Cambridge Assessment International Education

Cambridge IGCSE™

CANDIDATE NAME									
CENTRE NUMBER						CANDIDATE NUMBER				

9792532772

ENVIRONMENTAL MANAGEMENT **0680/11**

Paper 1 Theory **May/June 2022**

1 hour 45 minutes

You must answer on the question paper.

No additional materials are needed.

INSTRUCTIONS

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

INFORMATION

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

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

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Section A

1 The photograph shows a bund.

(a) Use the photograph to explain why some farmers use bunds.

.....

.....

.....

..... [2]

(b) Describe how the bund in the photograph is constructed.

.....

..... [1]

(c) Suggest **one** disadvantage of bunds.

.....

..... [1]

[Total: 4]

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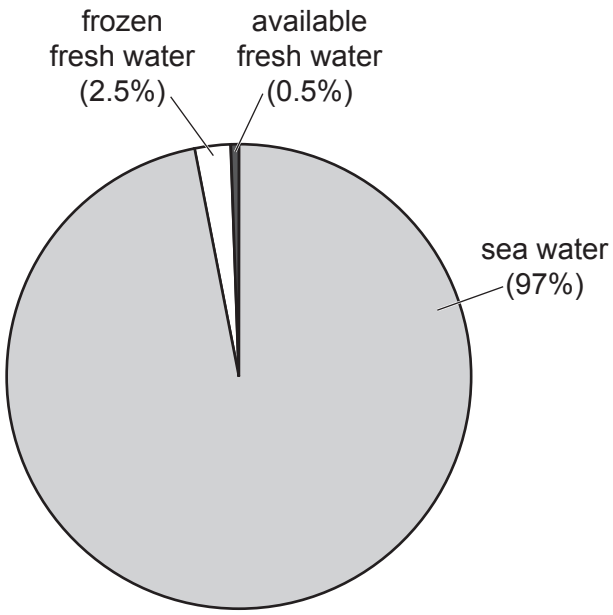
2 The pie chart represents all the water on Earth.



(a) Use the pie chart to calculate the total percentage of fresh water on Earth.

..... % [1]

(b) State **two** sources of fresh water.

1 .....

2 .....

[2]

(c) Suggest how the availability of fresh water may change as the population of the world increases.

.....

.....

.....

.....

.....

..... [3]

[Total: 6]

3 The photograph shows a boom being used to deal with an oil spill.

(a) Use the photograph to describe how the boom is used to deal with the oil spill.

.....

.....

.....

..... [2]

(b) State **two** other methods of dealing with oil spills.

1 .....

2 .....

[2]

(c) State **one** impact of oil spills on birds.

..... [1]

[Total: 5]

4 **(a)** Complete the description of the formation of sedimentary rocks using words from the list.

Each word may be used once, more than once or not at all.

crystallisation	**deposition**	**erosion**
sedimentation	**transportation**	**weathering**

Water in streams and rivers carries small particles of rock and sand. This process is called ..... .

Eventually, the particles reach a lake or the sea, and they sink to the bottom. This process is called ..... .

Over time, the particles build up in layers. The bottom layers are compressed, and the particles stick together to form rock. This process is called ..... .

[3]

(b) State the name of **one** sedimentary rock.

..... [1]

(c) State **one** characteristic of a sedimentary rock.

..... [1]

[Total: 5]

Section B

5 The oceans are a valuable resource. They can be used to generate electricity and to provide food.

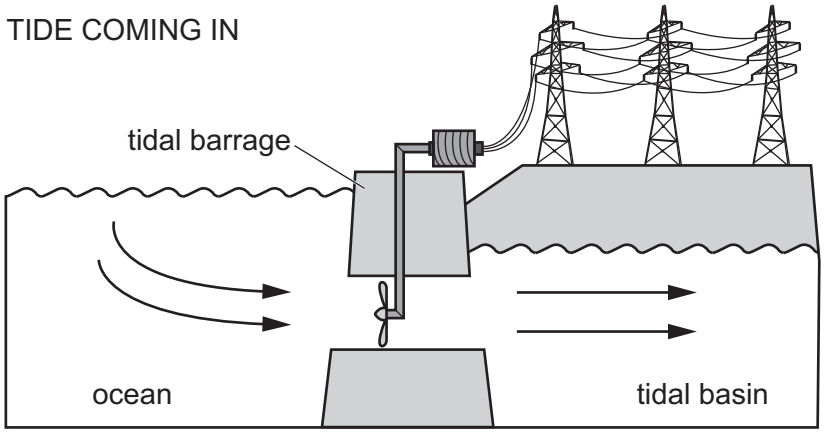
(a) State **two** other ways the oceans are a valuable resource.

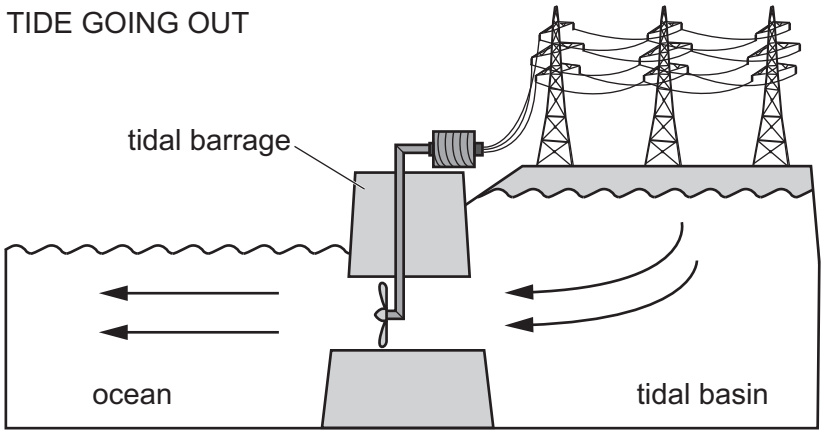
1 .....

2 .....

[2]

(b) The diagrams show how a tidal barrage is used to generate electricity.





Use the diagrams to describe how a tidal barrage is used to generate electricity.

.....

.....

