answer	Marks
8(a)(iii)	*any two from:* captive population too small; limited gene pool; animals released into wild do not survive; poaching / hunting, still continues in wild; unsuitable conditions in captivity for breeding; low reproduction rate; habitat, change / loss, in wild; AVP, e.g. only one sex remaining;	**2**

Question	Answer	Marks
8(b)	*Level of response marked question:* Level 3 [5–6 marks] **A coherent response is given that develops and supports the candidate's conclusion using relevant details and examples.** Indicative content and subject-specific vocabulary are generally used precisely and accurately. Good responses are likely to present a balanced evaluation of the statement. Level 2 [3–4 marks] **Development and support of the conclusion is evident, though the response may lack some coherence and/or detail. Irrelevant detail may be present.** Indicative content and subject-specific vocabulary are used but may lack some precision and/or accuracy. Responses contain evaluation of the statement, but this may not be balanced. Level 1 [1–2 marks] **The response may be limited in development and/or support.** Contradictions and/or irrelevant detail may be present. Indicative content and subject-specific vocabulary may be limited or absent. Responses may lack structure or be in the form of a list. Evaluation may be limited or absent. No response or no creditable response [0 marks] *Indicative content for :* Protecting living organisms is more important than exploiting the planet for natural resources. *protecting living organisms is more important:* some are endangered once extinct it is not possible to get species back alternative resources available in other areas technology could be used to find alternatives to the resource – examples of resource extraction affects a whole, habitat / ecosystem opportunities to, recycle / re-use existing resources or sustainable resources exist, e.g. sustainable forestry plantations we need some species in order to survive, e.g. bees for pollination, medicinal plants, gene engineering (unforeseen) wider effect on food web of species going extinct	**6**

Question	Answer	Marks
8(b)	*exploiting the planet is more important:* the use of these resources creates an income to afford conservation wildlife reserves / captive breeding can then be afforded possible to relocate animals and plants resources needed to keep people, alive / healthy land may be needed for, housing / food production any type of extraction affects habitats – it is impossible to stop all resource use world population increasing so more resources needed extinction an effect of natural selection fuels are essential as an energy supply	

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CANDIDATE NAME									
CENTRE NUMBER						CANDIDATE NUMBER				

6925740831

ENVIRONMENTAL MANAGEMENT **0680/13**

Paper 1 Theory **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.

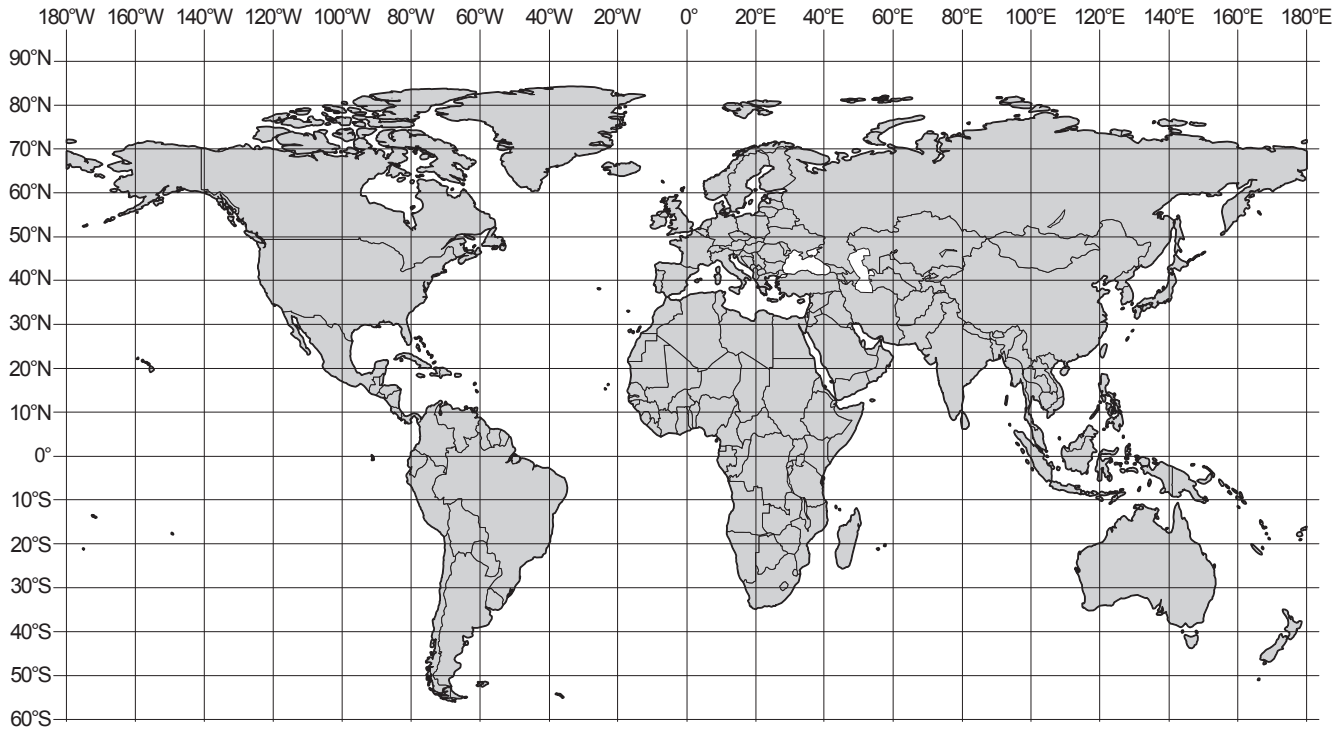
INFORMATION

- 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.

