Cambridge Assessment International Education

Cambridge IGCSE™

CANDIDATE NAME									
CENTRE NUMBER						CANDIDATE NUMBER				

2868307491

ENVIRONMENTAL MANAGEMENT **0680/11**

Paper 1 Theory **May/June 2024**

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)** Igneous and sedimentary are types of rock.

Complete the sentences about rocks.

An example of an igneous rock is .....

An example of a sedimentary rock is .....
[2]

(b) Describe the formation of a sedimentary rock.

.....

.....

.....

.....

.....

..... [3]

[Total: 5]

2 **(a)** The photograph shows irrigation of plants in a field.

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

..... [1]

(ii) State **two** reasons why this is an example of sustainable agriculture.

1 .....

.....

2 .....

.....

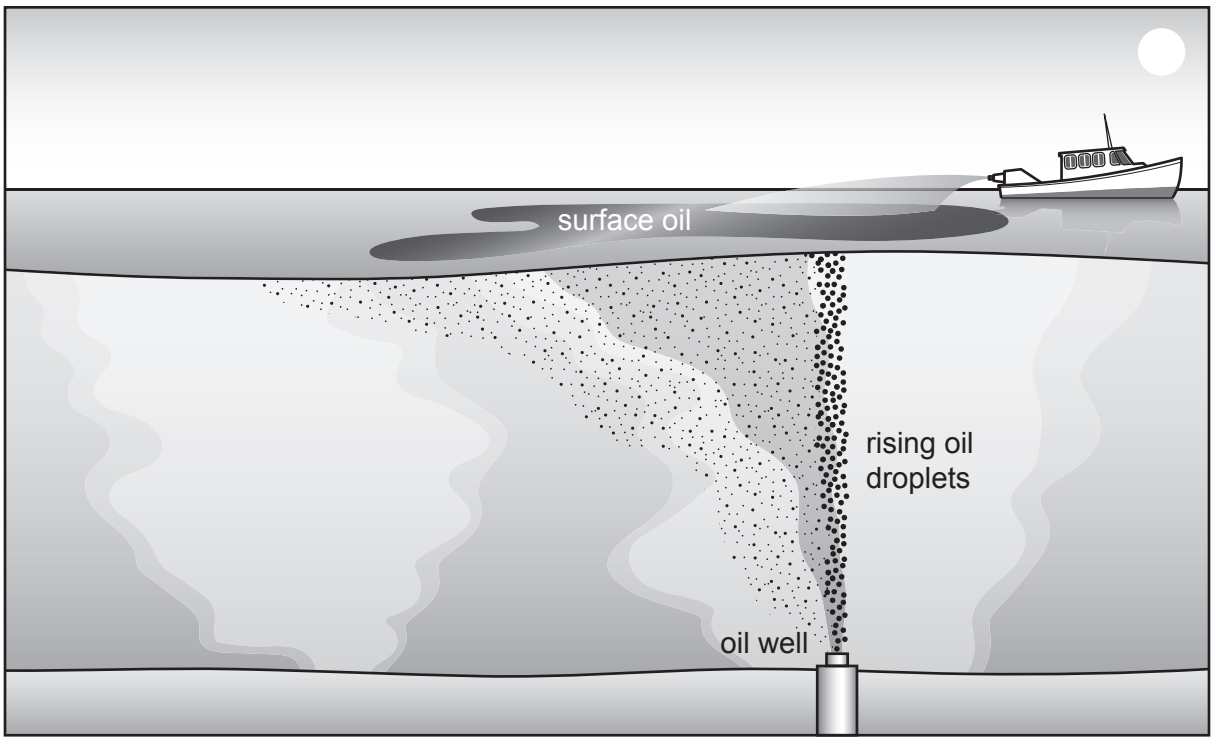
[2]

(b) State the process that releases water from plant leaves.

..... [1]

[Total: 4]

3 The diagram shows oil spilling from an oil well into the ocean.



(a) State the method of dealing with the oil spill shown in the diagram.

..... [1]

(b) State **two** other methods of dealing with oil spills on the ocean surface.

1 .....

2 .....

[2]

(c) State **three** impacts of oil pollution on marine ecosystems.

1 .....

.....

2 .....

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3 .....

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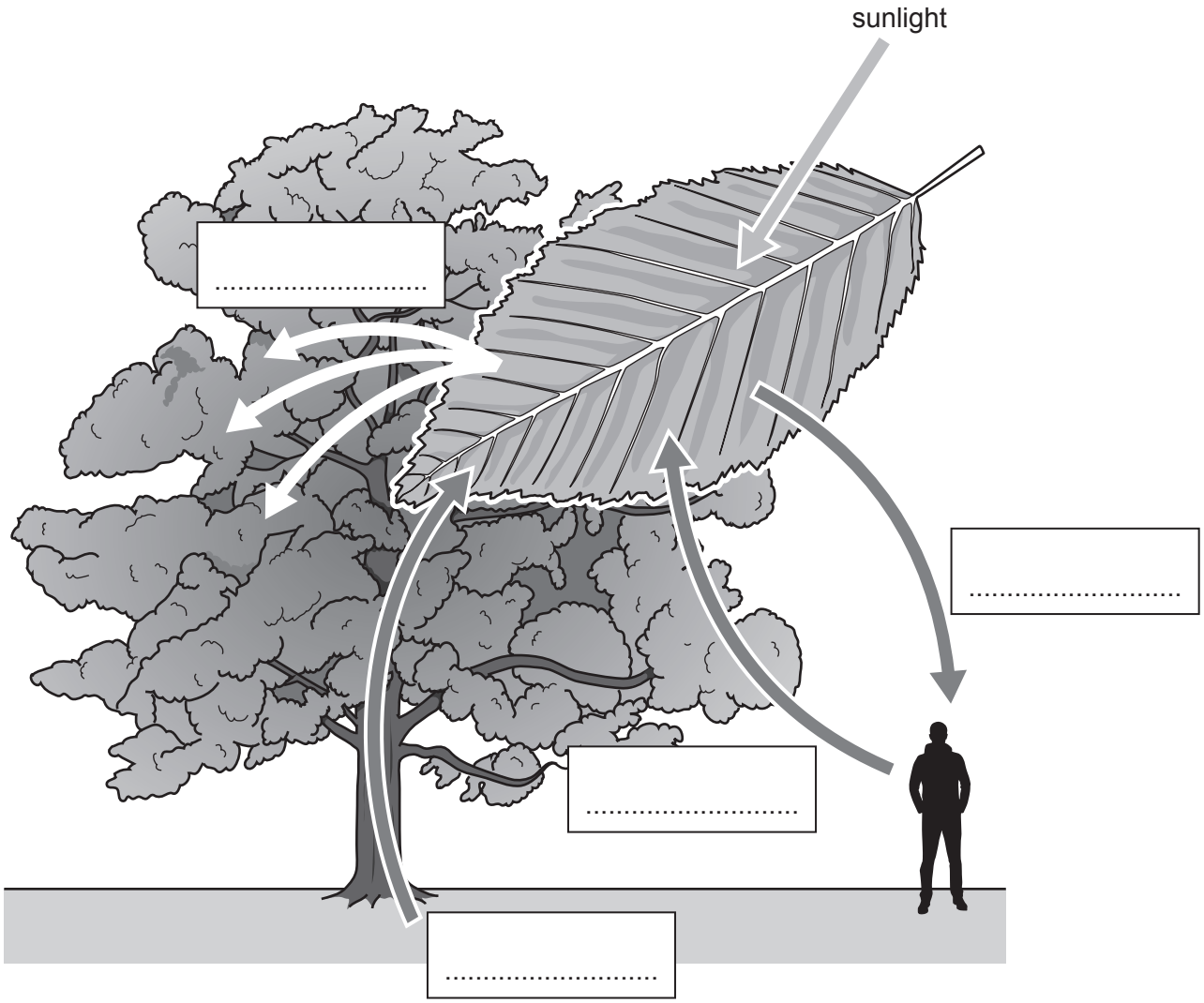
[3]

[Total: 6]

4 The diagram shows the process of photosynthesis.



(a) Complete the labels on the diagram. [2]

(b) State the green pigment found in leaves.

..... [1]

(c) Humans take in oxygen.

State the process that uses oxygen in living cells.

..... [1]

(d) State why trees are a carbon sink.

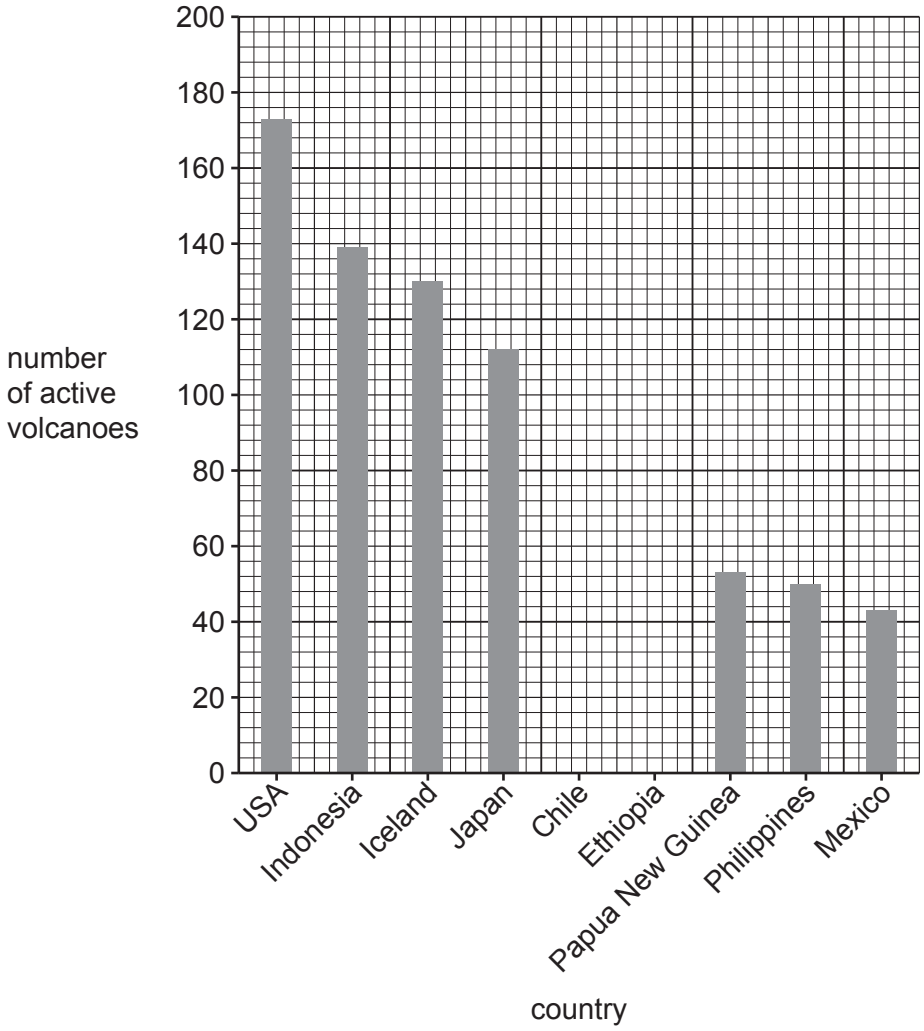
.....

..... [1]

[Total: 5]

Section B

5 The bar chart shows the number of active volcanoes in some countries.



(a) Complete the bar chart using the data in the table.

country	Chile	Ethiopia
number of active volcanoes	104	58

[2]

(b) Volcanoes erupt when magma rises to the Earth's surface from the mantle.

Explain how tectonic plate movement causes magma to rise to the Earth's surface.

.....

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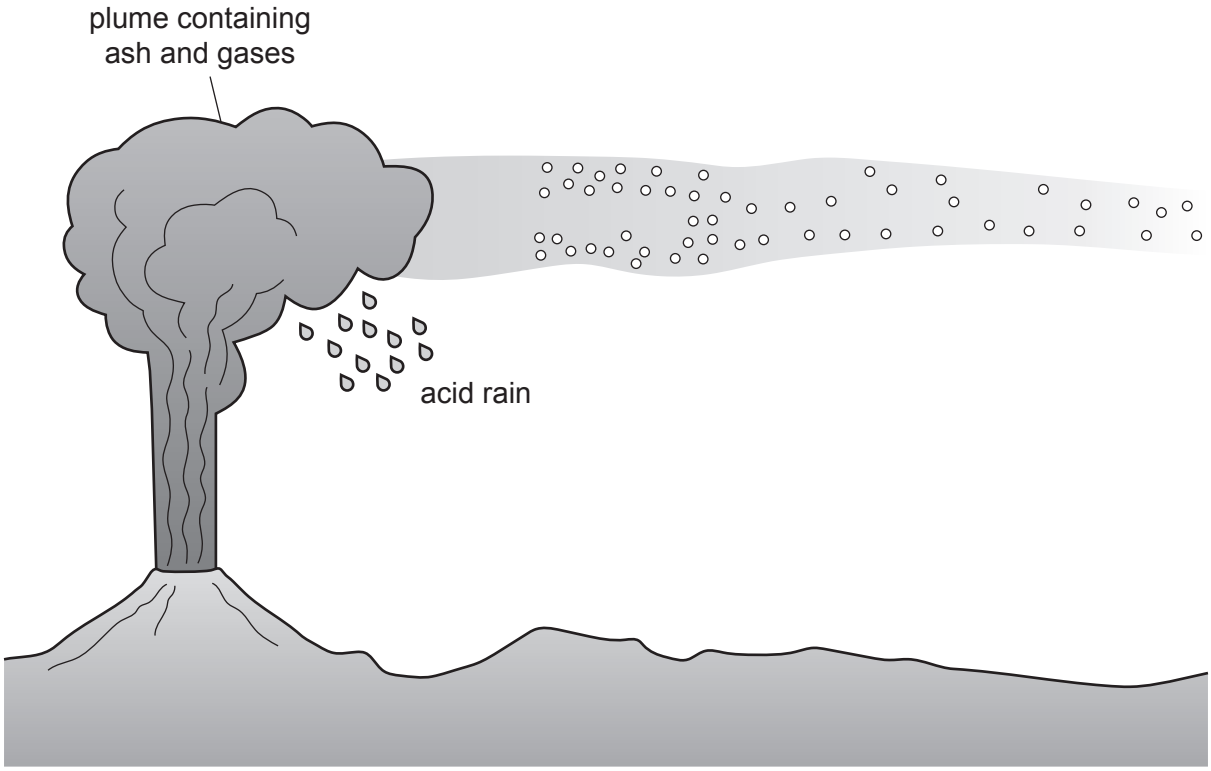
..... [4]

(c) The diagram shows a volcano erupting.