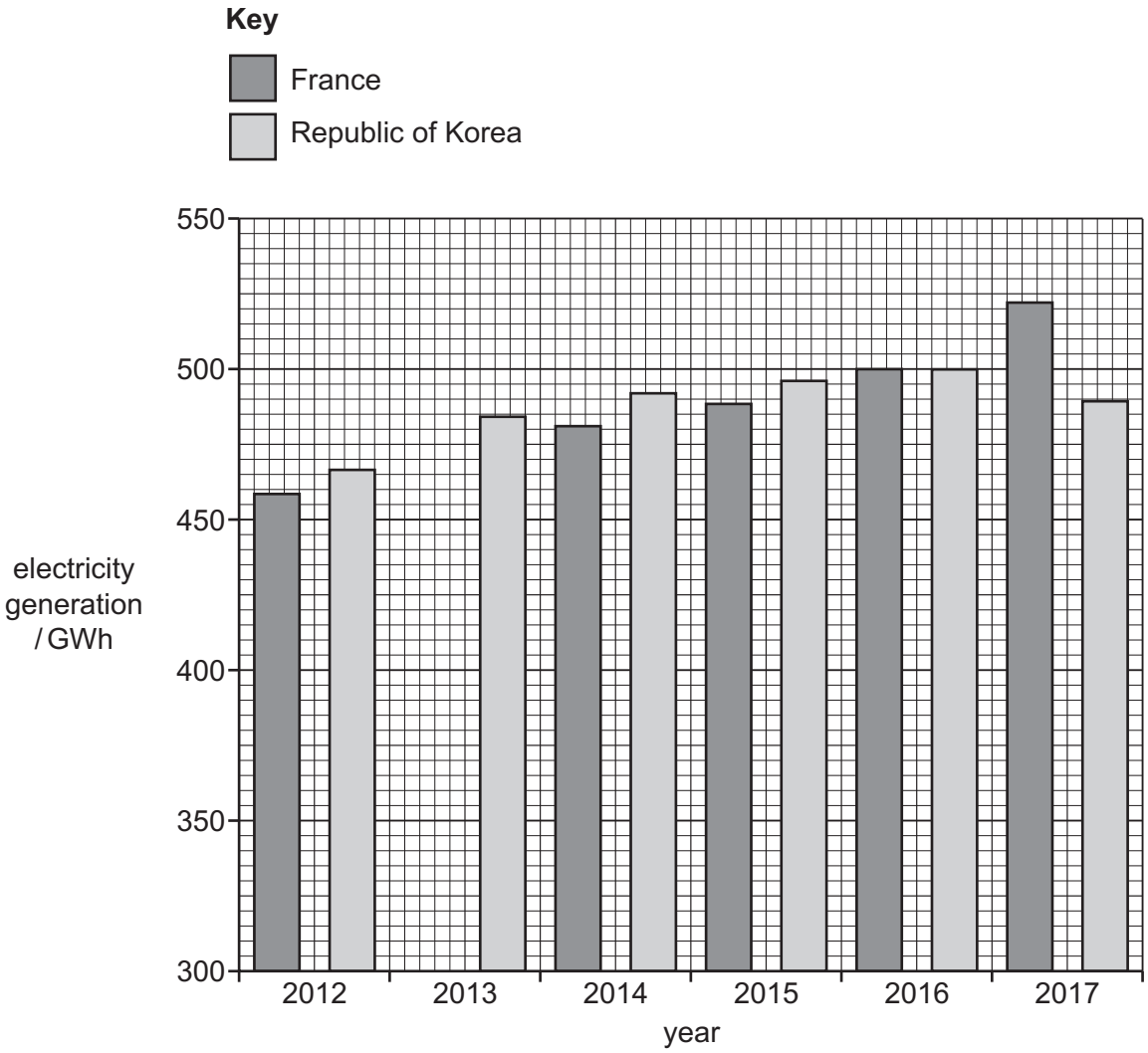
.....

.....

.....

..... [3]

(c) The bar chart shows the amount of electricity (GWh) generated by tidal power stations in France and the Republic of Korea from 2012 to 2017.



(i) Complete the bar chart to show that France generated 410 GWh of electricity in 2013. [1]

(ii) State which year France generated more electricity than the Republic of Korea.

..... [1]

(d) (i) Tidal power is a renewable source of energy.

State **one** other benefit of tidal power generation.

..... [1]

(ii) Describe **one** environmental impact of tidal power generation.

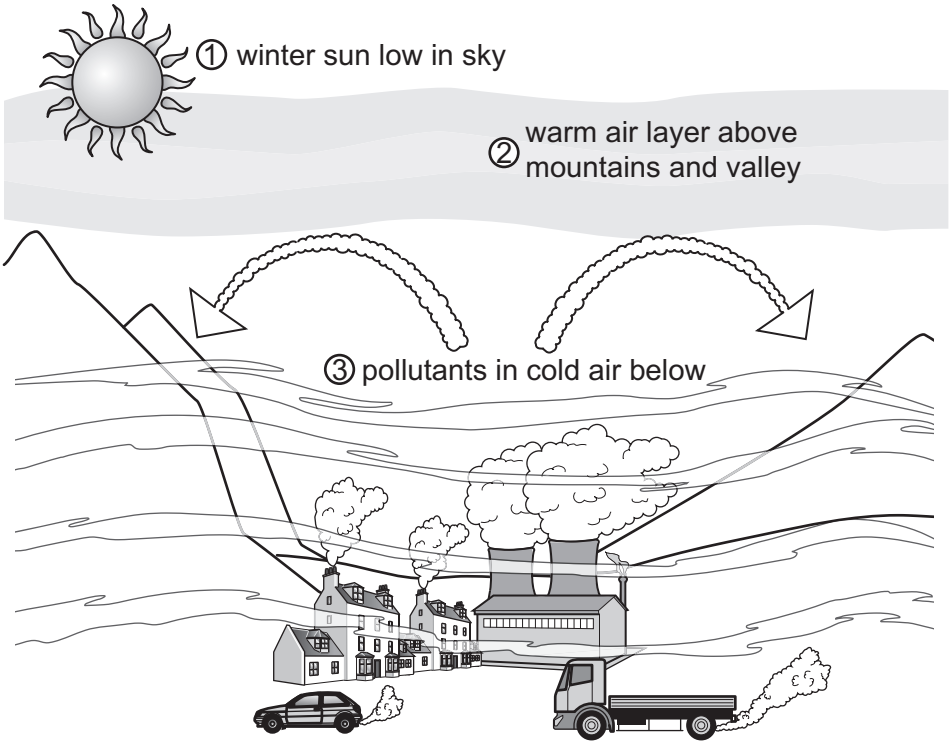
.....

.....

..... [2]

[Total: 10]

6 **(a)** The diagram shows features that may lead to the formation of smog.



(i) Use the diagram to describe how the features shown may lead to the formation of smog.

.....

.....

.....

.....

.....

..... [3]

(ii) State the names of **two** pollutants that form smog.

1 .....

2 .....

[2]

(b) Describe transport policies that governments can use to reduce atmospheric pollution in cities.

.....

.....