Section A

1 **(a)** Write the letter **T** on the map in **one** location where tropical cyclones form.



[2]

(b) State **one** condition needed for tropical cyclones to form.

..... [1]

(c) State **three** impacts of a tropical cyclone on a coastal city.

1 .....

2 .....

3 .....

[3]

[Total: 6]

2 **(a)** Malaria is caused by a parasite.

Explain how a human becomes infected with malaria.

.....

.....

.....

..... [2]

(b) **(i)** Governments use biological control as a method of reducing the spread of malaria.

State the meaning of biological control.

.....

..... [1]

(ii) State **three** ways individual people can protect themselves from being infected with malaria.

1 .....

.....

2 .....

.....

3 .....

.....

[3]

[Total: 6]

3 Some of the processes in the water cycle are shown.

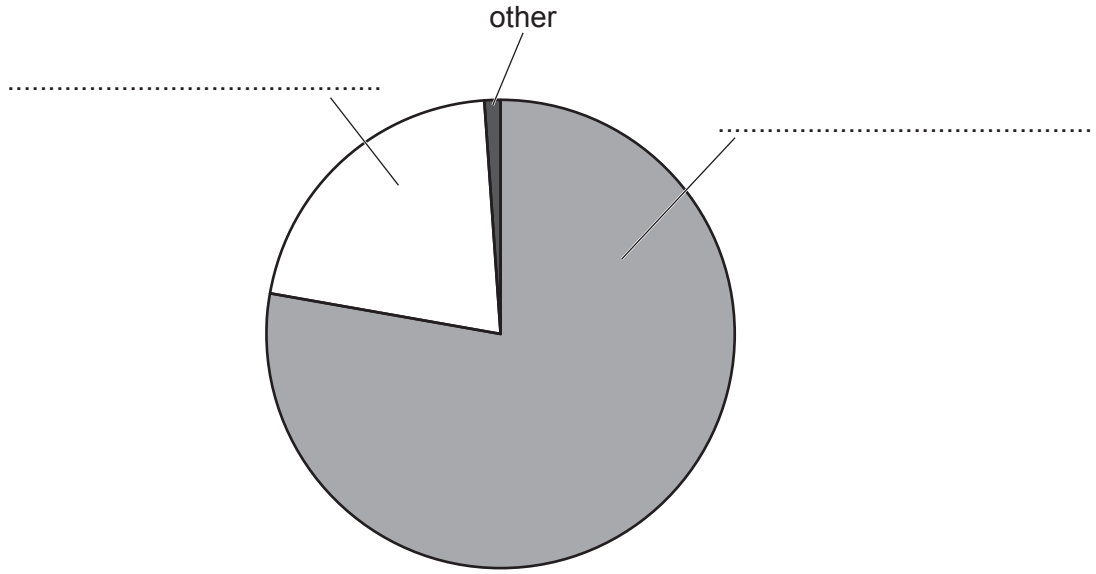
Draw **one** straight line from each name of the process to the correct description of the process.

name of process	description of process
condensation	the change in water from gas to liquid
evaporation	the change in water from liquid to gas
interception	the flow of water over the top of the soil
surface run-off	the movement of water through the lower soil layers
through-flow	the prevention of precipitation from immediately reaching the soil

[4]

4 The pie chart represents the composition of the **unpolluted** atmosphere.

The pie chart is **not** complete.



(a) Complete the pie chart with the names of the **two** gases. [2]

(b) State the names of **two** naturally occurring gases in the sector labelled 'other'.

1 .....

2 .....
[2]

[Total: 4]

Section B

5 A student reads an article about the European starling, a species of bird.

The European starling

In the 1890s, 110 European starlings were released into a park in New York, USA.

The starlings spread across the USA and now have a population of 200 million. They compete with local bird species and destroy crops.

Scientists estimate that European starlings cause $800 million of damage per year in the USA. This is $5 per hectare of agricultural land.

(a) A farm in the USA has 840 hectares of land.

(i) Calculate the cost of the damage caused by European starlings to this farm.

$ ..... per year [1]

(ii) Calculate the percentage increase in the population of European starlings.

.....% [2]

(b) (i) One method of reducing the impact of European starlings on crops is using pesticides.

Suggest **one** negative impact of using pesticides.

.....

..... [1]

(ii) Another method of controlling the population of European starlings is to play a recording of the sound of a bird suffering from stress.

Suggest why this method reduces the impact of European starlings on crops.

.....

..... [1]

(iii) European starlings fly together in large groups.

Suggest why these large groups are a hazard to aircraft.

.....

..... [1]

(c) Two food chains for the European starling are shown.

tomatoes → European starling → hawk

manure → earthworm → European starling → hawk

Explain why the European starling is a primary and secondary consumer.

primary consumer .....

.....