The table shows information about four volcanic eruptions.

volcanic eruption	plume height / km	volume of material in plume / km^3
Kilauea	less than 0.1	0.000001
Stromboli	0.1 to 1.0	0.00001
Galeras	1 to 5	0.001
Mount St. Helens	more than 25	1.0

(i) A student concludes that the Mount St. Helens eruption has a greater impact on the atmosphere than the Stromboli eruption.

Use the data to suggest if the student's conclusion is correct. Give reasons for your answer.

.....

.....

.....

..... [2]

(ii) The table shows information about the volcanic eruption index, VEI.

VEI is a measure of the explosiveness of a volcanic eruption.

VEI	0	1	2	3	4	5	6	7	8
volume of plume / km^3	less than 0.00001	more than 0.00001	more than 0.001	more than 0.01	more than 0.1	more than 1.0	more than 10.0	more than 100.0	more than 1000.0

State the VEI for Kilauea.

..... [1]

(iii) The table shows information about two earthquakes, A and B.

earthquake	**Richter magnitude**
A	2
B	4

Explain how the magnitude of earthquake A compares to the magnitude of earthquake B.

.....

.....

.....

.....

.....

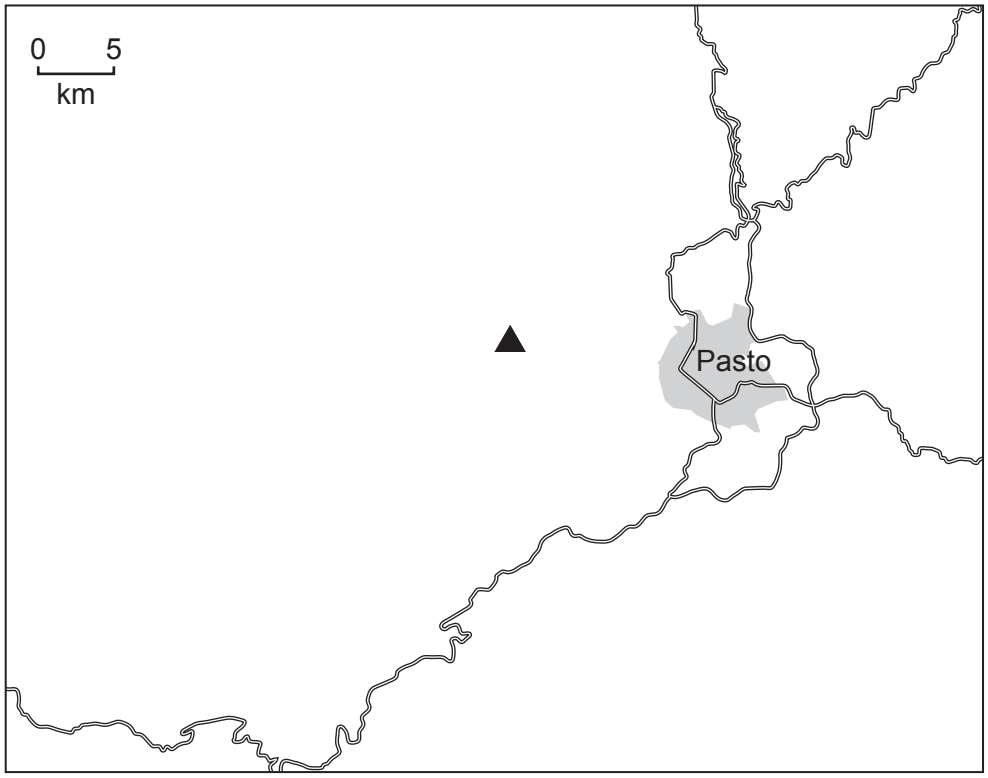
..... [3]

(iv) The map shows the location of the Galeras volcano.

Key

▲ volcano

major roads



Suggest why people living in Pasto are worried about the Galeras volcano.

.....

.....

.....

.....

.....

..... [2]

(v) Volcanic eruptions can cause acid rain.

Describe the formation of acid rain.

.....

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..... [4]

(d) Suggest why many farmers grow crops near volcanoes that can erupt.

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..... [2]

(e) More economically developed countries (MEDCs) use strategies to manage the impact of earthquakes before they happen.

Explain these strategies.

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..... [5]

[Total: 25]

6 **(a)** Complete the following statements about a typhoon.

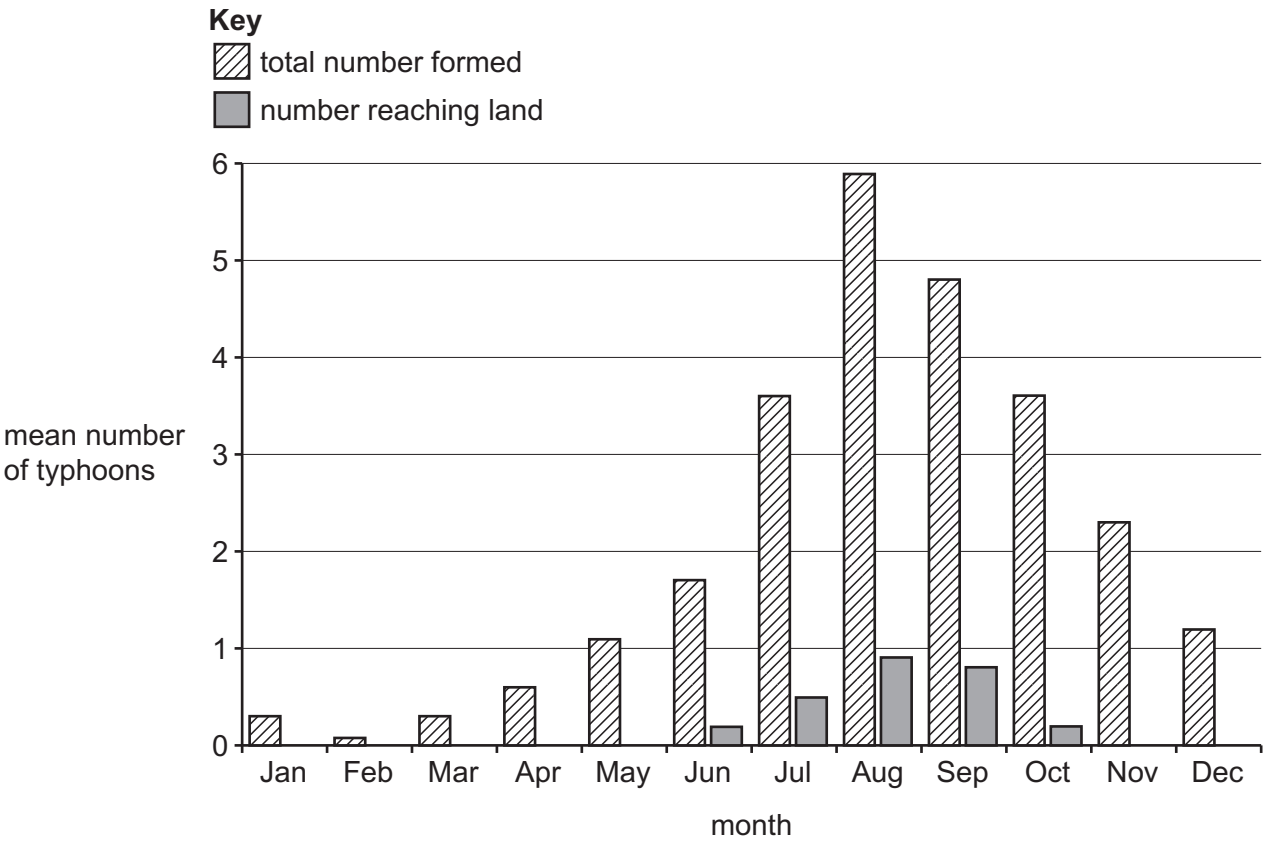
A typhoon can only form above the ocean between ……. and ……. degrees north or south of the Equator.

The ocean must be at least ……. m deep.

The surface temperature of the ocean must reach ……. °C.

[3]

(b) The graph shows data about typhoons near Japan.



(i) State the month when typhoons are most likely to form.

..... [1]

(ii) State between which months typhoons reach land.

…… and …… [1]

(iii) Estimate the percentage of the total number of typhoons formed that reach land in September.

Circle **one** percentage.

7% **17%** **27%** **37%**

[1]

(iv) Many typhoons are predicted to reach Japan.

Suggest **two** reasons why some of these typhoons do **not** reach Japan.

1 .....

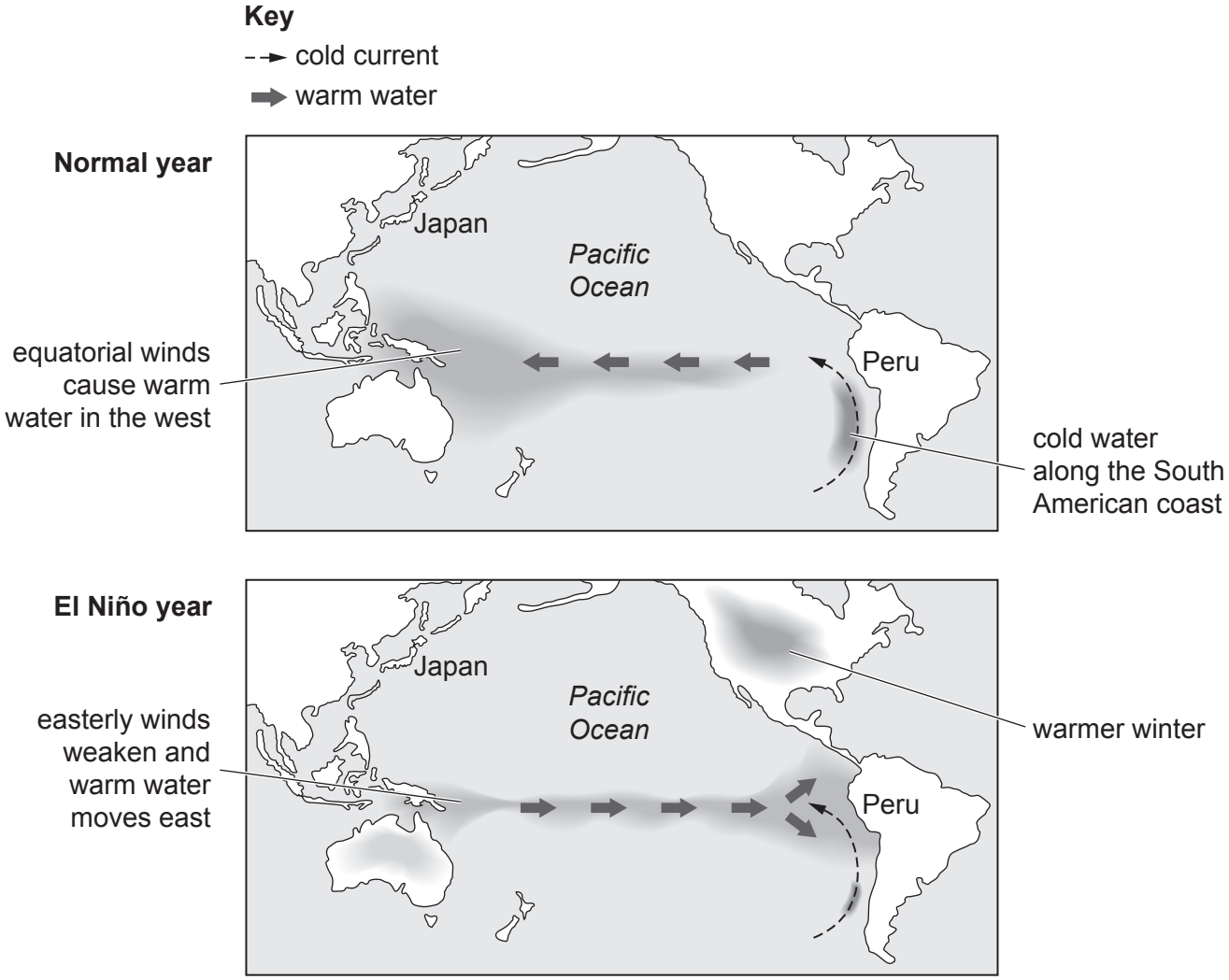
.....

2 .....

.....

[2]

(c) The diagram shows the change in the (surface) water temperature in the Pacific Ocean in a normal year and an El Niño year.



(i) Suggest how an El Niño year affects the number of typhoons expected to reach Japan.

Give reasons for your answer.

.....

.....

.....

..... [2]

(ii) Suggest **one** impact of El Niño on the people living in Peru.

.....