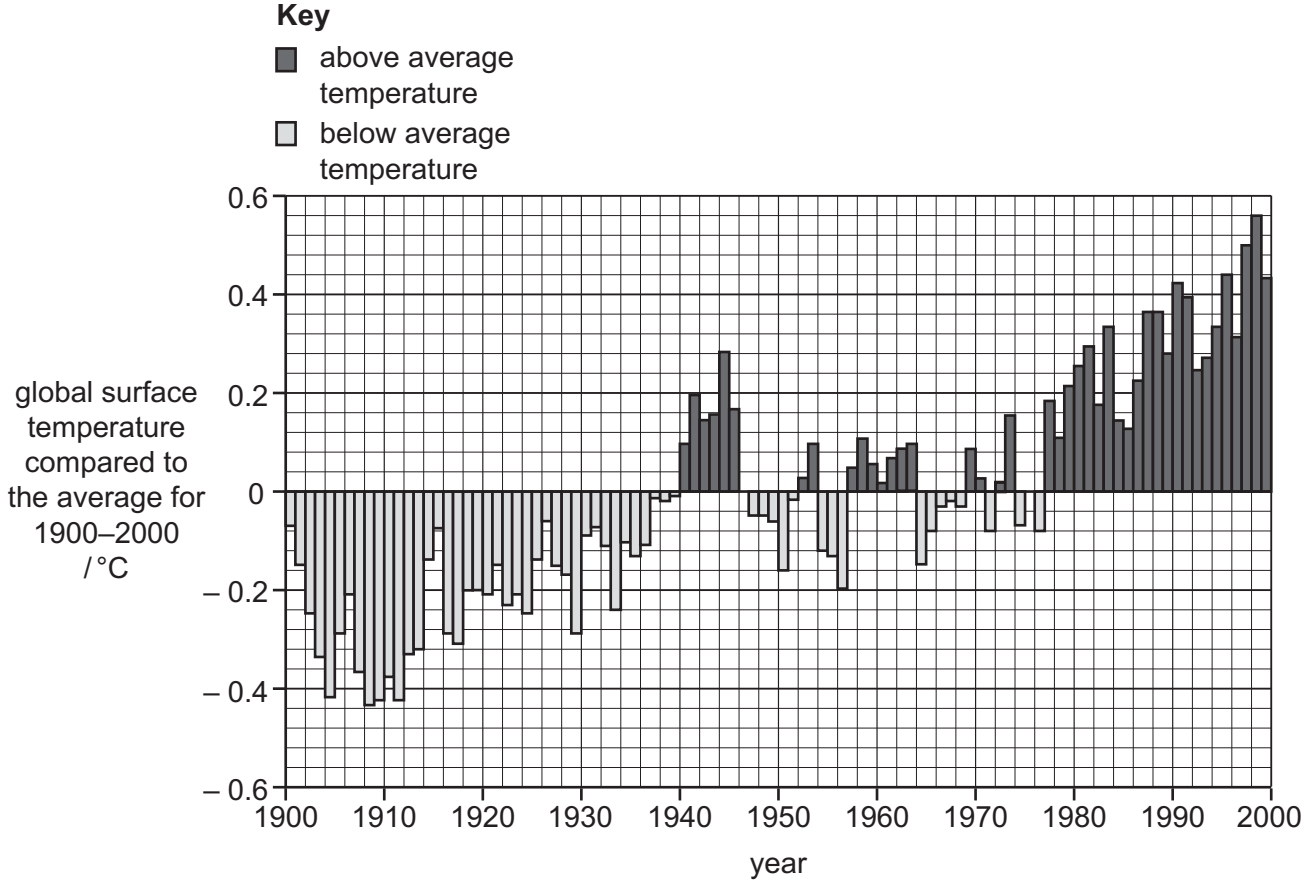
.....

.....

.....

..... [3]

(c) The bar chart shows annual variations in global surface temperatures compared to the average global surface temperature for 1900–2000.



(i) State the highest temperature above average shown on the bar chart.

..... °C [1]

(ii) Use the bar chart to describe the trends in global surface temperatures for 1900–2000.

.....

.....

.....

.....

.....

..... [3]

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(iii) Between 2000 and 2020, global surface temperatures increased.

Suggest the future impact on agriculture if global surface temperatures continue to increase.

.....

.....

.....

.....

.....

.....

.....

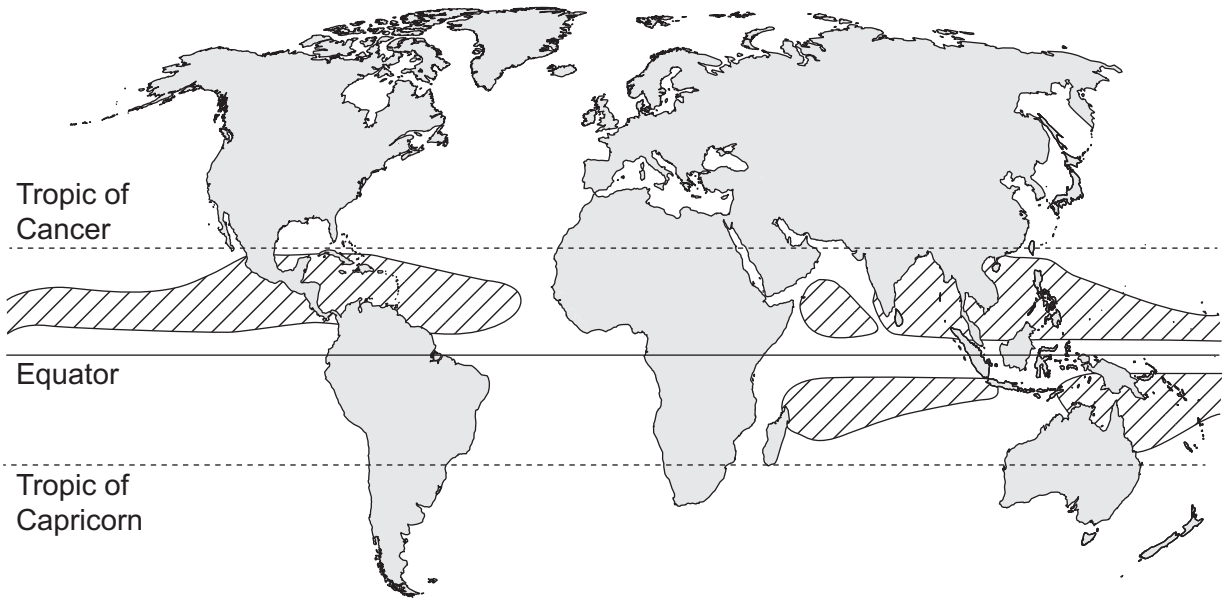
..... [4]

[Total: 16]

7 The world map shows areas where tropical cyclones form.

Key

areas where tropical cyclones form



(a) (i) Describe the distribution of areas where tropical cyclones form shown on the map.

.....

.....

.....

.....

.....

..... [3]

(ii) State **two** ocean conditions required for tropical cyclones to form.

1 .....

2 .....

[2]

(b) The table shows data on the number of tropical cyclones recorded in the 2018–2019 South Pacific cyclone season.

The tropical cyclones are classified in categories. The category depends on the maximum wind speed of the tropical cyclone.

category	maximum wind speed / km per hour	number of tropical cyclones recorded
1	119–153	2
2	154–177	2
3	178–208	1
4	209–251	1
5	>251	0

Calculate the percentage of tropical cyclones recorded with wind speeds greater than 177 km per hour.

..... % [2]

(c) (i) State **three** impacts of a tropical cyclone.

1 .....

2 .....

3 .....

[3]

(ii) Describe strategies for managing the impacts of a tropical cyclone.

.....

.....

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.....

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..... [3]

[Total: 13]

8 A student reads a blog about extractive reserves in the Amazon rainforest of Brazil.

> Extractive reserves in Brazil are protected areas of the Amazon rainforest. Local tribes and communities are given the right to use the land for subsistence farming and traditional practices. Other people are not allowed to access the land without permission.
>
> The idea of extractive reserves came from environmentalists, who wanted to help conserve the Amazon rainforest and ensure sustainable use of natural resources.
>
> The first reserve was established in 1983 and covered an area of 2 845 km^2. More reserves were created in 1990 to add an extra area of 21 630 km^2. An additional area of 22 008 km^2 was established in 1992. In 1997, a further eleven reserves were created, adding 25 108 km^2.

(a) (i) Present the data from the blog in a suitable table to show the total area (cumulative) of extractive reserves in Brazil in each of the years listed.

[3]

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(ii) Suggest ways that extractive reserves benefit local tribes and communities.