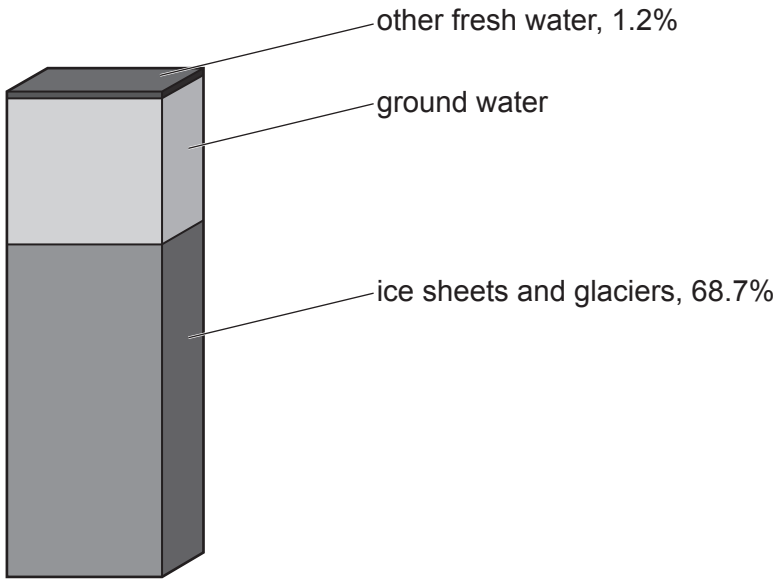
secondary consumer .....

.....

[2]

[Total: 8]

6 **(a)** The diagram shows the distribution of the Earth's fresh water.



(i) Calculate the percentage of fresh water that is ground water.

.....% [1]

(ii) Streams, rivers and lakes are examples of 'other fresh water'.

State **one** other example of a natural source of fresh water.

..... [1]

(iii) Suggest **two** impacts that global warming will have on the availability of the fresh water sources shown in the diagram. Give a reason for each impact.

impact 1 .....

reason .....

.....

impact 2 .....

reason .....

.....
[2]

(b) Living organisms produce water by respiration.

Write the **word** equation for respiration.

..... [2]

(c) Many people in rural areas of Africa have poor sanitation.

Poor sanitation means drinking water is **not** safe and sewage is **not** treated.

Suggest the impacts of poor sanitation.

.....

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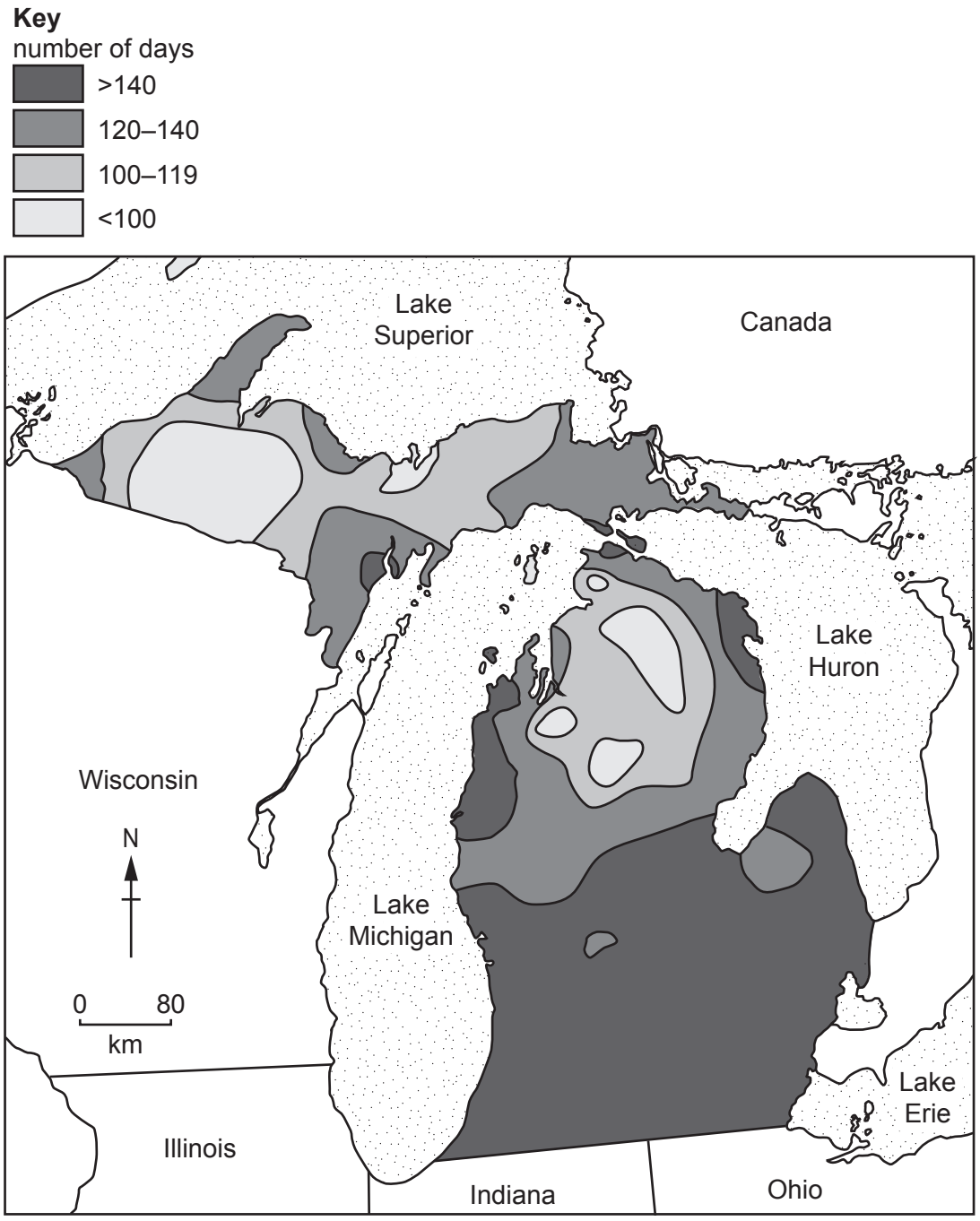
..... [5]

[Total: 11]

7 **(a)** The map shows the growing season for one crop in Michigan, a state in the USA.