..... [1]

[Total: 11]

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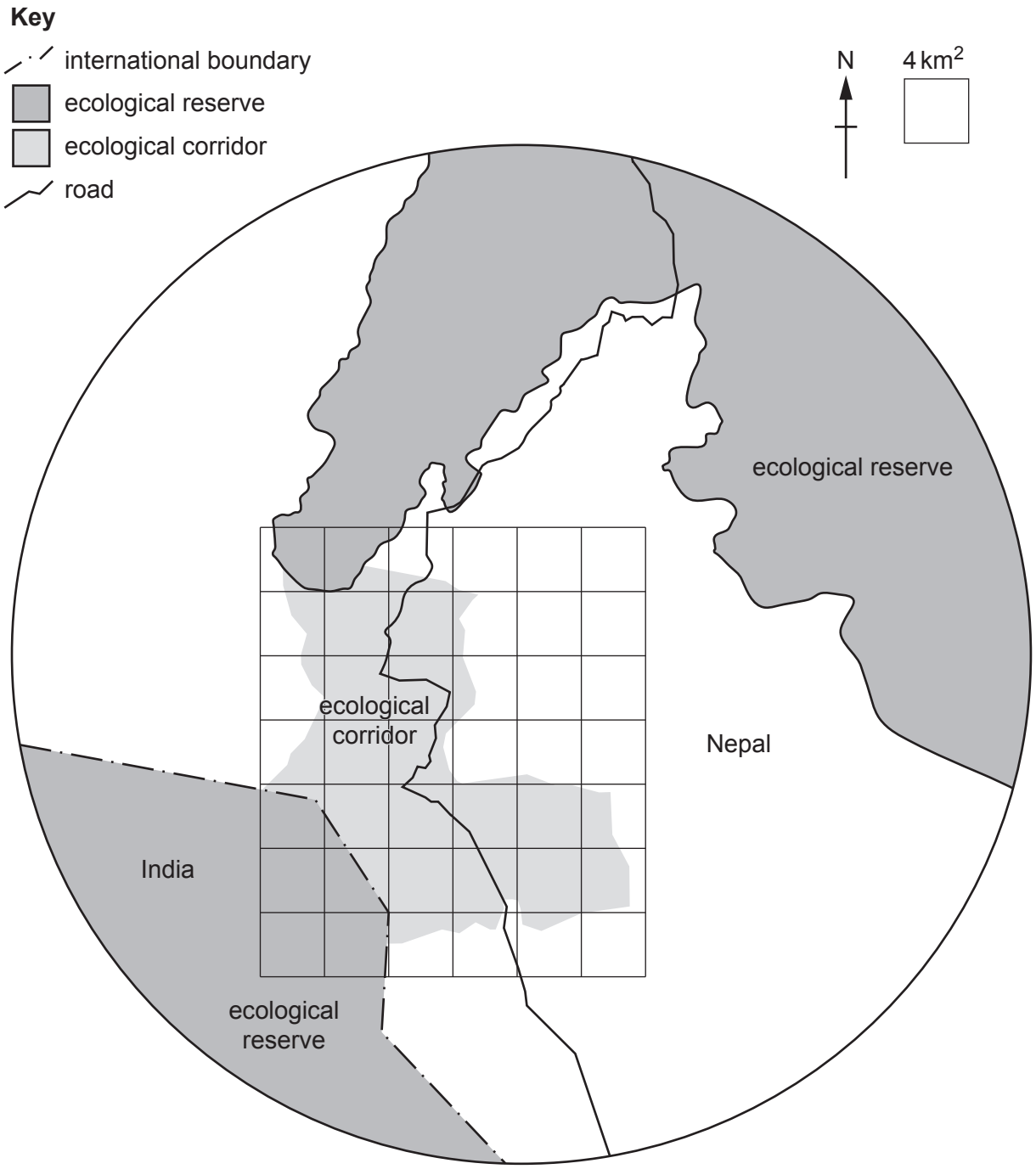
7 The map shows a corridor between ecological reserves in both Nepal and India.



(a) Use the scale to estimate the area of the corridor.

Show your working.

..... km^2 [2]

(b) Suggest why an international agreement was needed to set up the corridor shown on the map.

.....

..... [1]

(c) A reforestation programme began in 2000 when the corridor was created.

Local people were employed to plant trees.

Local people have seen an increase in tigers in the corridor.

There has also been an increase in the tiger population in both reserves.

(i) Explain the benefits to tigers of connecting the two ecological reserves by a corridor.

.....

.....

.....

.....

.....

..... [3]

(ii) Ecotourists visit the reserves to see the tigers. The ecotourists stay in houses in villages in the corridor.

Suggest reasons why this type of ecotourism is a sustainable activity.

.....

.....

.....

..... [2]

[Total: 8]

8 **(a)** The table shows ten countries with the most nuclear reactors in power stations in 2022.

country	nuclear reactors in power stations
Canada	19
China	28
France	58
India	21
Japan	43
Russia	34
South Korea	24
UK	16
Ukraine	15
USA	99

(i) State the number of countries that have more than 30 nuclear reactors in power stations.

..... [1]

(ii) State the fuel used in a nuclear reactor in a power station.

..... [1]

(iii) Suggest why nuclear power is a non-renewable energy resource.

.....

..... [1]

(iv) State **two** other non-renewable energy resources.

1 .....

2 .....

[2]

(v) Suggest **two** reasons why many countries do **not** have nuclear power stations.

1 .....

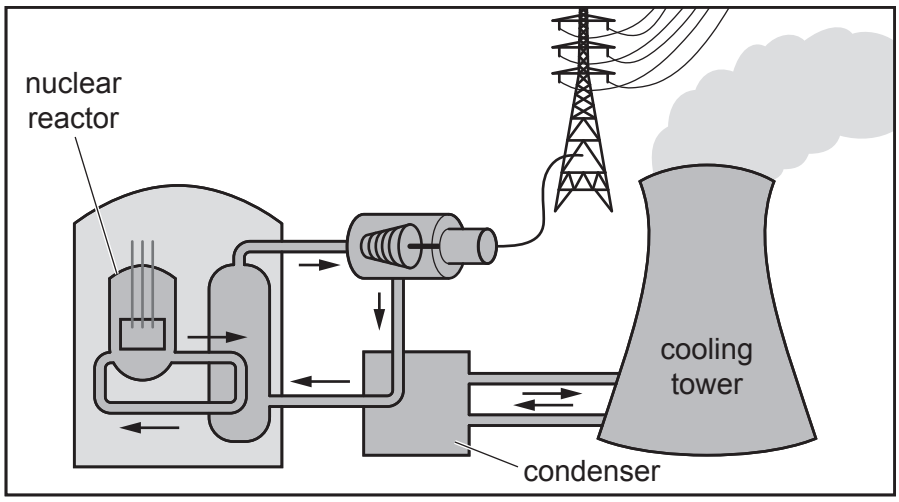
.....

2 .....

.....

[2]

(b) The diagram shows a nuclear power station generating electricity.



Describe how this power station generates electricity.

.....

.....

.....

.....

.....

.....

.....

..... [3]

(c) A student says:

> Building more nuclear power stations is the best way of reducing the world's carbon dioxide emissions.

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

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..... [6]

[Total: 16]

CAMBRIDGE
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ENVIRONMENTAL MANAGEMENT **0680/11**

Paper 1 Theory **May/June 2024**

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 2024 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 descriptions 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)	(igneous) basalt / granite ; (sedimentary) limestone / sandstone / shale ;	**2**
1(b)	any three from : erosion of rock / weathering ; deposited in water / seas / riverbed ; in layers ; compacted / under pressure, (to form rock) ;	**3**

Question	Answer	Marks
2(a)(i)	trickle drip ;	**1**
2(a)(ii)	any two from : water only given directly to plants/roots ; less water evaporation (from soil) ; water source lasts longer / less wastage ; less /no (risk of) salinisation / water logging ; less (risk of) erosion (by run off) ;	**2**
2(b)	transpiration ;	**1**

Question	Answer	Marks
3(a)	detergent (sprays) ;	**1**
3(b)	booms ; skimmers ;	**2**

Question	Answer	Marks
3(c)	any three from: kills fish / kills (sea) birds / marine mammals ; prevents light reaching producers / phytoplankton ; damages / kills coral reefs ; damage to beaches / mangroves ; disrupts food chain ;	**3**

Question	Answer	Marks
4(a)	carbon dioxide oxygen water glucose ;;	**2**
4(b)	chlorophyll ;	**1**
4(c)	respiration ;	**1**
4(d)	trees take in / absorb carbon dioxide ;	**1**

Question	Answer	Marks
5(a)	bar plotted correctly for Chile ; bar plotted correctly for Ethiopia ;	**2**
5(b)	any four from : plates move apart / constructive boundary ; plates pushed under another / destructive boundary / subduction ; rock / plate melts / becomes magma ; movements caused by convection currents ; magma / molten rock behaves as a liquid ; magma lighter than solid rock ; (so magma rises) through vents ;	**4**

Question	Answer	Marks
5(c)(i)	any two from : MSH higher (plume) height ; more (eruptive) volume ; so more emissions / ash / gas; travels longer distance ;	**2**
5(c)(ii)	0 *;*	**1**
5(c)(iii)	B has a greater / higher / larger (magnitude than A) ; B more risk / level of danger 100 x greater magnitude / each level is 10x increase in magnitude ;	**3**
5(c)(iv)	any two from : people live close to the volcano / estimated distance / not enough time to evacuate ; (The ash cloud / plume) could make them ill / respiratory problems / death ; damage property / infrastructure/ roads / crops ;	**2**
5(c)(v)	any four from : sulfur dioxide ; nitrogen oxides / NOx ; dissolve in water / react with ; (to form) sulfuric acid ; nitric acid ;	**4**
5(d)	any two from : limited land suitable for farming ; soil is rich in minerals / do not need fertilisers / fertile soil ; risk to life / crops is low ;	**2**

Question	Answer	Marks
5(e)	any five from: land zoning / town planning regulations (to avoid construction in high risk areas) ; buildings made to resist earthquakes ; so less collapse / risk of killing people ; disaster preparation / rapid response teams/medical aid/food and shelter ; effective early warning systems / monitoring ; so people know to evacuate ; drills / preparation / plans ; so evacuation is safe / controlled/prevents panic ; people get to a safe area ;	**5**

Question	Answer	Marks
6(a)	5 and 20 (degrees) ; 60 (metres) ; 27(degrees) ;	**3**
6(b)(i)	August ;	**1**
6(b)(ii)	June and October ;	**1**
6(b)(iii)	17%;	**1**
6(b)(iv)	any two from : they change direction out at sea ; they do not have enough energy to remain typhoons / reduce to storm force ; predictions were incorrect ;	**2**

Question	Answer	Marks
6(c)(i)	any two from : fewer typhoons ; the sea not as hot (around / near Japan) / warmer water further away (from Japan) ; so it is not hot enough to form a typhoon / only forms storms ; typhoons move on a different track / typhoons move in an easterly direction ;	**2**
6(c)(ii)	fewer fish/heavy rainfall ;	**1**

Question	Answer	Marks
7(a)	any number from 16 to 20 ; correct multiplication / larger area 22 of number above ;	**2**
7(b)	It connects two different countries/cross border ;	**1**
7(c)(i)	any three from : Increased access to prey / water ; free movement of prey ; finding a mate / reproducing ; reduced chance of extinction ; maintain genetic diversity in the population / reduces inbreeding ; reduced disturbance by humans / larger habitat / territory ; gives a suitable habitat in the case of wildfires ;	**3**
7(c)(ii)	any two from: tourists have to live the same as local people / no hotels / accommodation built ; limited damage to environment / small scale ; local people can make money (so likely to help protect habitat/tigers) / helps fund conservation project ; can go on for a long time / future generations can still do it ;	**2**

Question	Answer	Marks
8(a)(i)	4 ;	**1**
8(a)(ii)	Uranium ;	**1**
8(a)(iii)	obtained from rocks / will run out / finite ;	**1**
8(a)(iv)	any two from : coal ; oil ; (natural) gas ;	**2**
8(a)(v)	any two from: lack of funds/too expensive to build ; lack of expertise to build ; other cheaper non-renewables available ; plenty of other energy available ; lack of access to nuclear materials / uranium ; public opinion / produces toxic waste ; lack of suitable location ;	**2**
8(b)	any three from : Uranium / fuel decays (giving off heat) ; water warmed / boils / heated ; turns to steam ; steam turns / rotates / spins turbine ; turbine turns / powers generator ;	**3**

Question	Answer	Marks
8(c)	*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* agree does not produce carbon dioxide fuel does not contain carbon not a fossil fuel not weather dependent established technology energy dense fuel 24 / 7 supply of energy	**6**

Question	Answer	Marks
8(c)	disagree Uranium is a non-renewable resource/finite limited number of safe sites for nuclear power need a large supply of water waste disposal a problem with nuclear power risk of radiation leaks change to electric cars rather than oil will give a bigger reduction other resources are easier / quicker to build other sources of energy that release carbon dioxide renewable energy sources don't produce carbon dioxide and are safer than Uranium alternative renewable energy sources would be better	

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CANDIDATE NAME									
CENTRE NUMBER						CANDIDATE NUMBER				

5571879882

ENVIRONMENTAL MANAGEMENT **0680/12**

Paper 1 Theory **May/June 2024**

1 hour 45 minutes

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INFORMATION

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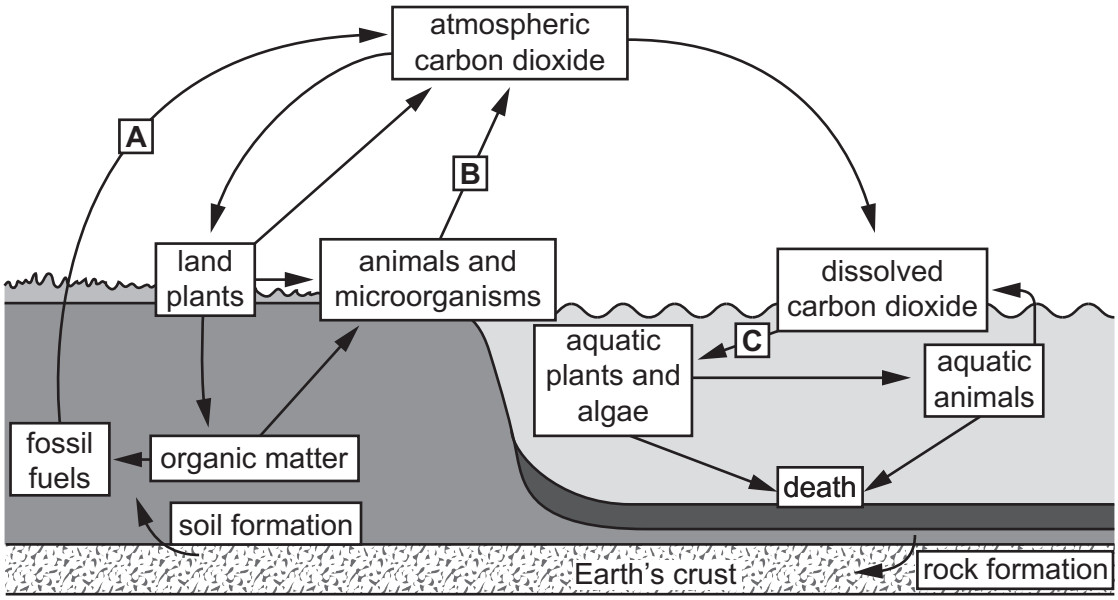
Section A

1 The diagram shows part of the carbon cycle.



(a) State the processes at **A**, **B** and **C**.