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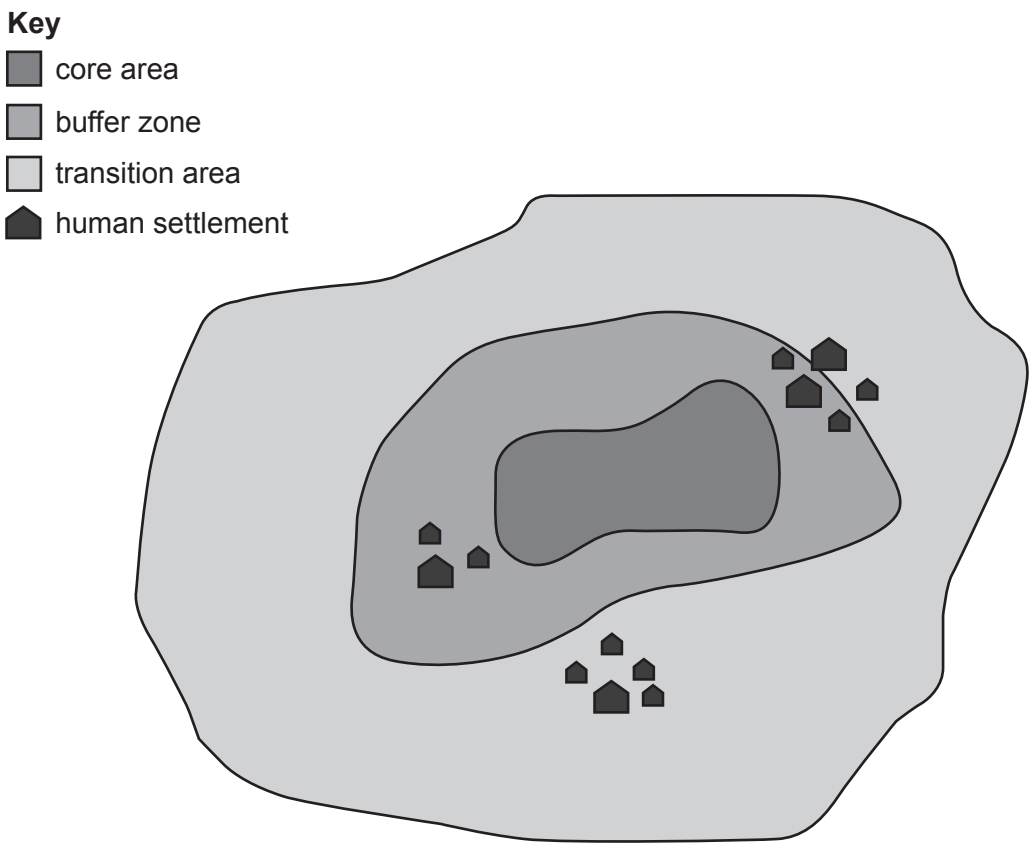
..... [3]

(b) Biosphere reserves are similar to extractive reserves.

Biosphere reserves have three main zones: the core area, the buffer zone and the transition area.



Explain the functions of the three main zones of a biosphere reserve.

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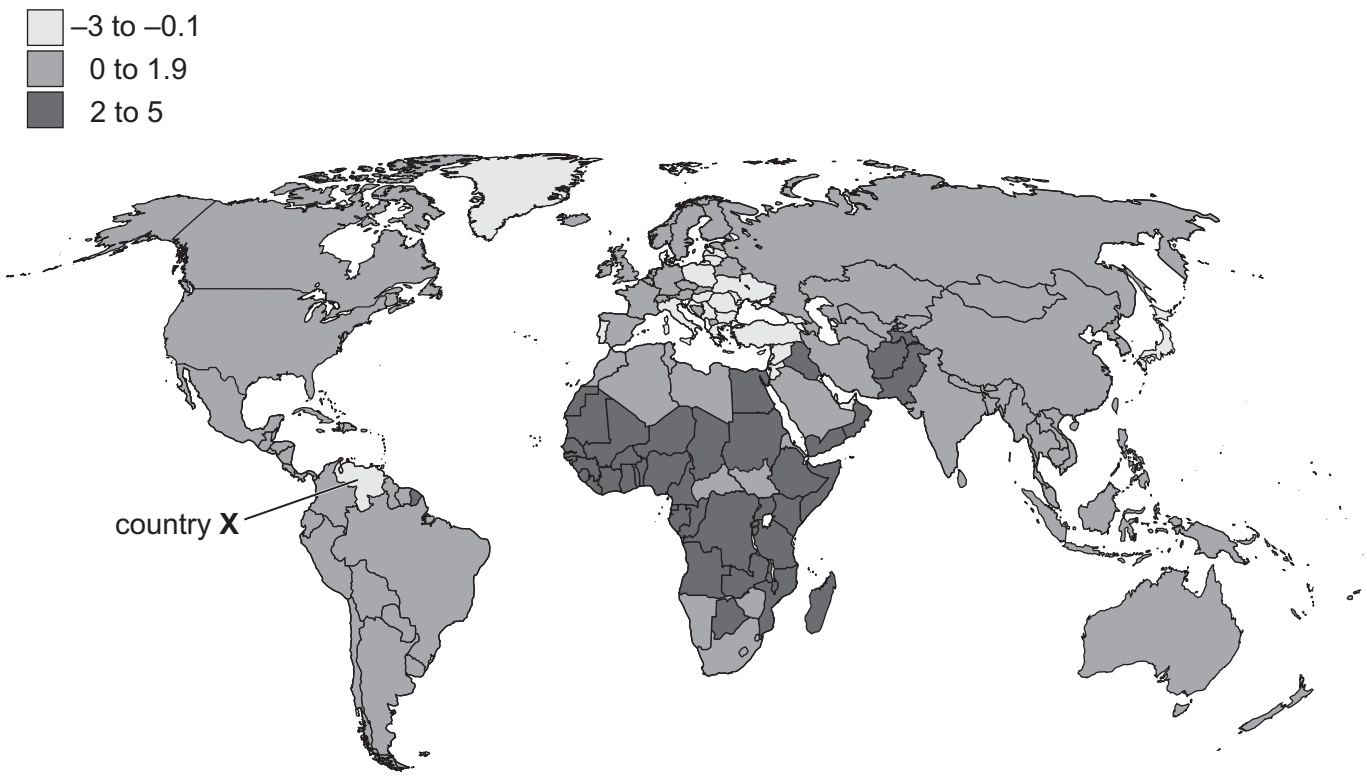
..... [3]

[Total: 9]

9 **(a)** The world map shows the average annual percentage population growth rate by country for 2015–2020.



(i) State the name of the **continent** with the highest average annual percentage population growth rate for 2015–2020.

..... [1]

(ii) Use the map to explain how the population of country **X** changed in 2020.

.....

.....

.....

..... [2]

(b) Suggest **one** reason why birth rates are often low in more economically developed countries (MEDCs).

.....

..... [1]

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(c) The population of a country can decrease because of migration.

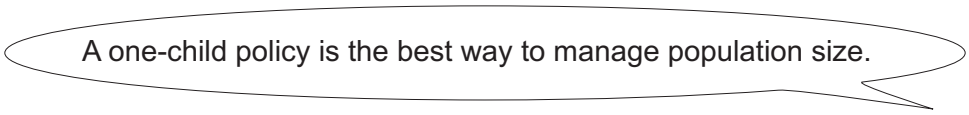
State **two** reasons why people migrate.