The growing season is the number of days that the crop can grow.



(i) Describe the pattern shown by the data on the map.

.....

.....

.....

..... [2]

(ii) Suggest reasons for the differences in the length of the growing season shown on the map.

.....

.....

.....

.....

.....

..... [3]

(b) Milk production from cows is important for commercial farms in Michigan.

(i) Cows release methane gas.

Explain why methane is an atmospheric pollutant.

.....

.....

.....

..... [2]

(ii) Describe **two** characteristics of commercial farming.

1 .....

.....

2 .....

.....
[2]

(c) A farmer plants a row of trees around the edge of a field.

Suggest the benefits of this agricultural practice.

.....

.....

.....

..... [2]

(d) A farmer uses rainwater harvesting for irrigation.

Describe **four** benefits of rainwater harvesting.

.....

.....

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.....

.....

..... [4]

[Total: 15]

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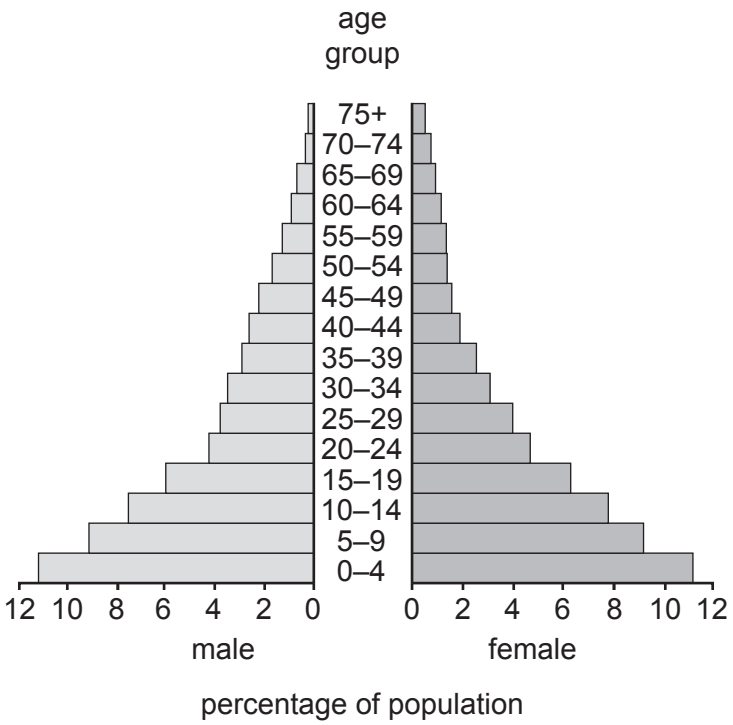
8 **(a)** The diagram shows a population pyramid for a less economically developed country (LEDC).



State what each of the following features indicate about the population of this less economically developed country (LEDC).

narrow top .....

.....

wide base .....

.....

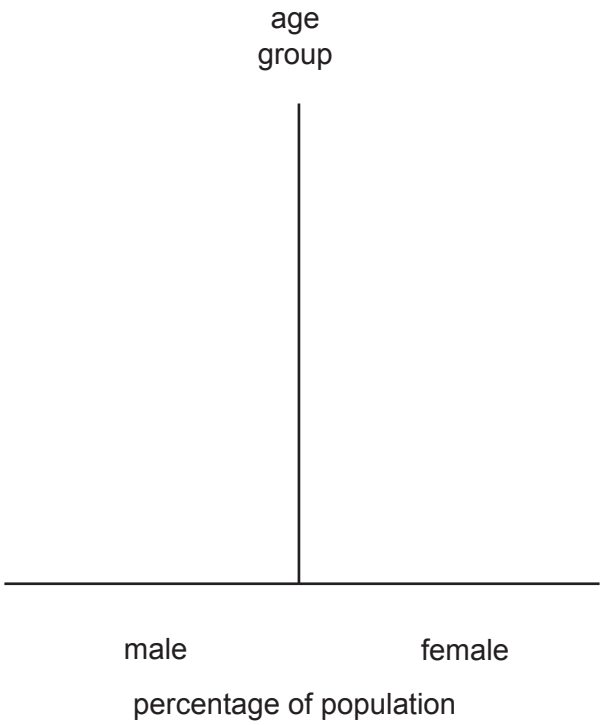
percentage of females compared to males in the 75+ age group .....

.....

.....

[3]

(b) Sketch the shape of the population pyramid for a more economically developed country (MEDC).



[1]

(c) The aim of the United Nations Population Fund (UNPF) is:

- to ensure that every pregnancy is wanted, every childbirth is safe and every young person's potential is fulfilled.

(i) Suggest how the UNPF can ensure every pregnancy is wanted.

.....

..... [1]

(ii) Governments around the world donate money to support the UNPF.

In 2020, the UK pledged $213 million to the UNPF. In April 2021, the UK government announced it was reducing this to $32 million.