A .....

B .....

C .....

[3]

(b) Explain why aquatic plants and algae are essential to aquatic animals.

.....

.....

.....

..... [2]

[Total: 5]

2 **(a)** The table shows the year that reserves of fossil fuels are predicted to be used up.

fossil fuel	year the reserve will be used up
oil	2052
coal	2090
natural gas	2060

(i) Calculate the number of years the reserves of coal are predicted to last.

..... years [1]

(ii) State **two** reasons why the reserves of fossil fuels might be used up before the predicted year.

1 .....

.....

2 .....

.....

[2]

(b) Describe the formation of coal.

.....

.....

.....

.....

.....

..... [3]

(c) State **two** renewable energy resources.

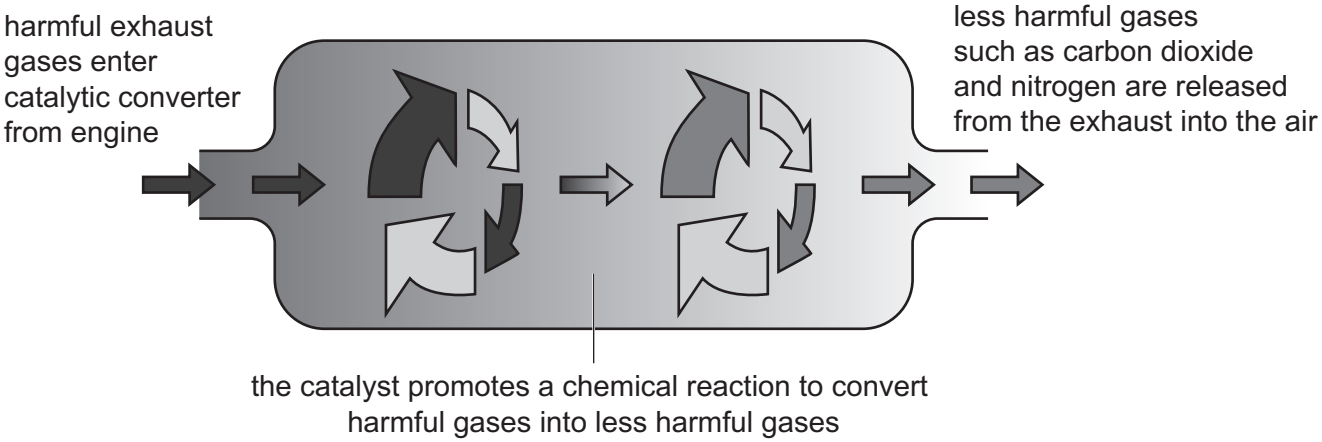
1 .....

2 .....

[1]

[Total: 7]

3 The diagram shows a catalytic converter used in vehicles.



(a) State **two** harmful gases converted by the catalytic converter.

1 .....

2 .....

[2]

(b) State **three** reasons why catalytic converters will **not** solve the problem of atmospheric pollution.

1 .....

.....

2 .....

.....

3 .....

.....

[3]

(c) State **three** strategies for reducing atmospheric pollution from vehicles other than catalytic converters.

1 .....

.....

2 .....

.....

3 .....

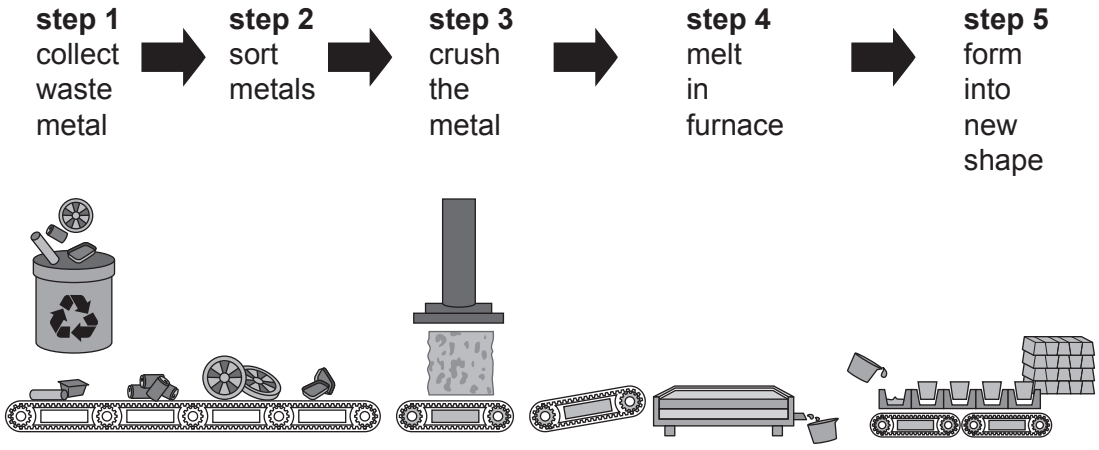
.....

[3]

[Total: 8]

Section B

4 The diagram shows a process for recycling metals.



(a) Explain the importance of step 2 in the recycling process.

.....

..... [1]

(b) New metal is extracted from mined rock.
The picture shows a type of mine.

(i) State the type of mining shown in the picture.

..... [1]

(ii) Suggest reasons why recycling metals is less harmful for the environment than mining for new metals.

.....

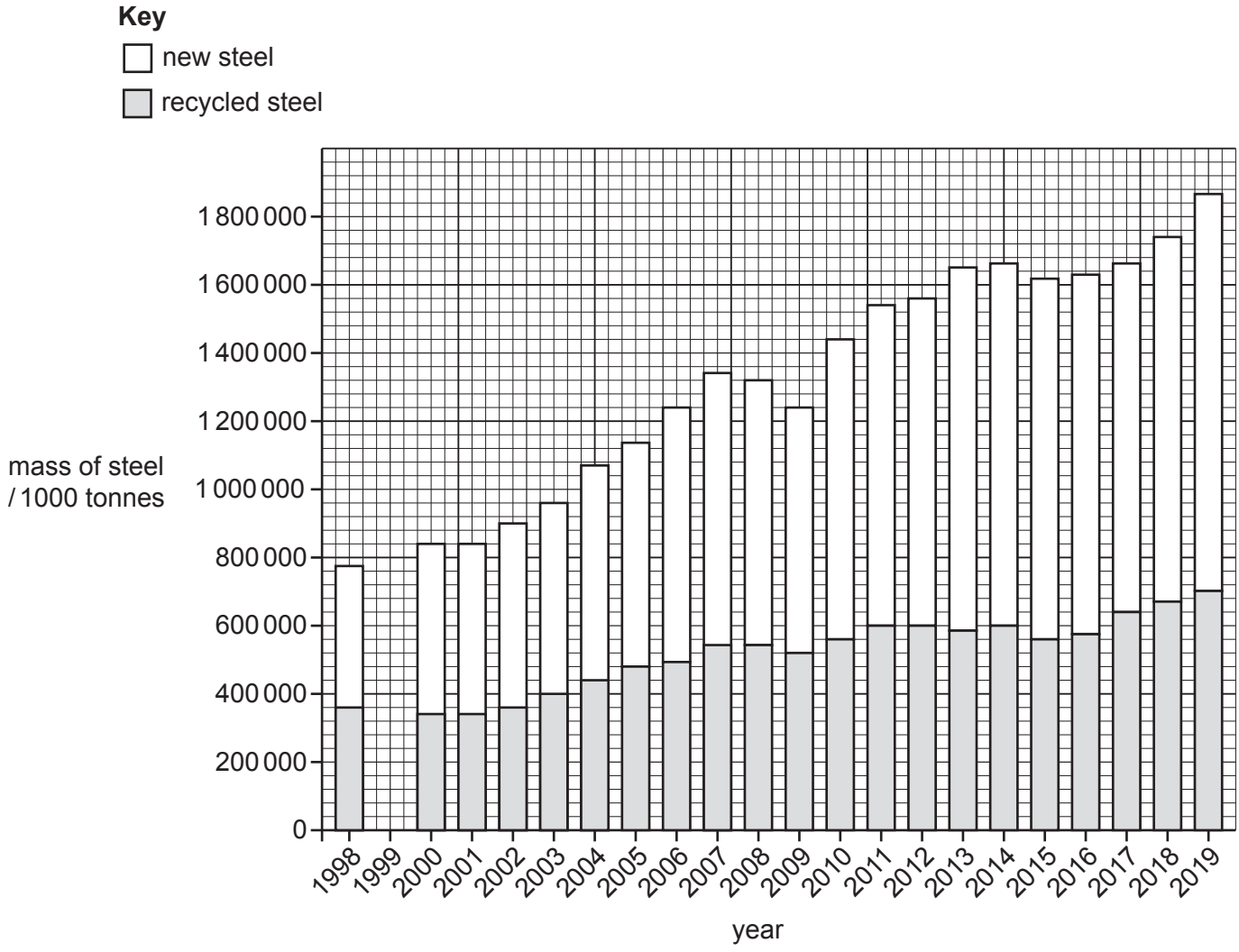
.....

.....

..... [2]

(c) The graph shows the total mass of steel produced from 1998 to 2019.

The total mass of steel contains recycled steel and new steel.



(i) Use the data in the table to complete the graph.

year	1999
mass of recycled steel / 1000 tonnes	340 000
mass of total steel production / 1000 tonnes	800 000

[2]

(ii) Describe the trend in the production of recycled steel between 2000 and 2019.

.....

.....

.....

..... [2]

(iii) Calculate the percentage of steel production from recycled steel in 1999.

Give your answer to one decimal place.

.....% [1]

(d) Suggest **three** strategies to increase the recycling of metals.

1 .....

.....

2 .....

.....

3 .....

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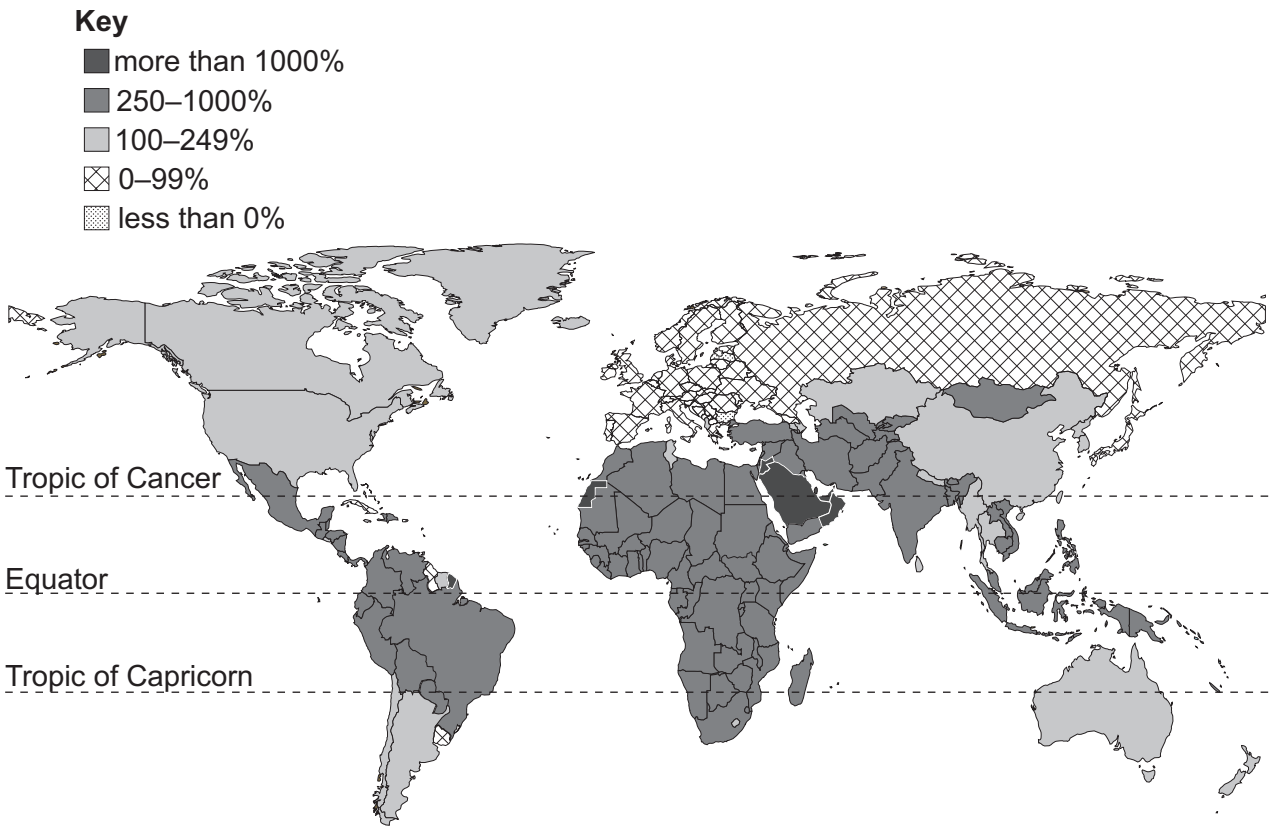
[3]

[Total: 12]

5 The map shows the percentage increase in population by country between 1950 and 2021.



(a) Describe the distribution of population growth between 1950 and 2021.

.....

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..... [4]

(b) Suggest the impacts on natural resources for countries with an increase in population of more than 1000%.

Give reasons for your answer.

.....

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..... [3]

(c) A country with a low population growth introduces a pronatalist strategy to encourage families to have more children.