1 .....

2 .....

[2]

(d) A student says:



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

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..... [6]

[Total: 12]

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ENVIRONMENTAL MANAGEMENT **0680/11**

Paper 1 Theory **May/June 2022**

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 2022 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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[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.

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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.

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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.

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Question	Answer	Marks
1(a)	*any two from:* to hold / capture / store water / keep(in the field); to collect surface run-off; / rainwater; irrigation/ to increase water infiltration / absorption; to prevent soil erosion / plant / minerals being washed away;	**2**
1(b)	*any one from:* idea of raising up the soil e.g. ridge / line / mound; built along contour lines;	**1**
1(c)	*any one from:* hard physical work; time-consuming; needs to be maintained;	**1**

Question	Answer	Marks
2(a)	3.0 ;	**1**
2(b)	*any two from:* aquifers; lakes; wells; rivers; reservoirs; rainfall; oasis; desalination plants;	**2**

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Question	Answer	Marks
2(c)	*any three from:* **reduce due to:** greater consumption (by people) ; (used by) industry / domestic; pollution of water sources; global warming / temperature rise / greater evaporation; climate change / less rainfall / drought; **increase due to:** technological advances; glaciers / ice sheet / permafrost melting;	**3**

Question	Answer	Marks
3(a)	boom (ends) connected to / towed by boats; boom, surrounds / collects / traps, oil spill;	**2**
3(b)	*any two from:* skimmers; dispersants / detergent;	**2**
3(c)	*any one from:* coats feathers so, unable to fly / may sink / cannot retain heat; disruption to the food chain / web; death / poisoning / kills if eaten;	**1**

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Question	Answer	Marks
4(a)	transportation; deposition; sedimentation;	**3**
4(b)	shale / limestone / sandstone; AVP	**1**
4(c)	layered / contains (rounded) grains / may contain fossils;	**1**

Question	Answer	Marks
5(a)	*any two from:* transport; tourism; source of, chemicals / building materials / minerals; desalination for fresh water;	**2**
5(b)	*any three from:* difference in water level causes water to flow; flow of water causes turbine to spin; (turbine) drives a generator; converts kinetic energy to electrical energy / electricity; works in both directions / as tide comes in AND as tide goes out;	**3**
5(c)(i)	bar chart completed correctly to 410 GWh;	**1**
5(c)(ii)	2017;	**1**
5(d)(i)	*any one from:* predictable / consistent / not weather dependent; (machine / barrage has) long life span; low running cost;	**1**

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Question	Answer	Marks
5(d)(ii)	*any developed impact for two marks, e.g.:* floods mudflats; which causes erosion; disrupts food chains; results in habitat loss / change; disrupts tidal flow / acts as a barrier; which restricts fish spawning / migration; causes collision risk ; disrupts food chains; increases siltation; so less light for photosynthesis by aquatic plants; results in habitat loss / change; AVP;;	**2**

Question	Answer	Marks
6(a)(i)	*any three from:* houses / factories / vehicles, emit pollutants / gases; winter / low sun provides less warmth to Earth's surface; (temperature) inversion / warm air layer, holds cold air near ground; cold air is denser and unable to rise; pollutants trapped (by the inversion); mountains and valleys increase strength of inversion;	**3**
6(a)(ii)	*any two from:* volatile organic compounds / (VOC); sulphur oxides; carbon monoxide; smoke / soot / particulate matter; ozone;	**2**

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Question	Answer	Marks
6(b)	*any three from:* encourage use of public transport / cycles / walk; encourage use of electric vehicles; introduce taxation of fuels / lower tax on alternative transport ; (introduce / use legislation) to have vehicle emissions filters / regular testing; introduce / use congestion charges / pedestrian zones; encourage people to work at home;	**3**
6(c)(i)	0.56;	**1**
6(c)(ii)	*any three from:* 1900 to 1939 below average; 1900 to 1939 decreased then increased; 1940 to 1976 fluctuating; 1977 to 2000 above average; 1977 to 2000 increasing; overall increase in temp;	**3**
6(c)(iii)	*any four from:* higher temperature means: longer growing season; faster growth rate of plants; crops can be grown in higher latitudes / at greater altitude; plants preferring cool climates will have less geographic range; regional change in type of plants grown; melting of ice / glaciers / permafrost (meaning rise of sea-level); causing flooding and loss of agricultural land; faster evaporation; causing water shortages / drought; changes in atmospheric circulation / weather patterns; some areas too dry for / limits agriculture; some areas become too hot for / limits / reduces agriculture; favourable conditions for increase in pests; favourable conditions for increase in diseases;	**4**

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Question	Answer	Marks
7(a)(i)	between 5 ° and 20 ° north and south of the Equator / between tropics; *any two from:* North of the Equator in the Atlantic Ocean; in the Indian Ocean; in the Pacific Ocean; north of Australia; AVP;	**3**
7(a)(ii)	(surface) temperature of (at least) 27 °C; depth of (at least) 60 m;	**2**
7(b)	2 ÷ 6 × 100; 33(.3 %);	**2**
7(c)(i)	*any three from:* flooding; loss of life / injury; financial losses / loss of jobs / employment; damage to buildings / infrastructure; loss of crops / livestock; loss of habitats; water-related disease / unsafe water / contaminated water;	**3**
7(c)(ii)	*any three from:* monitoring / early warning to allow for; evacuation plans; (preparation of emergency) shelters; stockpiling of supplies / food / water / electricity generators; (preparation of) rescue teams; (preparation of) medical teams / supplies / support; design of buildings / infrastructure, to withstand high winds / floods / storm surges; establishing communications; involvement of international aid agencies;	**3**

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Question	Answer	Marks
8(a)(i)	column or row headings: year, area; unit for area / km^2 in heading; four sets of area data recorded;	**3**
8(a)(ii)	*any three from:* right to follow traditional practices / way of life; continue fishing / hunting / gathering / farming; preserve their culture and way of life; prevent destruction of their environment / area e.g. deforestation; can live where ancestors lived ; reduce risk of infection from outside contact;	**3**
8(b)	*any three from:* idea of: different amounts of human activity allowed in each zone; **Core area:** monitoring / research activities / no settlements / protect the ecosystem; **Buffer zone**: controlled / limited access for people / eco-tourism / recreation / research, / education and training / some limited settlements / local tribes / communities ; **Transition area**: research / tourism / recreation / greater settlements / controlled human activities e.g. sustainable farming;	**3**

Question	Answer	Marks
9(a)(i)	Africa;	**1**
9(a)(ii)	(population) decreased; (because average annual percentage population growth) rate was, negative / –3 to –0.1;	**2**
9(b)	*any one from:* greater use / availability of contraception; more awareness of family planning; women focus more on education / career (and so have children later in life); people get married later in life; high cost of raising children;	**1**

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Question	Answer	Marks
9(c)	*any two from:* economic migration: find work / employment; better standards of living / quality of life; better services / hospitals ; better education; poverty; environmental migration: natural disasters / flood / drought / earthquake; famine / crop failure; better climate; political migration: war / conflict / unrest; high crime rate; (religious) persecution; social migration: family ties;	**2**