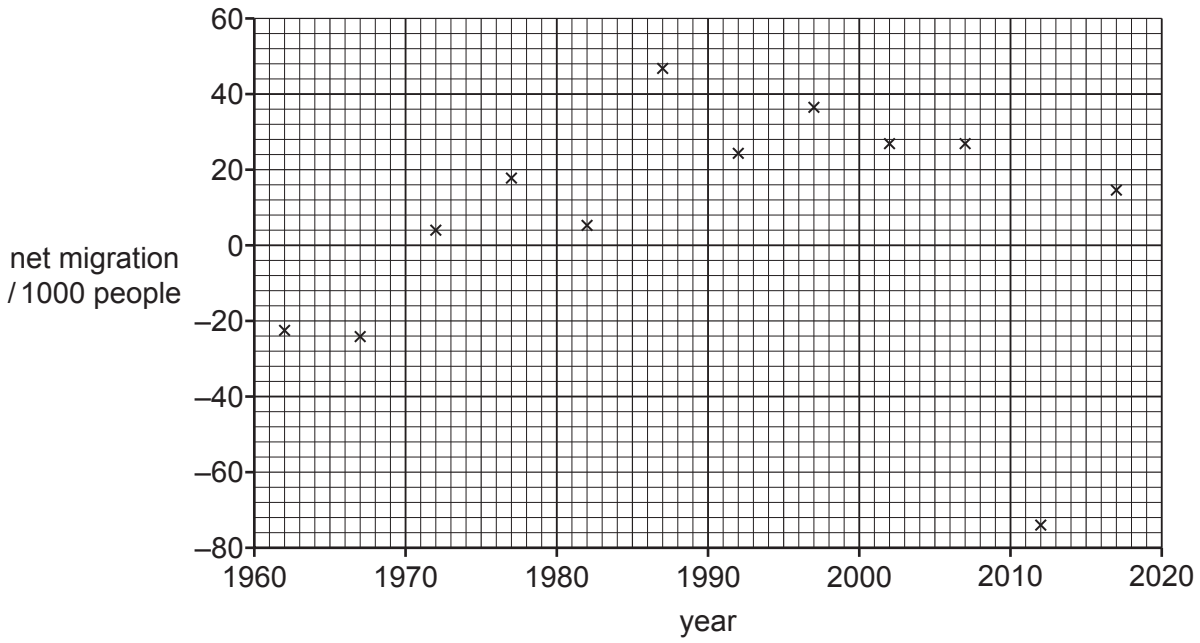
Suggest **one** impact of this change.

.....

..... [1]

(d) The graph shows net migration for Botswana between 1962 and 2017.

A negative value means the number of people leaving the country is greater than the number of people entering the country.



(i) Describe the pattern of net migration for Botswana.

.....

.....

.....

..... [2]

(ii) State **three** reasons for migration.

1 .....

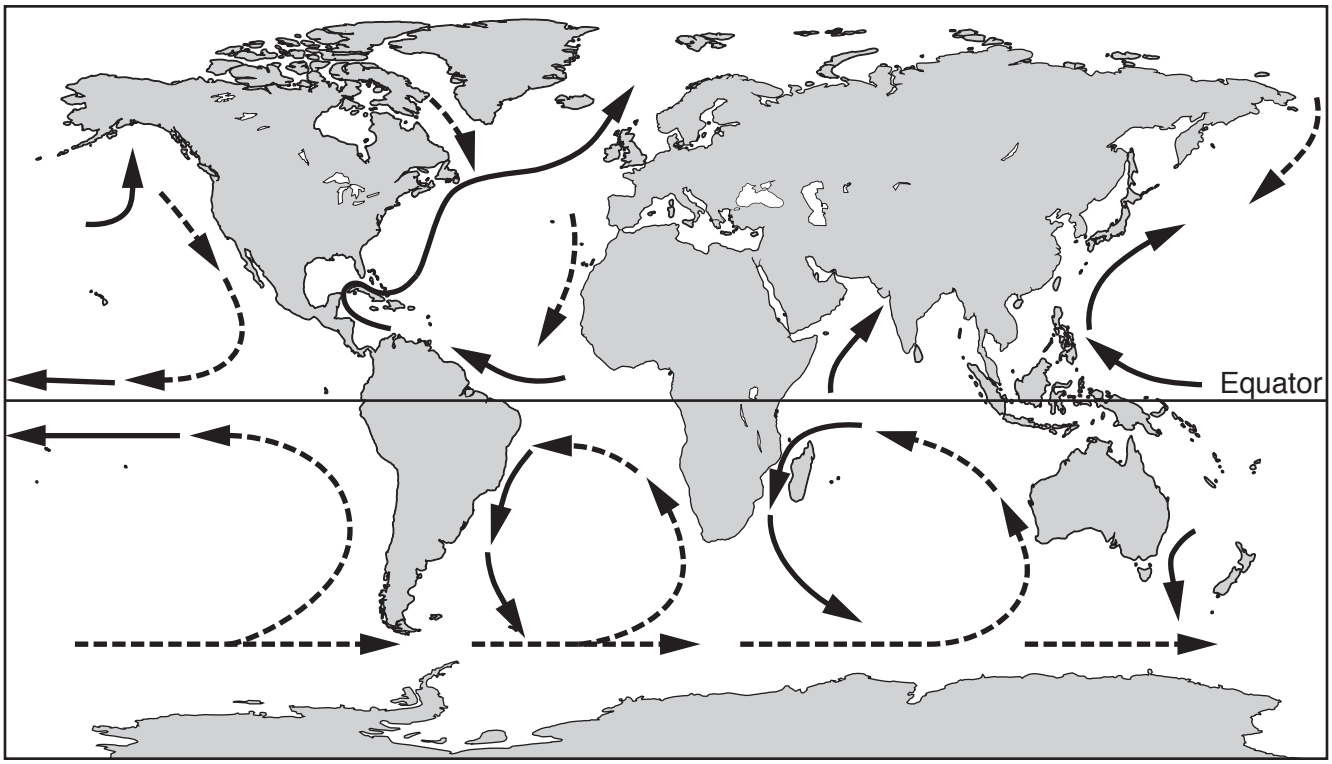
2 .....