(i) State **one** example of a pronatalist strategy.

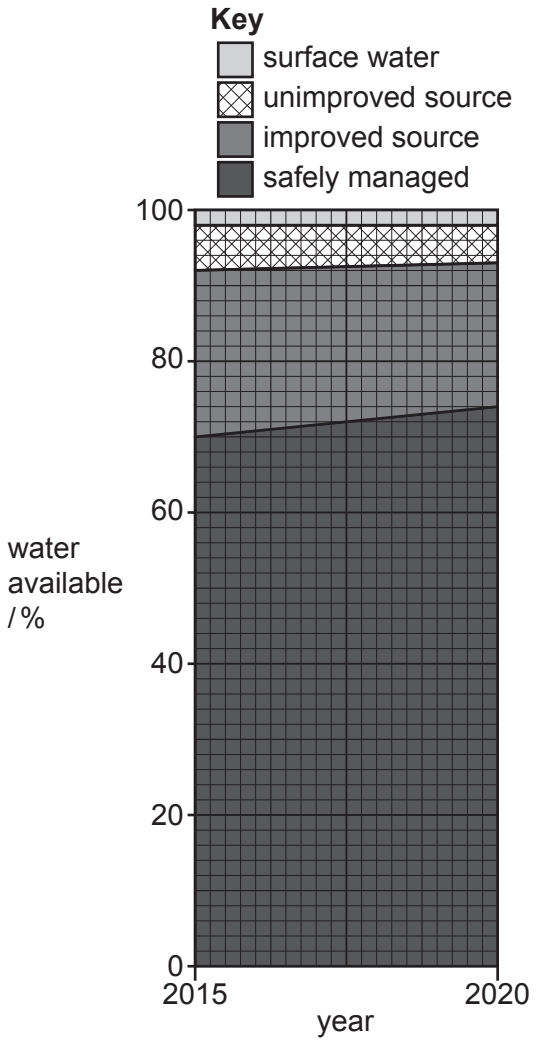
..... [1]

(ii) Suggest **one** negative impact of this strategy on the economy of a country.

..... [1]

[Total: 9]

6 The graph shows the global availability of drinking water supplies in 2015–2020.



(a) State the percentage of the world population who had access to safely managed water in 2020.

.....% [1]

(b) Suggest **three** reasons why some people do **not** have access to safely managed water.

1 .....

.....

2 .....

.....

3 .....

.....

[3]

(c) Cholera is an infectious disease that can enter drinking water.

(i) State **two** strategies to treat drinking water which is contaminated with cholera.

1 .....

2 .....
[2]

(ii) Describe how cholera enters drinking water.

.....

.....

.....

.....

.....

..... [3]

(d) Suggest **two** reasons why some fresh water sources are **not** used for drinking water, other than contamination.

1 .....

.....

2 .....

.....
[2]

[Total: 11]

7 In 2011, a tsunami occurred 130 km from the coast of Japan.

The tsunami killed 18 000 people and damaged many buildings including the Fukushima nuclear power station.

(a) Describe how a tsunami occurs.

.....

.....

.....

.....

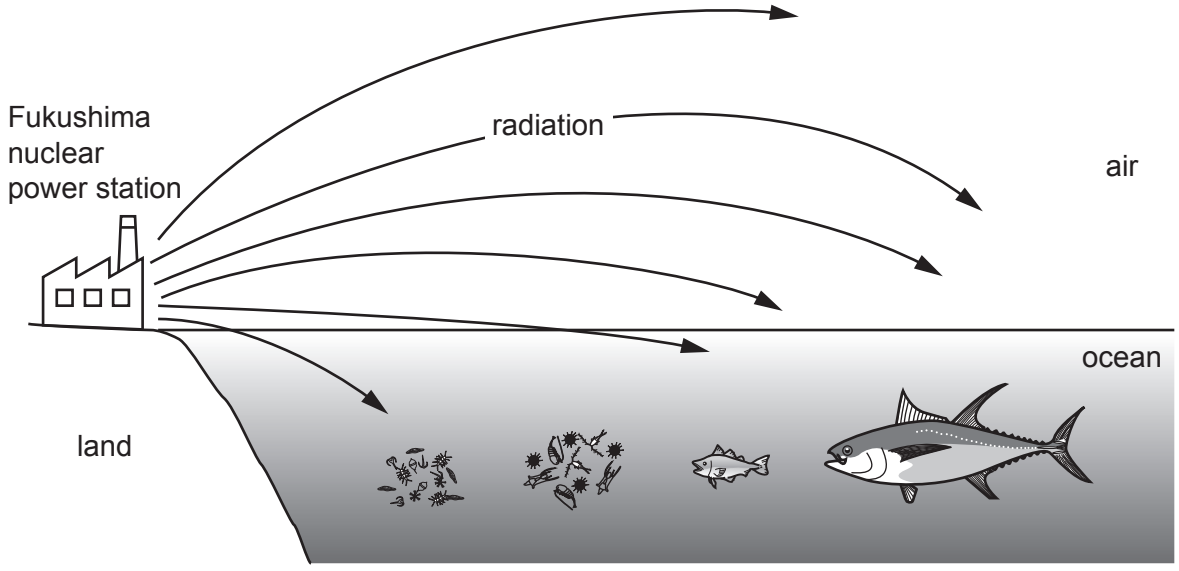
.....

..... [3]

(b) The damage to the Fukushima nuclear power station caused a leak of radiation. Radiation is harmful to all organisms.

Scientists are still monitoring marine organisms to check their radiation levels.

The diagram shows Fukushima nuclear power station.



Explain why large fish have the greatest radiation levels.

Use the diagram to support your answer.

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..... [5]

(c) Suggest reasons why countries build nuclear power stations to generate electricity.

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..... [3]

[Total: 11]

8 A newspaper article said:

Tree species threatened with extinction

Scientific research reports that 30% of the world's tree species are threatened with extinction in the wild.

17 500 tree species are threatened with extinction.

The threats include:

- forest clearance for crops (affecting 29% of species)
- logging (27%)
- clearance for livestock grazing or farming (14%)
- clearance for development (13%)
- fire (13%)
- other (4%).

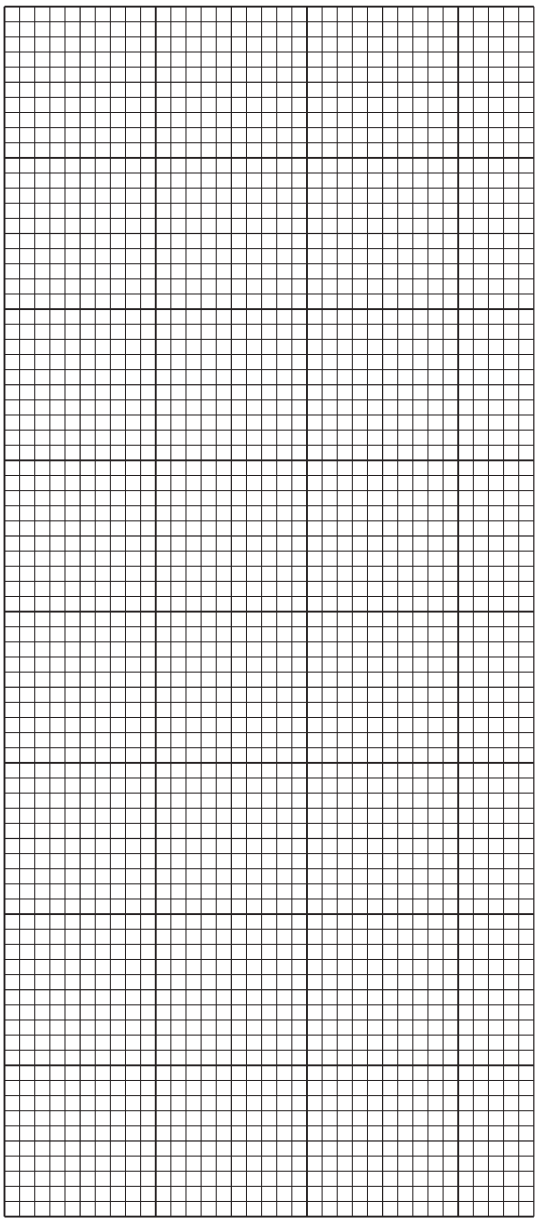
Scientists demand that action is taken to prevent the extinction of these species.

(a) (i) Calculate the number of tree species in the world.

number of tree species = ... [1]

(ii) Draw a bar chart to show the threats to tree species.

Use the information in the article.



[4]

(iii) 4% of tree species are threatened with extinction for other reasons.

Suggest **two** of these other threats.

1 .....

.....

2 .....

.....

[2]

(b) Extractive reserves and seed banks are two ways to reduce the threat of extinction of these tree species.

Explain how these methods reduce the threat of extinction.

extractive reserves .....

.....

.....

.....

seed banks .....

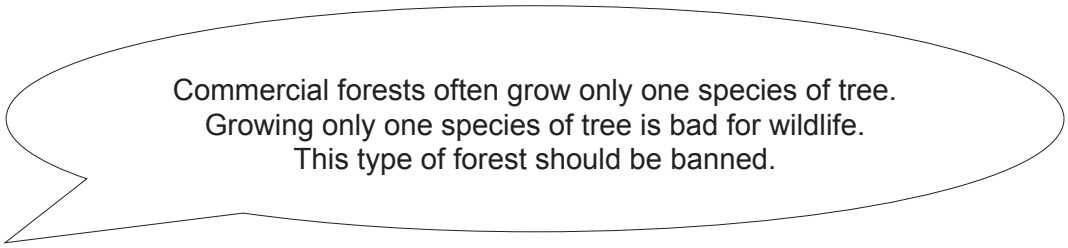
.....

.....

.....

[4]

(c) A student says:



To what extent do you agree with this statement?

Give reasons for your answer.

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..... [6]

[Total: 17]

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CAMBRIDGE
International Education

Cambridge IGCSE™

ENVIRONMENTAL MANAGEMENT **0680/12**

Paper 1 Theory **May/June 2024**

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 2024 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 descriptions 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)	A – combustion: B – respiration; C – photosynthesis;	**3**
1(b)	*Any two from:* Plants provide: oxygen; through photosynthesis / for respiration; food source; to provide energy; shelter; to provide protection / shade;	**2**

Question	Answer	Marks
2(a)(i)	66 years;	**1**
2(a)(ii)	T*wo from:* demand might increase / change; increase in industrialisation; urbanisation; increase in population; shortage of other sources; increase in living standards / activity; some sources are too environmentally damaging to extract;	**2**
2(b)	dead plants are buried; (intense) heat and pressure; over millions of years;	**3**

Question	Answer	Marks
2(c)	*Any two for 1 mark:* tidal; wave; water / hydro-electric; wind; sun / solar; geothermal; biofuels / bioethanol / biogas / wood;	**1**

Question	Answer	Marks
3(a)	*Any two from:* carbon monoxide; NOx; hydrocarbons;	**2**
3(b)	*Any three from:* not 100% efficient; carbon dioxide is released into the atmosphere (still harmful / pollutant); more vehicles in use; there are other sources of air pollution; named air pollutant;	**3**
3(c)	*Any three from:* use electric vehicles; energy efficiency; transport policies / named policy / taxation; use of bicycles; (development of) public transport; car sharing / car pooling;	**3**

Question	Answer	Marks
4(a)	separate into types of metal (owtte);	**1**
4b(i)	shaft mining / deep mining / subsurface mining;	**1**
4(b)(ii)	*Any two from:* Less land needed for mining more materials / less land clearance / less loss of habitat; Less air / water / noise / pollution (due to mineral extraction); More energy efficient to recycle; Metals are finite / mining is not sustainable;	**2**
4(c)(i)	Correct plotting at: 340 000 and 800 000; width and key;	**2**
4(c)(ii)	*Two from:* general increase; fluctuates; data comparison e.g.340 000 (1000) to 700 000 (1000) / 360 000 (1000) increase / reducing proportion;	**2**
4(c)(iii)	42.5 (%);	**1**
4(d)	*Three from:* legislation / limit extraction / quotas; Increase recycling points for metals; Sorting facilities at refuse sites; Tariffs / taxation / grants; education / raise awareness; pay / reward for recycling;	**3**

Question	Answer	Marks
5(a)	*Four from:* lowest growth rate north of Tropic of Cancer / south of Tropic of Capricorn / in Europe / North Asia; greatest rates south of the Tropic of Cancer / in Africa / between the tropics; comparison within a continent; 1000+% in West Asia / Middle East / North West Africa / North East, South America; reference to specific growth rates;; negative growth in two countries;	**4**
5(b)	*Three from:* *Impact:* greater demand for natural resources which reduces the availability of resources; *Reasons:* shortage of water due to industrial / domestic use / pollution; shortage of food causes soil erosion / soil exhaustion; increased deforestation / land use due to increase demand for land for agriculture / housing / industry; shortage / increased demand for energy due to increase use of fuel resources / power;	**3**
5(c)(i)	financial incentive; awards; named example;	**1**
5(c)(ii)	increase financial burden on services / named example;	**1**

Question	Answer	Marks
6(a)	74%;	1
6(b)	*Three from:* lack of infrastructure / pipes; remote locations / rural areas; lack of rainfall / water stores; insufficient money; water is contaminated / polluted / water-borne disease; population increase; conflict;	3
6(c) (i)	boiling; chlorination;	2
6(c) (ii)	*Three from:* bacterial disease / Vibrio cholerae; poor sanitation / e.g. open toilets; poor personal hygiene; faeces / waste (from infected person); through run off (to water source / ground water);	3
6(d)	*Two from:* frozen; remote location/ not near population; too deep; geology;	2

Question	Answer	Marks
7(a)	*Three from:* tectonic event / volcano; / earthquake / plate movement; causes sudden movement in ocean; creates large waves (reach land) / wave get larger as reaches shallow water / shore;	3