Question	Answer	Marks
9(d)	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:* A one-child policy is the best way to manage population size. *agree:* simple, straightforward easy to manage more freedom for women better education for female children financial benefits for family state benefits given: extra land, free homes irrigation higher pensions cheap loans	**6**

Question	Answer	Marks
9(d)	better government jobs priority service at hospital subsidised education longer maternity leave more jobs became available more food became available more housing available more land available *disagree:* creates mandatory contraception and sterilisation creates gender imbalance emphasis on boys / abandonment of girls increase in orphanages mainly for girls difficult to enforce in rural communities elderly had less support young have large burden of care for ageing parents severe penalties: large fines property seized jail applied inconsistently: government officials wealthy can be exceptions: rural families allowed two children some ethnic minorities allowed three children birth defects learning disabilities unexpected tragedies Twins / multiple births both parents from only child households financial burden for government tin administration	

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Question	Answer	Marks
9(d)	other strategies might be better e.g. two-children policy still results in population decrease	

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CANDIDATE NAME									
CENTRE NUMBER						CANDIDATE NUMBER				

7274544302

ENVIRONMENTAL MANAGEMENT **0680/12**

Paper 1 Theory **May/June 2022**

1 hour 45 minutes

You must answer on the question paper.

No additional materials are needed.

INSTRUCTIONS

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Section A

1 Rocks and minerals needed for building can be extracted from the ground by open-pit mining.

(a) State **one** environmental impact of open-pit mining.

..... [1]

(b) Describe how rock and mineral extraction can benefit the local community.

.....

.....

.....

..... [2]

(c) The photograph shows an area of land that was used for open-pit mining.

The land has been restored.

Use the photograph to describe how this land has been restored.

.....

.....

.....

..... [2]

[Total: 5]

2 **(a)** The photograph shows bycatch on a prawn-fishing boat.

Explain what the fisherman is doing with the bycatch in the photograph.

.....

.....

.....

..... [2]

(b) **(i)** Describe the environmental impacts of overfishing.

.....

.....

.....

..... [2]

(ii) State **two** strategies that can be used to reduce overfishing.

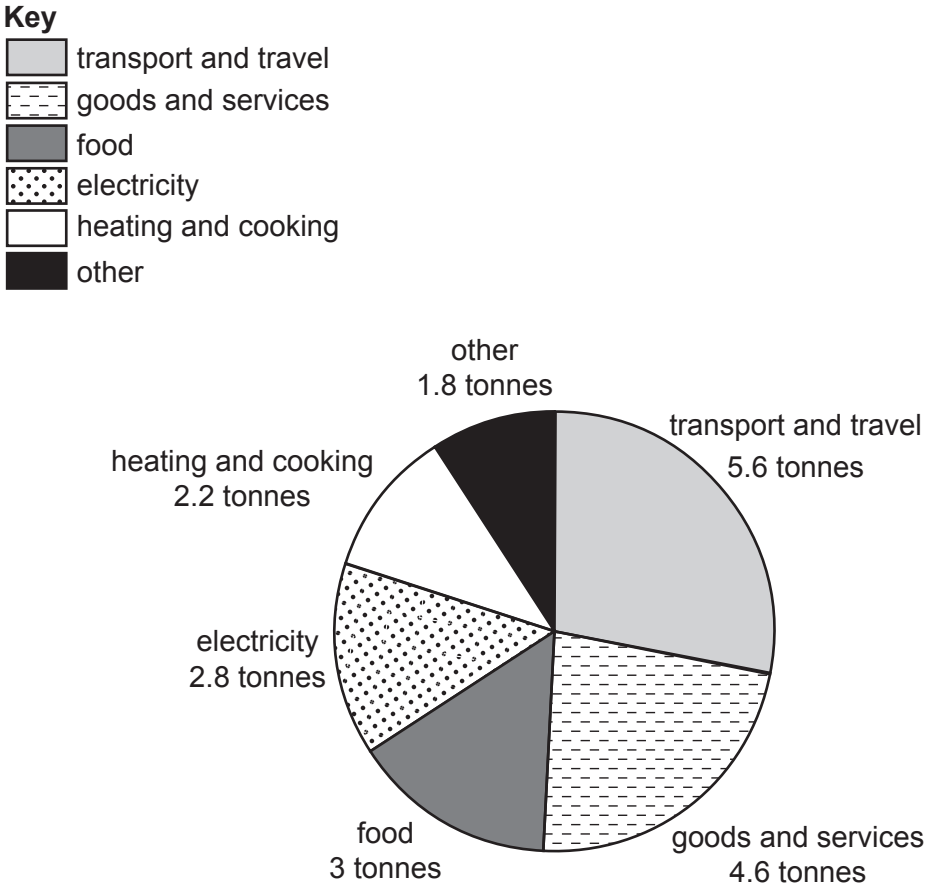
1 .....

2 .....

[2]

[Total: 6]

3 **(a)** The pie chart shows the annual carbon footprint for the average U.S. citizen by sector.



(i) State which sector makes the largest contribution to the annual carbon footprint.

..... [1]

(ii) Calculate the total annual carbon footprint in tonnes for the average U.S. citizen.

..... tonnes [1]

(iii) Calculate the percentage contribution of the electricity sector.

..... % [1]

(b) Suggest strategies that individuals can use to reduce their carbon footprints.

.....

.....

.....

..... [2]

[Total: 5]

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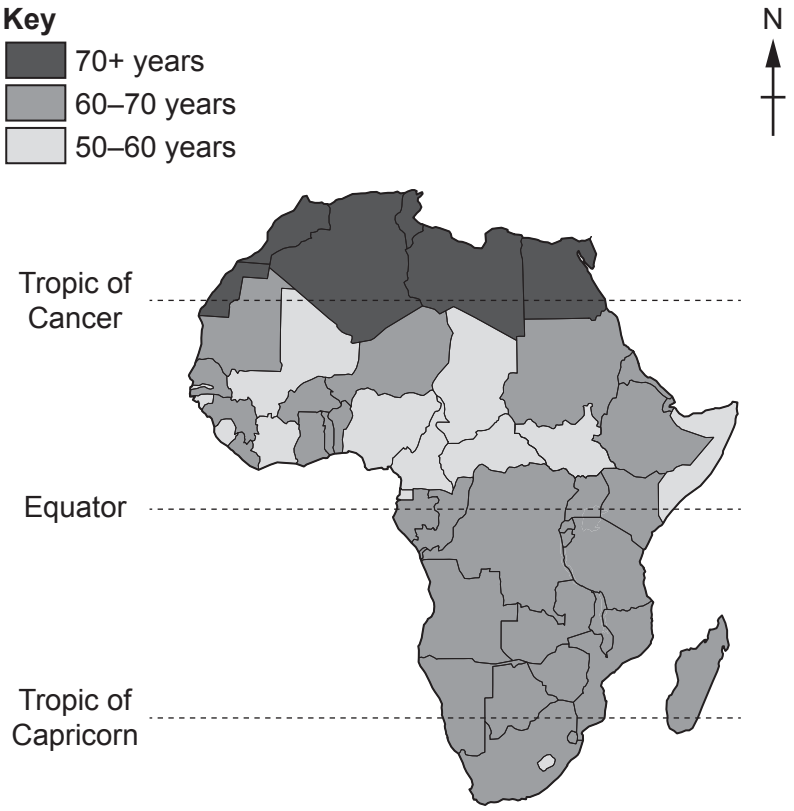
4 The map of Africa shows average life expectancy by country.