3 .....

[3]

[Total: 11]

9 **(a)** The map shows the distribution of some of the major ocean currents.



(i) Complete the key to identify cold currents and warm currents.

Key

..... cold current

..... warm current

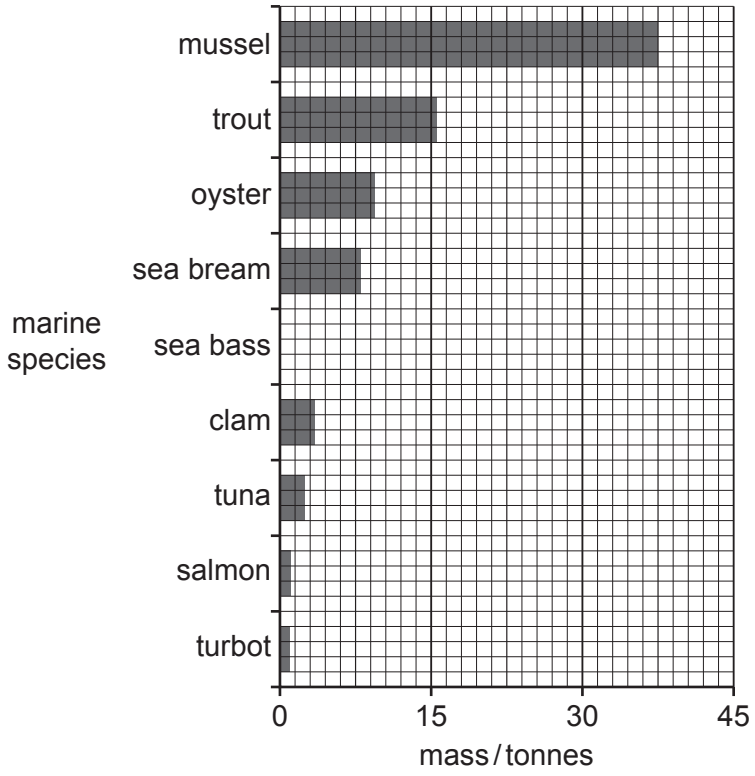
[2]

(ii) State the direction of movement of ocean currents south of the Equator.

.....

..... [1]

(b) The bar chart shows the main marine species farmed by some countries in Europe in 2018.



(i) Complete the bar chart to show that 5 tonnes of sea bass were farmed in 2018. [1]

(ii) Spain produced 7 tonnes out of every 10 tonnes of mussels farmed in Europe in 2018.

Determine the mass of mussels farmed by Spain in 2018.

..... tonnes [2]

(c) Providing a source of food is one way the oceans are a resource.

State **three** other ways the oceans are a resource.

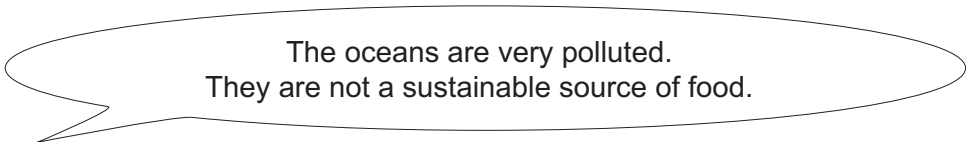
1 .....

2 .....

3 .....

[3]

(d) A student says:



To what extent do you agree with this statement? Give reasons for your answer.

.....

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.....

.....

..... [6]

[Total: 15]

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Cambridge Assessment International Education

Cambridge IGCSE™

ENVIRONMENTAL MANAGEMENT **0680/13**

Paper 1 Theory **May/June 2023**

MARK SCHEME

Maximum Mark: 80

Published

This mark scheme is published as an aid to teachers and candidates, to indicate the requirements of the examination. It shows the basis on which Examiners were instructed to award marks. It does not indicate the details of the discussions that took place at an Examiners' meeting before marking began, which would have considered the acceptability of alternative answers.

Mark schemes should be read in conjunction with the question paper and the Principal Examiner Report for Teachers.

Cambridge International will not enter into discussions about these mark schemes.

Cambridge International is publishing the mark schemes for the May/June 2023 series for most Cambridge IGCSE, Cambridge International A and AS Level and Cambridge Pre-U components, and some Cambridge O Level components.

[Turn over

PUBLISHED

Generic Marking Principles

These general marking principles must be applied by all examiners when marking candidate answers. They should be applied alongside the specific content of the mark scheme or generic level descriptors for a question. Each question paper and mark scheme will also comply with these marking principles.

GENERIC MARKING PRINCIPLE 1:

Marks must be awarded in line with:

- the specific content of the mark scheme or the generic level descriptors for the question
- the specific skills defined in the mark scheme or in the generic level descriptors for the question
- the standard of response required by a candidate as exemplified by the standardisation scripts.

GENERIC MARKING PRINCIPLE 2:

Marks awarded are always **whole marks** (not half marks, or other fractions).