Question	Answer	Marks
7(b)	*Five from:* radiation released into the ocean; radiation in the air enters ocean through rain; radiation absorbed by (named) organism / all organisms; bioaccumulation; radiation retained in organism / egestion less than ingestion; description of build up of radiation in higher trophic levels / feeds on organisms containing radiation / moves up the food chain; large fish are a high trophic level;	**5**
7(c)	*Three from:* shortage of fossil fuels; not all countries have suitable renewable sites / not weather dependent; nuclear power stations do not emit carbon dioxide; energy dense source; takes less space to generate electricity compared to renewable sites; Increase in price of other sources; Increase in demand for electricity;	**3**

Question	Answer	Marks
8(a)(i)	58333;	**1**
8(a)(ii)	labelled axes; use of a suitable linear scale, data using at least half the grid; accurately plotted bars; bars of equal width;	**4**
8(a)(iii)	*Two from:* pest / disease; (competition from) non-native species; climate change / extreme weather; water extraction; acid rain;	**2**

Question	Answer	Marks
8(b)	*Extractive reserves:* prevents development in the area; only locals permitted to harvest in the area; harvesting / use of trees is sustainable; investment to maintain the security of the forest; *Seed Banks:* (wide range of) genetic material held; stored until suitable conditions are available; can be used in future plant breeding / increase genetic diversity; safe storage in case wild population destroyed;	**4**

Question	Answer	Marks
8(c)	*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:* 'Commercial forests often grow only one species of tree. Growing only one species of tree is bad for wildlife. This type of forest should be banned." *agree:* one species of tree does not support a diverse range of species reduced biodiversity extinction of species examples – e.g. orangutangs and palm oil plantations trees are genetically similar increasing risk of pest or disease less likely to deal with a change in weather conditions tree species may not be native to the area	**6**

Question	Answer	Marks
8(c)	*disagree:* demand for timber / crops is large forests are efficient way of producing crops therefore take up less land – leaving other land undisturbed without forests, sourcing materials would damage larger areas of forest – affecting habitats natural forest does not grow as efficiently as commercial forests forests provide employment and help the country's economy	

Cambridge Assessment International Education

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CANDIDATE NAME									
CENTRE NUMBER						CANDIDATE NUMBER				

2953702819

ENVIRONMENTAL MANAGEMENT **0680/13**

Paper 1 Theory **May/June 2024**

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 (KS) 341872

[Turn over

Section A

1 **(a)** Igneous and sedimentary are types of rock.

Complete the sentences about rocks.

An example of an igneous rock is .....

An example of a sedimentary rock is .....
[2]

(b) Describe the formation of a sedimentary rock.

.....

.....

.....

.....

.....

..... [3]

[Total: 5]

2 **(a)** The photograph shows irrigation of plants in a field.

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

..... [1]

(ii) State **two** reasons why this is an example of sustainable agriculture.

1 .....

.....

2 .....

.....

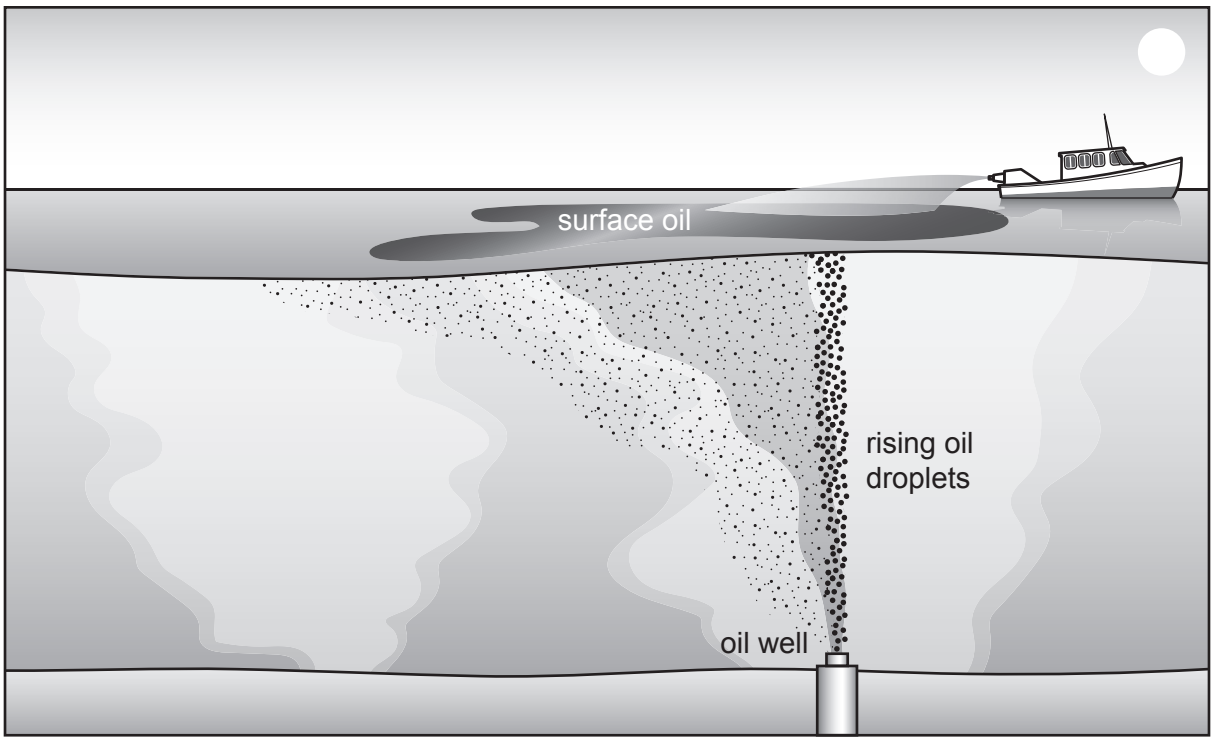
[2]

(b) State the process that releases water from plant leaves.

..... [1]

[Total: 4]

3 The diagram shows oil spilling from an oil well into the ocean.



(a) State the method of dealing with the oil spill shown in the diagram.

..... [1]

(b) State **two** other methods of dealing with oil spills on the ocean surface.

1 .....

2 .....

[2]

(c) State **three** impacts of oil pollution on marine ecosystems.

1 .....

.....

2 .....

.....

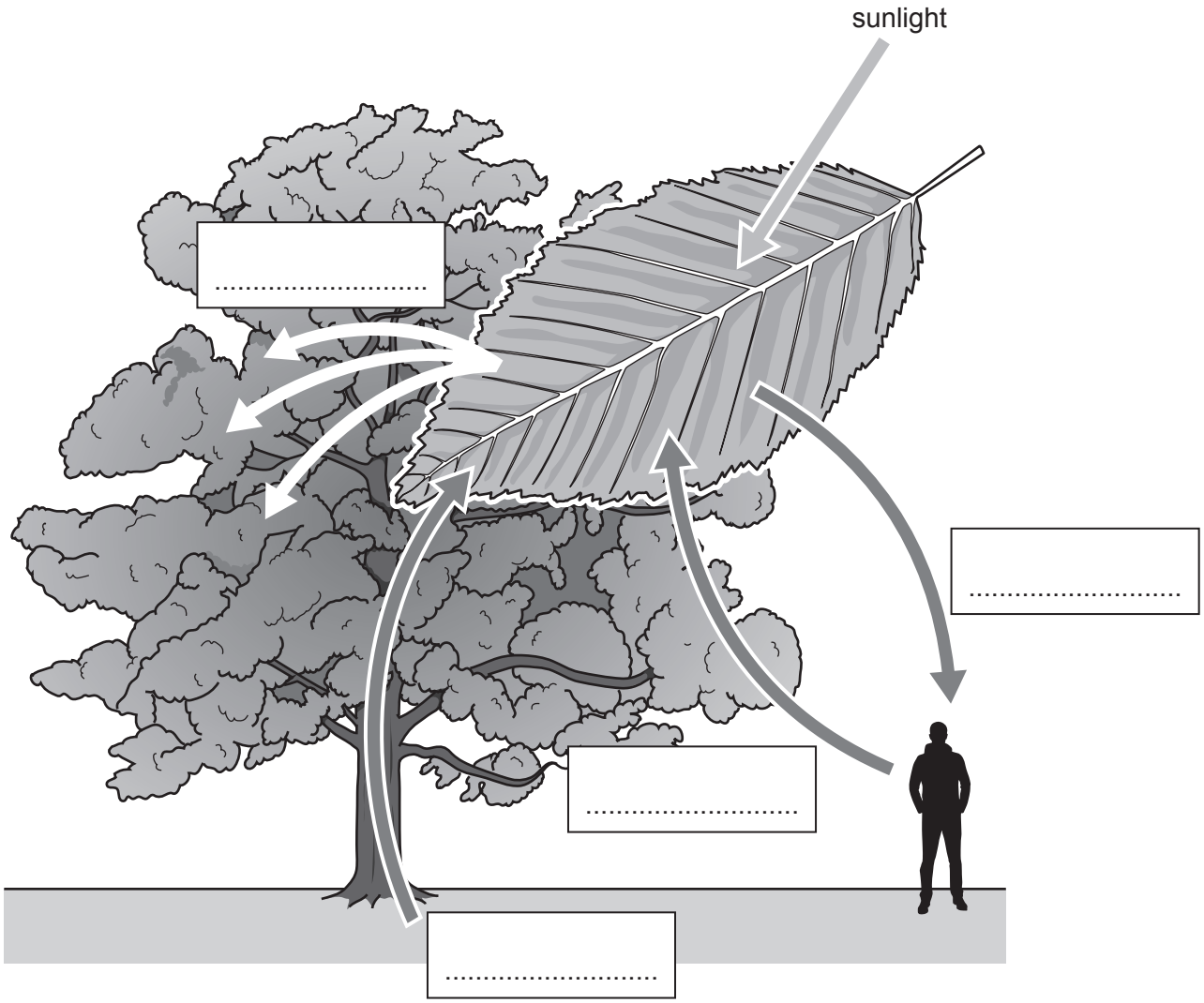
3 .....

.....

[3]

[Total: 6]

4 The diagram shows the process of photosynthesis.



(a) Complete the labels on the diagram. [2]

(b) State the green pigment found in leaves.

..... [1]

(c) Humans take in oxygen.

State the process that uses oxygen in living cells.

..... [1]

(d) State why trees are a carbon sink.

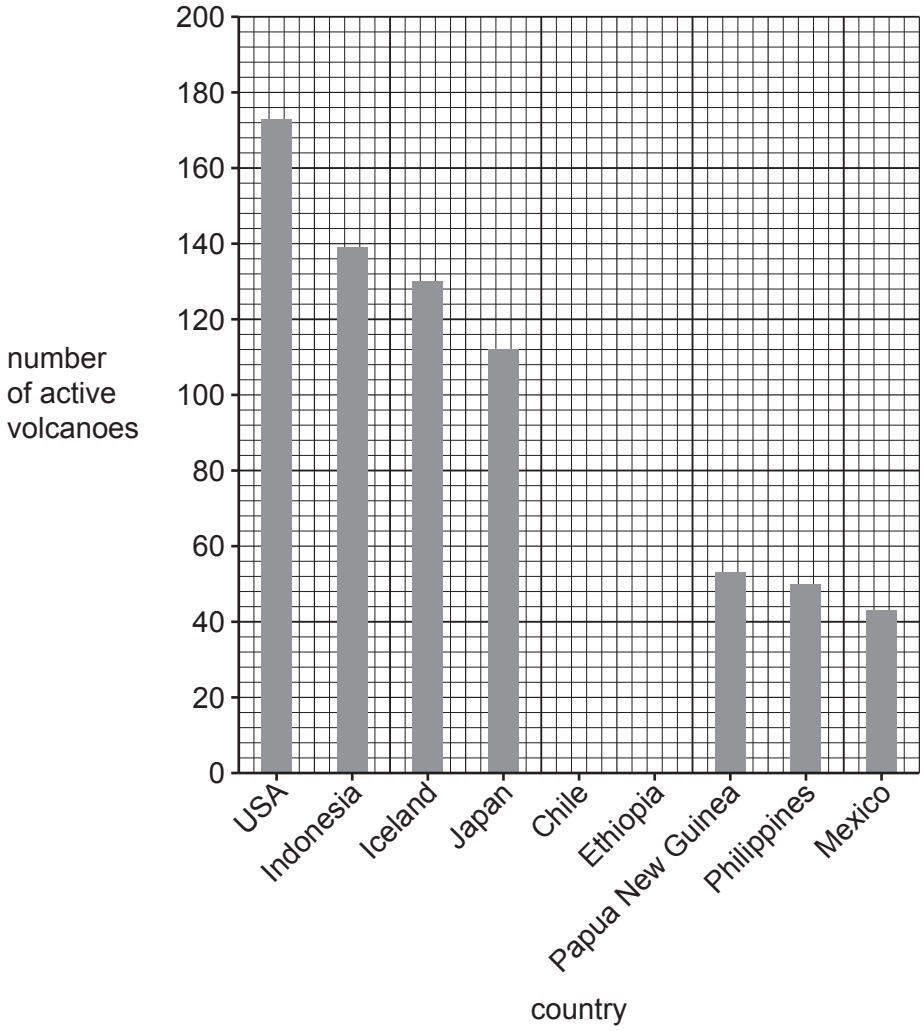
.....

..... [1]

[Total: 5]

Section B

5 The bar chart shows the number of active volcanoes in some countries.



(a) Complete the bar chart using the data in the table.

country	Chile	Ethiopia
number of active volcanoes	104	58

[2]

(b) Volcanoes erupt when magma rises to the Earth's surface from the mantle.

Explain how tectonic plate movement causes magma to rise to the Earth's surface.

.....