(a) Describe the distribution of average life expectancy in Africa.

.....

.....

.....

..... [2]

(b) Suggest why average life expectancy might change in the future.

.....

.....

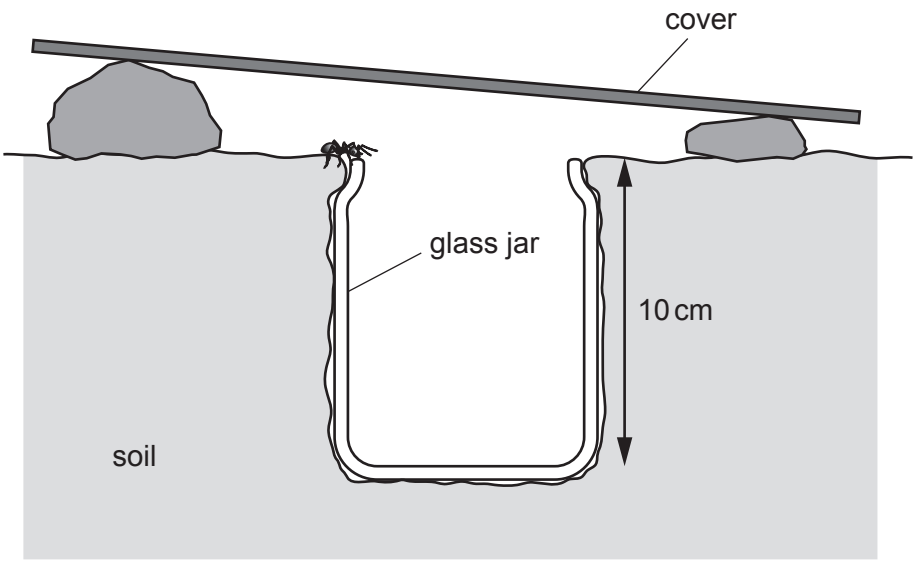
.....

..... [2]

[Total: 4]

Section B

5 The diagram shows a pitfall trap.



(a) (i) Describe how the pitfall trap shown in the diagram is used to sample organisms.

.....

.....

.....

.....

.....

..... [3]

(ii) Suggest **two** limitations of using this pitfall trap to sample organisms.

1 .....

.....

2 .....

.....

[2]

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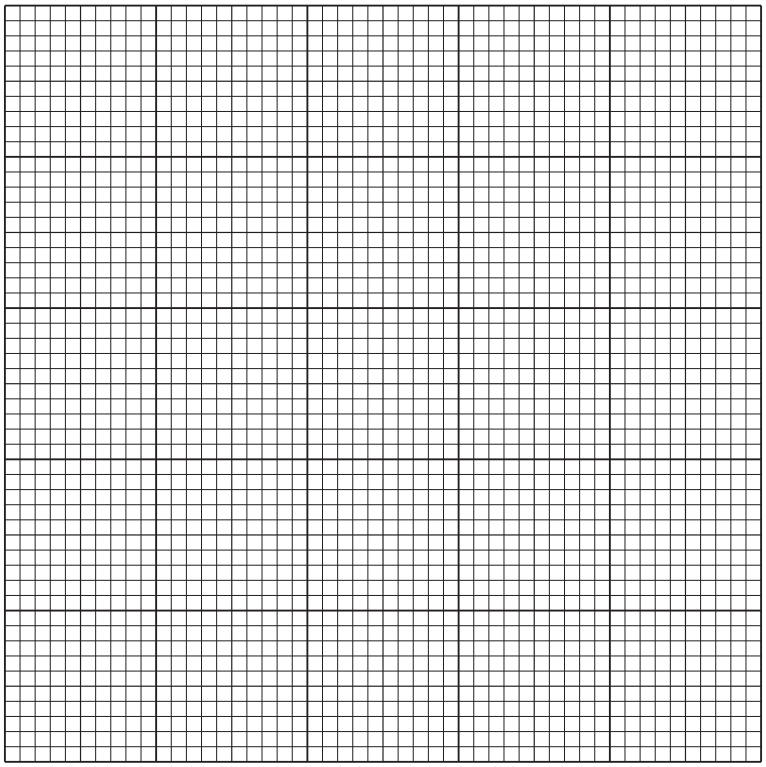
(b) The table shows organisms caught in five pitfall traps.

The table is **not** complete.

organisms	number of organisms					
	trap 1	**trap 2**	**trap 3**	**trap 4**	**trap 5**	**total**
ants	18	8	12	9	14	.....
beetles	1	4	0	2	0	7
centipedes	1	2	2	1	3	9
grasshoppers	0	1	1	0	1	3
spiders	2	3	4	3	3	15

(i) Complete the table to show the **total** number of ants. [1]

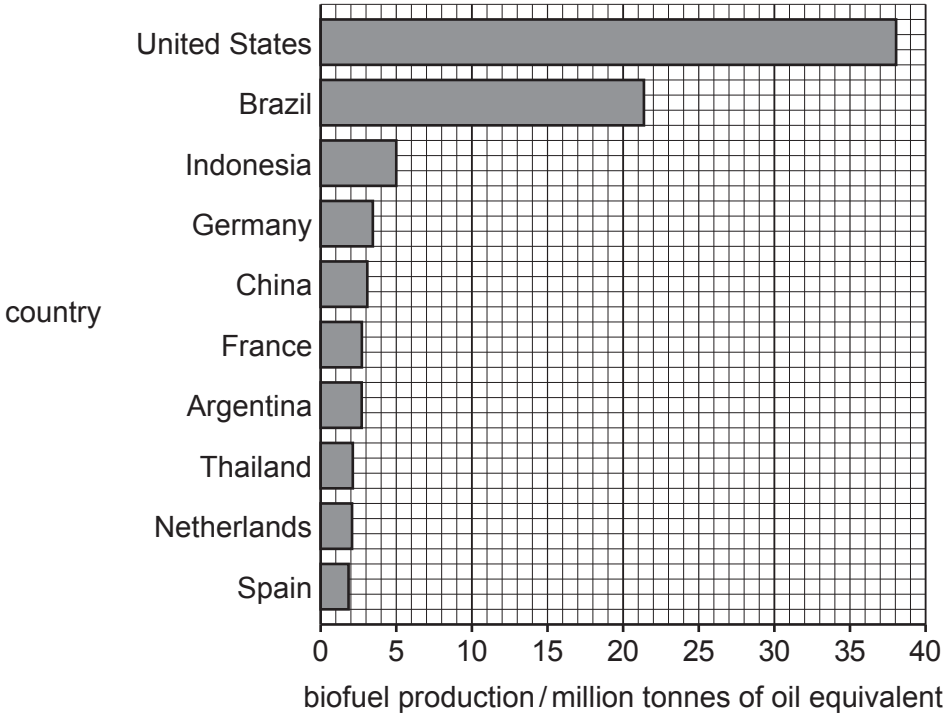
(ii) On the grid, plot a bar chart to show the number of each organism in **trap 2**.



[4]

[Total: 10]

6 **(a)** The bar chart shows the leading countries for biofuel production in 2018 (in million tonnes of oil equivalent).