GENERIC MARKING PRINCIPLE 3:

Marks must be awarded **positively**:

- marks are awarded for correct/valid answers, as defined in the mark scheme. However, credit is given for valid answers which go beyond the scope of the syllabus and mark scheme, referring to your Team Leader as appropriate
- marks are awarded when candidates clearly demonstrate what they know and can do
- marks are not deducted for errors
- marks are not deducted for omissions
- answers should only be judged on the quality of spelling, punctuation and grammar when these features are specifically assessed by the question as indicated by the mark scheme. The meaning, however, should be unambiguous.

GENERIC MARKING PRINCIPLE 4:

Rules must be applied consistently, e.g. in situations where candidates have not followed instructions or in the application of generic level descriptors.

GENERIC MARKING PRINCIPLE 5: Marks should be awarded using the full range of marks defined in the mark scheme for the question (however; the use of the full mark range may be limited according to the quality of the candidate responses seen).
GENERIC MARKING PRINCIPLE 6: Marks awarded are based solely on the requirements as defined in the mark scheme. Marks should not be awarded with grade thresholds or grade descriptors in mind.

Science-Specific Marking Principles

1	Examiners should consider the context and scientific use of any keywords when awarding marks. Although keywords may be present, marks should not be awarded if the keywords are used incorrectly.
2	The examiner should not choose between contradictory statements given in the same question part, and credit should not be awarded for any correct statement that is contradicted within the same question part. Wrong science that is irrelevant to the question should be ignored.
3	Although spellings do not have to be correct, spellings of syllabus terms must allow for clear and unambiguous separation from other syllabus terms with which they may be confused (e.g. ethane / ethene, glucagon / glycogen, refraction / reflection).
4	The error carried forward (ecf) principle should be applied, where appropriate. If an incorrect answer is subsequently used in a scientifically correct way, the candidate should be awarded these subsequent marking points. Further guidance will be included in the mark scheme where necessary and any exceptions to this general principle will be noted.
5	‘List rule’ guidance For questions that require ***n*** responses (e.g. State **two** reasons …): • The response should be read as continuous prose, even when numbered answer spaces are provided. • Any response marked *ignore* in the mark scheme should not count towards ***n***. • Incorrect responses should not be awarded credit but will still count towards ***n***. • Read the entire response to check for any responses that contradict those that would otherwise be credited. Credit should **not** be awarded for any responses that are contradicted within the rest of the response. Where two responses contradict one another, this should be treated as a single incorrect response. • Non-contradictory responses after the first ***n*** responses may be ignored even if they include incorrect science.

6 Calculation specific guidance

Correct answers to calculations should be given full credit even if there is no working or incorrect working, **unless** the question states 'show your working'.

For questions in which the number of significant figures required is not stated, credit should be awarded for correct answers when rounded by the examiner to the number of significant figures given in the mark scheme. This may not apply to measured values.

For answers given in standard form (e.g. $a \times 10^n$) in which the convention of restricting the value of the coefficient (a) to a value between 1 and 10 is not followed, credit may still be awarded if the answer can be converted to the answer given in the mark scheme.

Unless a separate mark is given for a unit, a missing or incorrect unit will normally mean that the final calculation mark is not awarded. Exceptions to this general principle will be noted in the mark scheme.

7 Guidance for chemical equations

Multiples / fractions of coefficients used in chemical equations are acceptable unless stated otherwise in the mark scheme.

State symbols given in an equation should be ignored unless asked for in the question or stated otherwise in the mark scheme.

Question	Answer	Marks
1(a)	**T** located in the sea / ocean; between 5° and 20° North OR South of the equator;	**2**
1(b)	ocean (surface) temperature of (at least) 27 (°C) / ocean depth of (at least) 60 m;	**1**
1(c)	*any three from:* flooding; loss of life / injuries; loss of livestock / crops; financial losses / jobs; damage to, buildings / infrastructure; contamination of water supplies / water-related diseases; food shortages / starvation;	**3**

Question	Answer	Marks
2(a)	**bitten** by (female) mosquito; transfers the (malaria) **parasite**	**2**
2(b)(i)	idea of using a natural predator / organism to control a population / pest;	**1**
2(b)(ii)	*any three from:* (insecticide treated) mosquito net; use insecticide; use mosquito repellents; drain stagnant water; spray (standing) water with oil; take antimalarial drugs; vaccination; stay inside from dusk to dawn (to avoid being bitten); wear, long sleeves / trousers;	**3**

Question	Answer	Marks
3	**name of process** — **description of process** condensation — the change in water from gas to liquid evaporation — the change in water from liquid to gas interception — the prevention of precipitation from immediately reaching the soil surface run-off — the flow of water over the top of the soil through-flow — the movement of water through the lower soil layers 1 correct; 2 correct; 3 correct; 5 correct;	**4**

Question	Answer	Marks
4(a)	*clockwise in order:* 78%: nitrogen; 21%: oxygen;	**2**
4(b)	*two from:* argon; carbon dioxide; water (vapour);	**2**

Question	Answer	Marks
5(a)(i)	$4200;	**1**
5(a)(ii)	**M1** 200 000 000 – 110 **OR** 199 999 890; **M2** (M1 ÷ 110 × 100 =) 1.8×10^8(%);	**2**
5(b)(i)	kills non-target species; bioaccumulation / described (build up of toxin within an organism);	**1**
5(b)(ii)	creates a sense of danger / birds perceive threat / scares birds away;	**1**
5(b)(iii)	fly into engines / blocks (the pilot's) vision;	**1**
5(c)	primary consumer because it, feeds at second trophic level / eats producers / eats tomatoes; secondary consumer because it, feeds at third trophic level / eats primary consumers; / eats earthworms;	**2**