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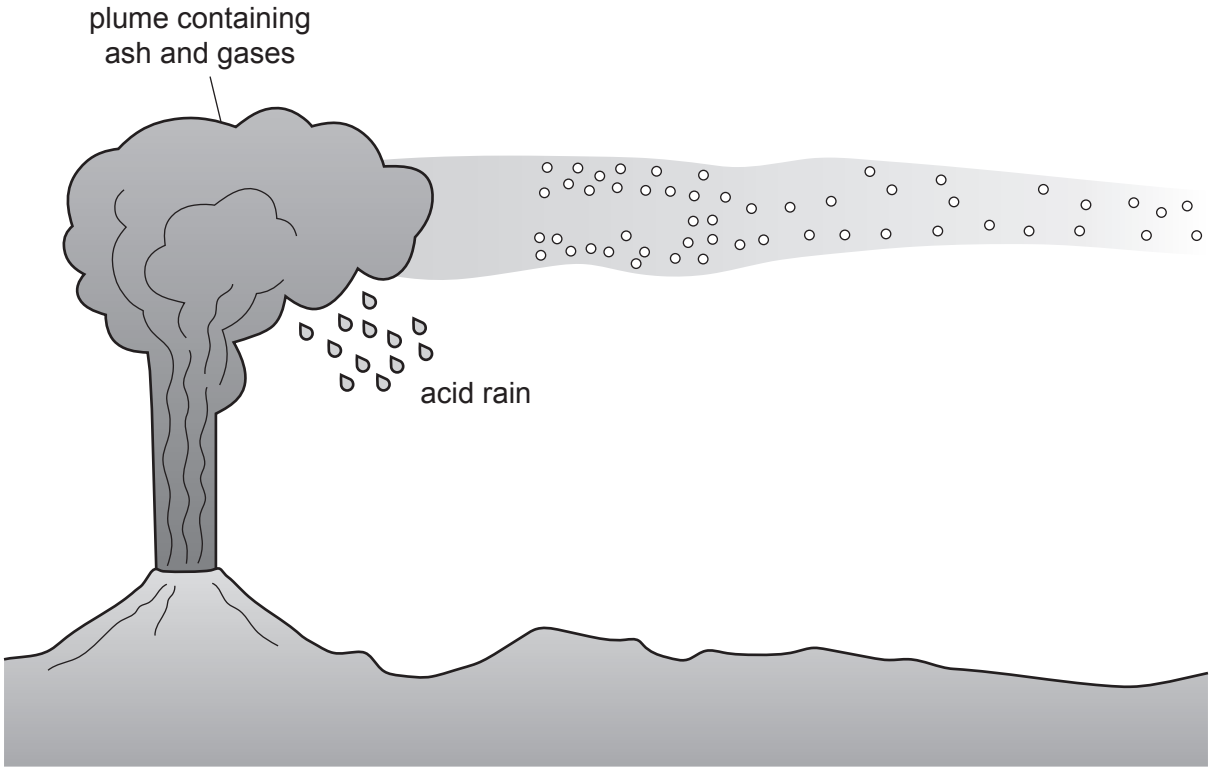
..... [4]

(c) The diagram shows a volcano erupting.



The table shows information about four volcanic eruptions.

volcanic eruption	plume height / km	volume of material in plume / km^3
Kilauea	less than 0.1	0.000001
Stromboli	0.1 to 1.0	0.00001
Galeras	1 to 5	0.001
Mount St. Helens	more than 25	1.0

(i) A student concludes that the Mount St. Helens eruption has a greater impact on the atmosphere than the Stromboli eruption.

Use the data to suggest if the student's conclusion is correct. Give reasons for your answer.

.....

.....

.....

..... [2]

(ii) The table shows information about the volcanic eruption index, VEI.

VEI is a measure of the explosiveness of a volcanic eruption.

VEI	0	1	2	3	4	5	6	7	8
volume of plume / km^3	less than 0.00001	more than 0.00001	more than 0.001	more than 0.01	more than 0.1	more than 1.0	more than 10.0	more than 100.0	more than 1000.0

State the VEI for Kilauea.

..... [1]

(iii) The table shows information about two earthquakes, A and B.

earthquake	**Richter magnitude**
A	2
B	4

Explain how the magnitude of earthquake A compares to the magnitude of earthquake B.

.....

.....

.....

.....

.....

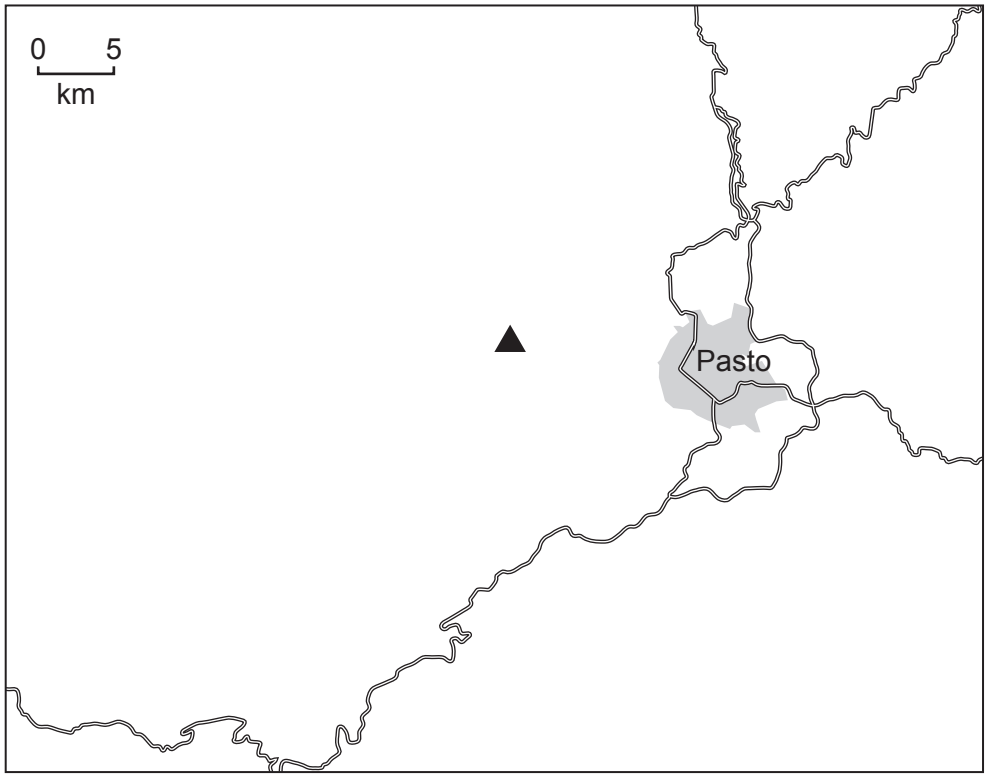
..... [3]

(iv) The map shows the location of the Galeras volcano.

Key

▲ volcano

major roads



Suggest why people living in Pasto are worried about the Galeras volcano.

.....

.....

.....

.....

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..... [2]

(v) Volcanic eruptions can cause acid rain.

Describe the formation of acid rain.

.....

.....

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.....

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.....

.....

..... [4]

(d) Suggest why many farmers grow crops near volcanoes that can erupt.

.....

.....

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..... [2]

(e) More economically developed countries (MEDCs) use strategies to manage the impact of earthquakes before they happen.

Explain these strategies.

.....

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..... [5]

[Total: 25]

6 **(a)** Complete the following statements about a typhoon.

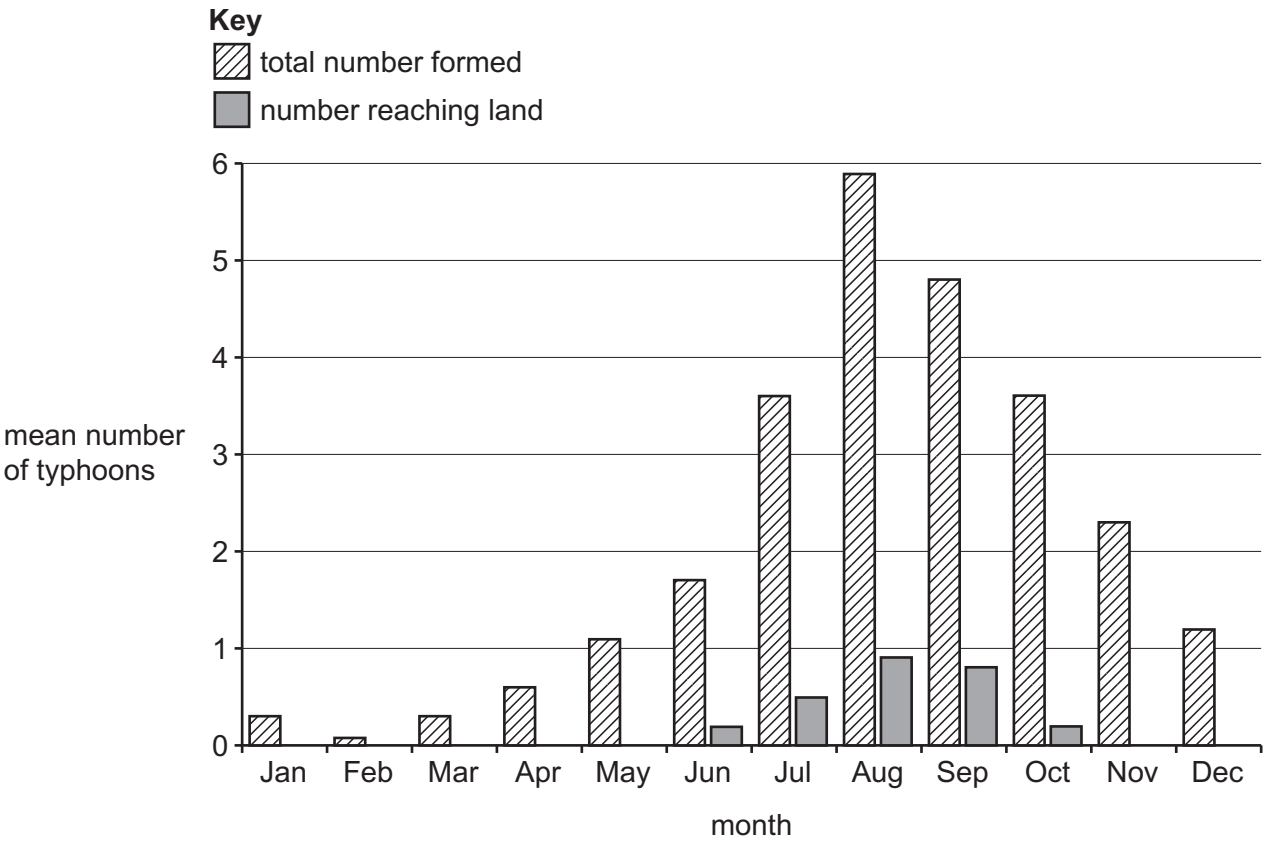
A typhoon can only form above the ocean between ……. and ……. degrees north or south of the Equator.

The ocean must be at least ……. m deep.

The surface temperature of the ocean must reach ……. °C.

[3]

(b) The graph shows data about typhoons near Japan.



(i) State the month when typhoons are most likely to form.

..... [1]

(ii) State between which months typhoons reach land.

…… and …… [1]

(iii) Estimate the percentage of the total number of typhoons formed that reach land in September.

Circle **one** percentage.

7% **17%** **27%** **37%**

[1]

(iv) Many typhoons are predicted to reach Japan.

Suggest **two** reasons why some of these typhoons do **not** reach Japan.

1 .....

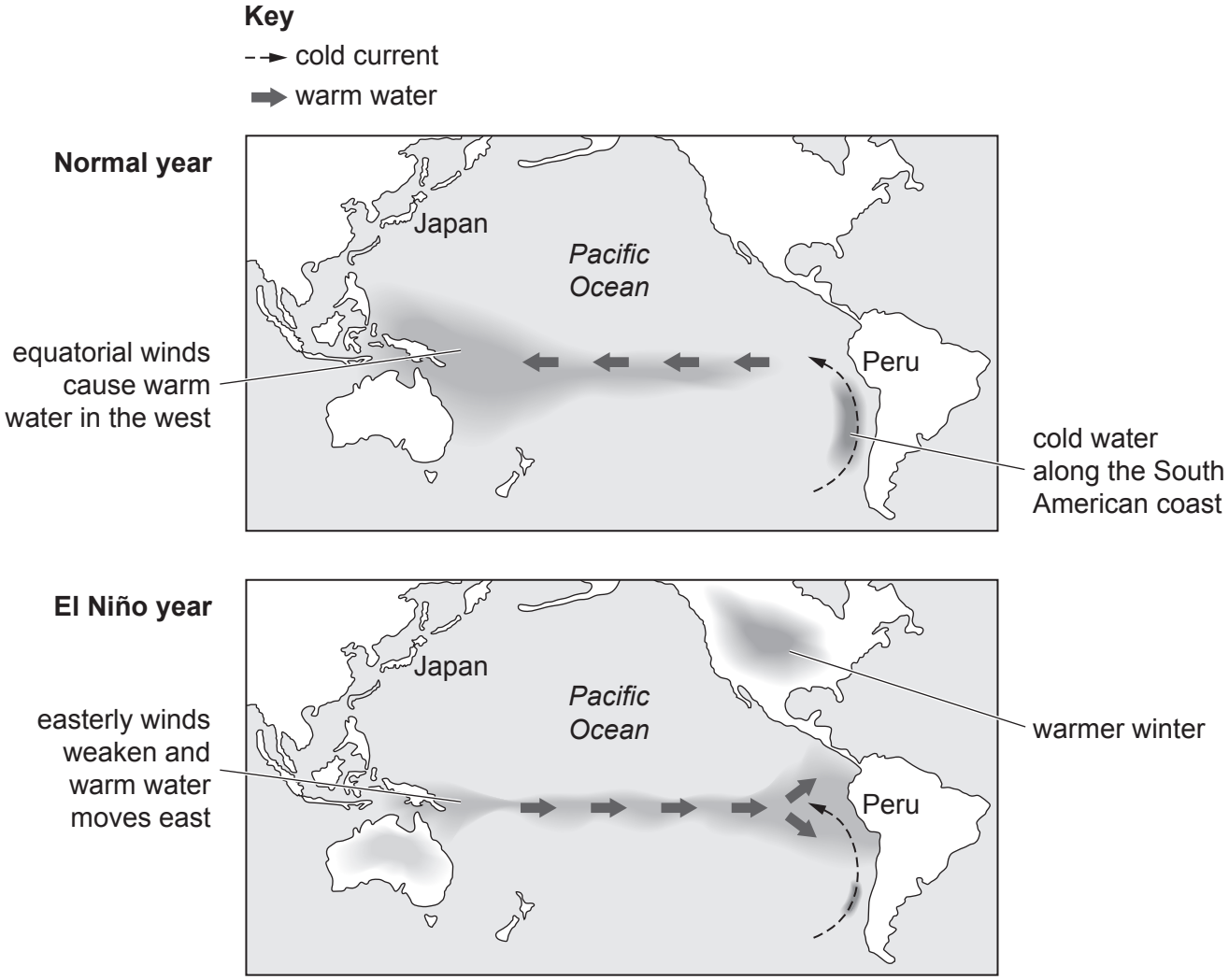
.....