Question	Answer	Marks
6(a)(i)	30.1(%);	**1**
6(a)(ii)	atmosphere;	**1**
6(a)(iii)	*any two from:* decrease in ice sheets and glaciers due to melting; increase (in ground)water due to, ice sheets / permafrost, melting; increase in atmosphere content due to evaporation of, surface water / groundwater; decrease in (ground)water / water levels in rivers / lakes due to evaporation at the surface; increase in sea levels as ice sheets / glaciers melt ;	**2**
6(b)	glucose + oxygen; → carbon dioxide + water;	**2**

Question	Answer	Marks
6(c)	*any five from:* spread of / increase in water borne disease / illness; named bacterial disease, e.g. typhoid, cholera; loss of earnings / too ill to work / loss of time (to do other things); loss of human life; lower life expectancy; maintains poverty/ lower living standards / conditions; places demands on government (to improve sanitation); AVP;	**5**

Question	Answer	Marks
7(a)(i)	*any two from:* longer growing season in South / shorter growing season in North; specific area described; longer growing season near lakes;	**2**
7(a)(ii)	*any three from:* temperature; amount / availability of water / rainfall; amount of sun / light; terrain / elevation; effect of lake on local climate;	**3**
7(b)(i)	*any two from:* greenhouse gas; heat / infra-red radiation emitted from the Earth is trapped by greenhouse gases in the atmosphere contributes to, global warming / (enhanced) greenhouse effect;	**2**

Question	Answer	Marks
7(b)(ii)	*any two from:* farming for a profit / produce sold; large scale; mechanised / use of technology; very few workers;	**2**
7(c)	*any two from:* wind break; shelter / shade for, livestock / crops; roots binds soil; prevents wind / soil erosion; provides habitat; for, pollinators / beneficial insects; increases biodiversity; provides corridor for wildlife; dead leaves provide organic matter;	**2**
7(d)	*any four from:* water / rain, easily available / specialist expertise not required; sustainable; free from chemicals that may be in, groundwater / surface water; reduces use of, groundwater / water in aquifers / other sources; may reduce, floods/waterlogging / soil erosion / impacts of drought; saves money / free; money saved can be used for another named purpose, e.g. education, buying seeds; suitable for trickle drip irrigation;	**4**

Question	Answer	Marks
8(a)	*narrow top:* low proportion of people live into old age / high death rate; *wide base:* large number of children / high birth rate; *percentage of females compared to males in the 75+ age group:* women live longer than men;	**3**
8(b)	base narrower than middle AND male and female approximately equal;	**1**
8(c)(i)	availability of family planning / education;	**1**
8(c)(ii)	*any one from:* no funding for projects; the UNPF will not fulfil its aim; increased (unwanted) pregnancies; more deaths in childbirth; example of how young persons' potential in not fulfilled;	**1**
8(d)(i)	*Any two from;* general trend of overall increase (in population)(between 1962 and 2017); net migration fluctuates; correct use of data;	**2**
8(d)(ii)	*any three from:* economic / jobs; education; social ties / closer to family; escape from, political persecution / war / ethnic or religious intolerance or persecution; environmental / natural hazards / drought; food or water insecurity ;	**3**

Question	Answer	Marks
9(a)(i)	dashed line arrow = cold current solid line arrow = warm current correct symbols that match the diagram; symbols match correct current;	**2**
9(a)(ii)	circular / anticlockwise;	**1**
9(b)(i)	bar to 5 tonnes, same width as existing bars;	**1**
9(b)(ii)	37.5 (tonnes); (7 ÷ 10 × 37.5 =) 26.25;	**2**
9(c)	*any three from:* chemicals / salt / minerals; building materials; wave / tidal, energy; tourism; transport; desalination (for drinking water);	**3**

Question	Answer	Marks
9(d)	*Level of response marked question:* Level 3 [5–6 marks] **A coherent response is given that develops and supports the candidate's conclusion using relevant details and examples.** Indicative content and subject-specific vocabulary are generally used precisely and accurately. Good responses are likely to present a balanced evaluation of the statement. Level 2 [3–4 marks] **Development and support of the conclusion is evident, though the response may lack some coherence and/or detail.** Irrelevant detail may be present. Indicative content and subject-specific vocabulary are used but may lack some precision and / or accuracy. Responses contain evaluation of the statement, but this may not be balanced. Level 1 [1–2 marks] **The response may be limited in development and / or support.** Contradictions and / or irrelevant detail may be present. Indicative content and subject-specific vocabulary may be limited or absent. Responses may lack structure or be in the form of a list. Evaluation may be limited or absent. No response or no creditable response [0 marks] *indicative content discussion of:* The oceans are too polluted to be a source of safe food. *agree:* many types of pollution, e.g. plastic, oil, sewage, chemical description of how pollution gets into the sea, e.g. leaching, illegal dumping, poor waste disposal effects of pollution, e.g. eutrophication, bioaccumulation, food chains and food web destruction, reduction of marine populations (even) fish farming can pollute currents carry pollution all round world increasing population means we must use ocean as resource overfishing	**6**

Question	Answer	Marks
9(d)	*do not agree:* most fish / sources of food are not (yet) polluted many different types of food source in oceans oceans are very large pollution often localised / coastal (rather than worldwide) current fisheries industry is strong in many countries it is possible to maintain fishing sustainably using close seasons, net design etc. fish farming where water quality can be controlled and monitored international treaties to reduce waste disposal into ocean, improvement in legislation public awareness of single use plastics	