2 .....

.....

[2]

(c) The diagram shows the change in the (surface) water temperature in the Pacific Ocean in a normal year and an El Niño year.



(i) Suggest how an El Niño year affects the number of typhoons expected to reach Japan.

Give reasons for your answer.

.....

.....

.....

..... [2]

(ii) Suggest **one** impact of El Niño on the people living in Peru.

.....

..... [1]

[Total: 11]

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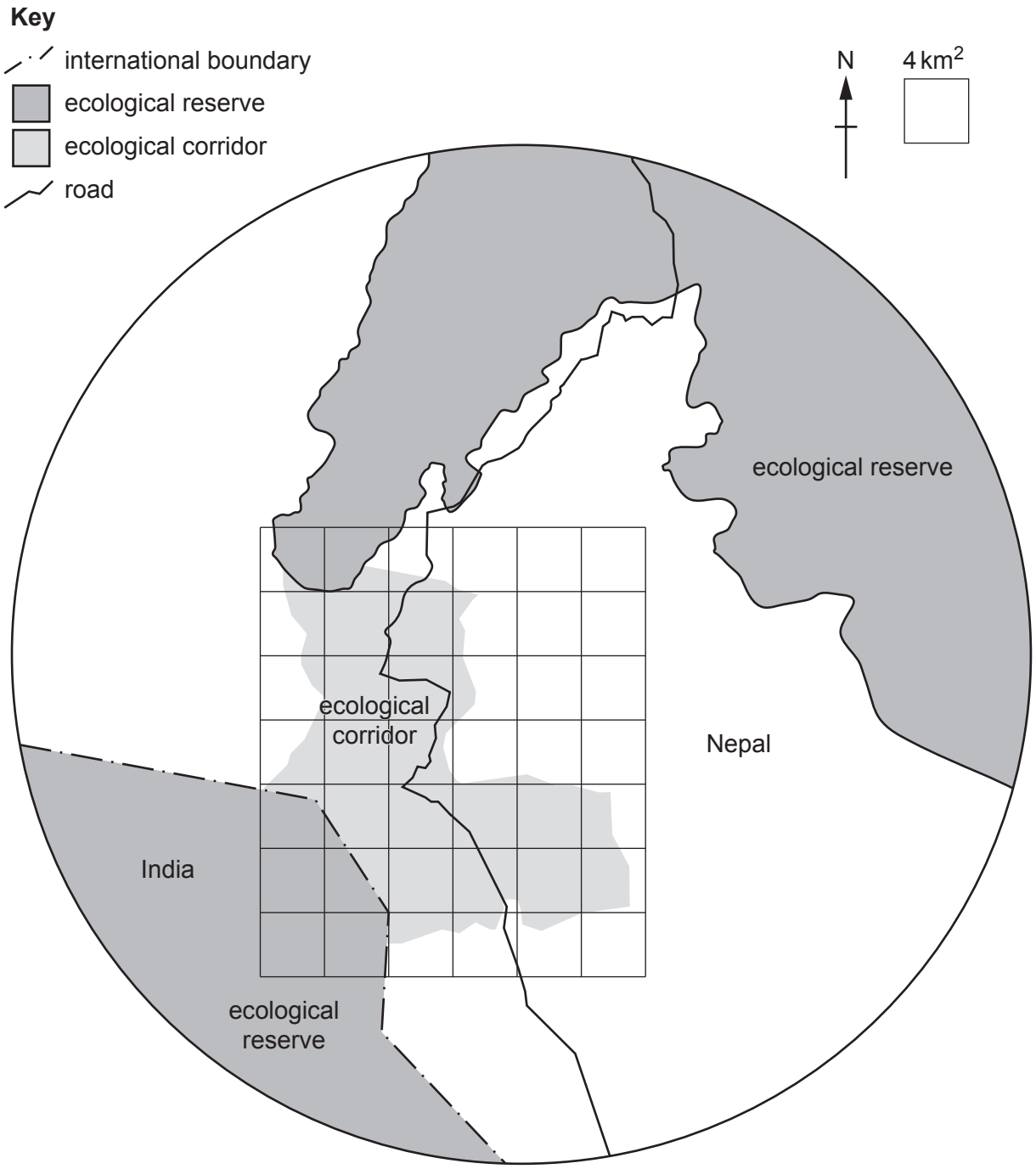
7 The map shows a corridor between ecological reserves in both Nepal and India.



(a) Use the scale to estimate the area of the corridor.

Show your working.

..... km^2 [2]

(b) Suggest why an international agreement was needed to set up the corridor shown on the map.

.....

..... [1]

(c) A reforestation programme began in 2000 when the corridor was created.

Local people were employed to plant trees.

Local people have seen an increase in tigers in the corridor.

There has also been an increase in the tiger population in both reserves.

(i) Explain the benefits to tigers of connecting the two ecological reserves by a corridor.

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..... [3]

(ii) Ecotourists visit the reserves to see the tigers. The ecotourists stay in houses in villages in the corridor.

Suggest reasons why this type of ecotourism is a sustainable activity.

.....

.....

.....

..... [2]

[Total: 8]

8 **(a)** The table shows ten countries with the most nuclear reactors in power stations in 2022.

country	nuclear reactors in power stations
Canada	19
China	28
France	58
India	21
Japan	43
Russia	34
South Korea	24
UK	16
Ukraine	15
USA	99

(i) State the number of countries that have more than 30 nuclear reactors in power stations.

..... [1]

(ii) State the fuel used in a nuclear reactor in a power station.

..... [1]

(iii) Suggest why nuclear power is a non-renewable energy resource.

.....

..... [1]

(iv) State **two** other non-renewable energy resources.

1 .....

2 .....

[2]

(v) Suggest **two** reasons why many countries do **not** have nuclear power stations.

1 .....

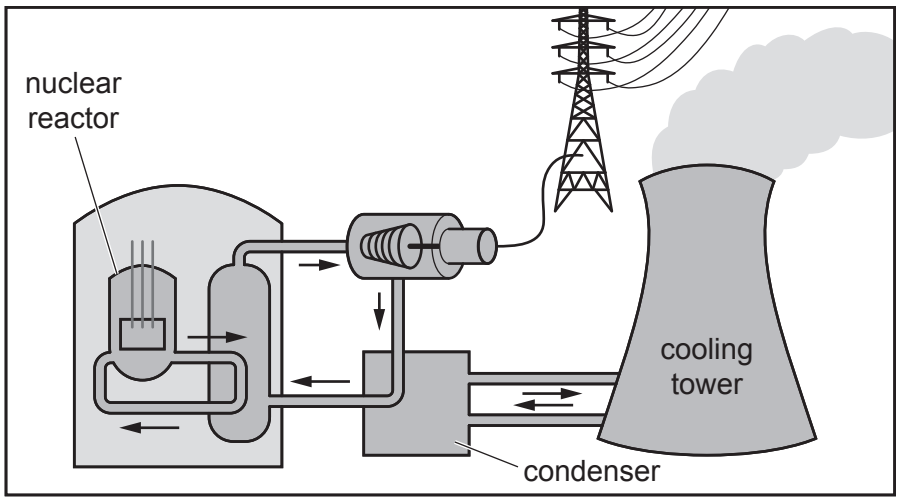
.....

2 .....

.....

[2]

(b) The diagram shows a nuclear power station generating electricity.



Describe how this power station generates electricity.

.....

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.....

..... [3]

(c) A student says:

> Building more nuclear power stations is the best way of reducing the world's carbon dioxide emissions.

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

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..... [6]

[Total: 16]

CAMBRIDGE
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ENVIRONMENTAL MANAGEMENT **0680/13**

Paper 1 Theory **May/June 2024**

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 2024 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 descriptions 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)	(igneous) basalt / granite ; (sedimentary) limestone / sandstone / shale ;	**2**
1(b)	any three from : erosion of rock / weathering ; deposited in water / seas / riverbed ; in layers ; compacted / under pressure, (to form rock) ;	**3**

Question	Answer	Marks
2(a)(i)	trickle drip ;	**1**
2(a)(ii)	any two from : water only given directly to plants/roots ; less water evaporation (from soil) ; water source lasts longer / less wastage ; less /no (risk of) salinisation / water logging ; less (risk of) erosion (by run off) ;	**2**
2(b)	transpiration ;	**1**

Question	Answer	Marks
3(a)	detergent (sprays) ;	**1**
3(b)	booms ; skimmers ;	**2**

Question	Answer	Marks
3(c)	any three from: kills fish / kills (sea) birds / marine mammals ; prevents light reaching producers / phytoplankton ; damages / kills coral reefs ; damage to beaches / mangroves ; disrupts food chain ;	**3**

Question	Answer	Marks
4(a)	carbon dioxide oxygen water glucose ;;	**2**
4(b)	chlorophyll ;	**1**
4(c)	respiration ;	**1**
4(d)	trees take in / absorb carbon dioxide ;	**1**

Question	Answer	Marks
5(a)	bar plotted correctly for Chile ; bar plotted correctly for Ethiopia ;	**2**
5(b)	any four from : plates move apart / constructive boundary ; plates pushed under another / destructive boundary / subduction ; rock / plate melts / becomes magma ; movements caused by convection currents ; magma / molten rock behaves as a liquid ; magma lighter than solid rock ; (so magma rises) through vents ;	**4**

Question	Answer	Marks
5(c)(i)	any two from : MSH higher (plume) height ; more (eruptive) volume ; so more emissions / ash / gas; travels longer distance ;	**2**
5(c)(ii)	0 *;*	**1**
5(c)(iii)	B has a greater / higher / larger (magnitude than A) ; B more risk / level of danger 100 x greater magnitude / each level is 10x increase in magnitude ;	**3**
5(c)(iv)	any two from : people live close to the volcano / estimated distance / not enough time to evacuate ; (The ash cloud / plume) could make them ill / respiratory problems / death ; damage property / infrastructure/ roads / crops ;	**2**
5(c)(v)	any four from : sulfur dioxide ; nitrogen oxides / NOx ; dissolve in water / react with ; (to form) sulfuric acid ; nitric acid ;	**4**
5(d)	any two from : limited land suitable for farming ; soil is rich in minerals / do not need fertilisers / fertile soil ; risk to life / crops is low ;	**2**

Question	Answer	Marks
5(e)	any five from: land zoning / town planning regulations (to avoid construction in high risk areas) ; buildings made to resist earthquakes ; so less collapse / risk of killing people ; disaster preparation / rapid response teams/medical aid/food and shelter ; effective early warning systems / monitoring ; so people know to evacuate ; drills / preparation / plans ; so evacuation is safe / controlled/prevents panic ; people get to a safe area ;	**5**

Question	Answer	Marks
6(a)	5 and 20 (degrees) ; 60 (metres) ; 27(degrees) ;	**3**
6(b)(i)	August ;	**1**
6(b)(ii)	June and October ;	**1**
6(b)(iii)	17%;	**1**
6(b)(iv)	any two from : they change direction out at sea ; they do not have enough energy to remain typhoons / reduce to storm force ; predictions were incorrect ;	**2**

Question	Answer	Marks
6(c)(i)	any two from : fewer typhoons ; the sea not as hot (around / near Japan) / warmer water further away (from Japan) ; so it is not hot enough to form a typhoon / only forms storms ; typhoons move on a different track / typhoons move in an easterly direction ;	**2**
6(c)(ii)	fewer fish/heavy rainfall ;	**1**

Question	Answer	Marks
7(a)	any number from 16 to 20 ; correct multiplication / larger area 22 of number above ;	**2**
7(b)	It connects two different countries/cross border ;	**1**
7(c)(i)	any three from : Increased access to prey / water ; free movement of prey ; finding a mate / reproducing ; reduced chance of extinction ; maintain genetic diversity in the population / reduces inbreeding ; reduced disturbance by humans / larger habitat / territory ; gives a suitable habitat in the case of wildfires ;	**3**
7(c)(ii)	any two from: tourists have to live the same as local people / no hotels / accommodation built ; limited damage to environment / small scale ; local people can make money (so likely to help protect habitat/tigers) / helps fund conservation project ; can go on for a long time / future generations can still do it ;	**2**

Question	Answer	Marks
8(a)(i)	4 ;	**1**
8(a)(ii)	Uranium ;	**1**
8(a)(iii)	obtained from rocks / will run out / finite ;	**1**
8(a)(iv)	any two from : coal ; oil ; (natural) gas ;	**2**
8(a)(v)	any two from: lack of funds/too expensive to build ; lack of expertise to build ; other cheaper non-renewables available ; plenty of other energy available ; lack of access to nuclear materials / uranium ; public opinion / produces toxic waste ; lack of suitable location ;	**2**
8(b)	any three from : Uranium / fuel decays (giving off heat) ; water warmed / boils / heated ; turns to steam ; steam turns / rotates / spins turbine ; turbine turns / powers generator ;	**3**

Question	Answer	Marks
8(c)	*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* agree does not produce carbon dioxide fuel does not contain carbon not a fossil fuel not weather dependent established technology energy dense fuel 24 / 7 supply of energy	**6**

Question	Answer	Marks
8(c)	disagree Uranium is a non-renewable resource/finite limited number of safe sites for nuclear power need a large supply of water waste disposal a problem with nuclear power risk of radiation leaks change to electric cars rather than oil will give a bigger reduction other resources are easier / quicker to build other sources of energy that release carbon dioxide renewable energy sources don't produce carbon dioxide and are safer than Uranium alternative renewable energy sources would be better	