(i) Use the bar chart to determine the biofuel production for Indonesia.

..... million tonnes of oil equivalent [1]

(ii) Suggest **two** advantages of using biofuel as an energy resource.

1 .....

.....

2 .....

.....

[2]

(iii) Suggest **one** disadvantage of using biofuel as an energy resource.

.....

..... [1]

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(iv) It is predicted that the U.S. will use approximately 36 billion gallons of biofuels and 140 billion gallons of gasoline for transport in 2022.

Suggest whether biofuels are a realistic replacement for gasoline in transport. Give reasons for your answer.

.....

.....

.....

.....

.....

..... [3]

(b) A student reads an internet article on electric vehicles.

> Worldwide, the use of electric vehicles has increased rapidly.
>
> In 2013, there were approximately 250 000 electric cars in the world.
>
> In 2018, there were more than 5.1 million electric cars in the world. The number of electric two-wheelers was 260 million, and there were 460 000 electric buses. In freight transport, there were 250 000 light-commercial vehicles (LCVs) and 1000 electric trucks.

(i) Present the data from the article in a suitable table to show the number of each type of electric vehicle in 2018.

[3]

(ii) Suggest why there has been a rapid increase in the worldwide use of electric vehicles.

.....

.....

.....

.....

.....

.....

.....

..... [4]

[Total: 14]

7 **(a)** Agriculture can be divided into three main types: arable, mixed and pastoral.

(i) Complete the table using the words shown to match the descriptions to the types of agriculture.

arable **mixed** **pastoral**

description	type of agriculture
The farm grows crops.	.....
The farm raises animals.	.....
The farm grows crops and raises animals.	.....

[1]

(ii) Describe the difference between a commercial farm and a subsistence farm.

.....

..... [1]

(b) State **two** problems caused by mismanagement of irrigation.

1 .....

2 .....

[2]

(c) Describe how crop rotation and selective breeding of plants can be used to increase agricultural yield.

crop rotation .....

.....

.....

.....

selective breeding .....

.....

.....

.....

[4]

(d) The factsheet contains information about the prickly pear cactus in Australia.

The prickly pear cactus

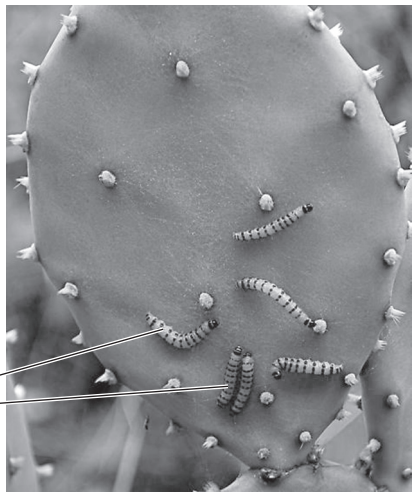
The prickly pear cactus is native to the Americas.

When it was brought to Australia, it spread rapidly, covering millions of hectares of farmland.

Farmers unsuccessfully tried several methods of controlling the cactus.

Eventually, the ‘cactus moth’ from South America was introduced.

The larvae of this moth ate the cacti and successfully reduced the cacti population.



(i) Suggest why the prickly pear cactus spread so rapidly in Australia.

.....

.....

.....

..... [2]

(ii) Suggest the impact of the prickly pear cactus on the farmlands of Australia.

.....

.....

.....

..... [2]

(iii) State the type of control used successfully by the farmers.

..... [1]

[Total: 13]

8 The photograph shows a location after a storm surge.

(a) Flooding is one impact of the storm surge.

(i) Describe **one** other impact of the storm surge that can be seen in the photograph.

.....

..... [1]

(ii) Suggest strategies to reduce the impacts of the flooding at this location.

.....

.....

.....

.....

.....

..... [3]

(b) Tropical cyclones produce storm surges and flooding.

(i) State **two** other causes of flooding.

1 .....

2 .....
[2]

(ii) Suggest why climate change may increase the impacts of tropical cyclones.

.....

.....

.....

.....

.....

.....

.....

..... [4]

[Total: 10]

9 **(a)** In 2020, over 2 billion people did **not** have access to safe drinking water.

By 2050, the world population is predicted to increase by 2 billion people.

Suggest why an increase in world population will affect access to safe drinking water.

.....

.....

.....

.....

.....

..... [3]

(b) Water samples are taken at three locations along a river.

The table shows the concentrations of some ions in the river water at each location.

ion	**concentration of ion / mg per litre**		
	location 1	location 2	location 3
iron	0.4	0.6	0.5
nitrate	5.4	5.8	33.0
phosphate	0.2	0.4	1.2
potassium	2.6	3.0	11.8
zinc	0.1	0.2	0.1

(i) State the location of the sample with the lowest concentration of iron.

..... [1]

(ii) Calculate the range in concentration for potassium.

..... mg per litre [1]

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(iii) At one of the locations, the river flows through a farm that uses fertiliser.

State which location. Explain your answer.

location .....

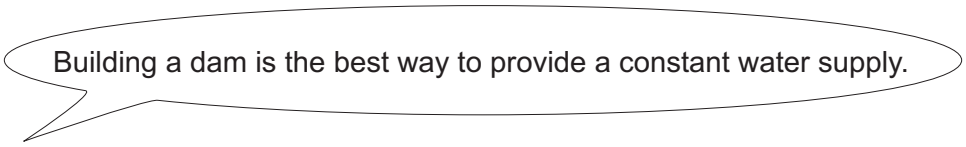
explanation .....

.....

.....

[2]

(c) A student says:



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

.....

.....

.....

.....

.....

.....

.....

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.....

.....

.....

.....

..... [6]

[Total: 13]

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EMVIRONMENTAL MANAGEMENT **0680/12**

Paper 1 Theory **May/June 2022**

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.

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Cambridge International is publishing the mark schemes for the May/June 2022 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.

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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.

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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.

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Question	Answer	Marks
1(a)	*any one from:* loss of habitat; water pollution; air pollution / dust; loss of (agricultural) land; erosion; noise pollution; visual pollution; loss of vegetation;	**1**
1(b)	*any two from:* employment / jobs, in mine; employment / jobs, in associated service industry; improves economy (by bringing in business); improved, infrastructure / roads / rail; use / availability of materials used locally;	**2**
1(c)	*any two from*: land has been filled; lake / pond, has been made; car park / new road has been built; (top)soil added: trees / vegetation has been planted; area has been landscaped; park created;	**2**

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Question	Answer	Marks
2(a)	shovelling / sweeping overboard / putting back in the sea; because bycatch is unwanted species caught during fishing (for target species);	**2**
2(b)(i)	*any two from:* decline of fish stocks; reduction / extinction of fish species / biodiversity; death of bycatch; alteration to food, chain / web; causing death of, birds / sharks / dolphins / turtles / predators;	**2**
2(b)(ii)	*any two from:* changing fishing practice / education; modifications to, fishing gear / net type / mesh size; reduce / ban, fishing in hotspots / closed season (create) reserves; quotas; laws / international agreements; fish farming;	**2**

Question	Answer	Marks
3(a)(i)	transport and travel;	**1**
3(a)(ii)	20 (tonnes);	**1**
3(a)(iii)	14;	**1**

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Question	Answer	Marks
3(b)	*any two from:* change to a more vegetarian diet; reduce travel in cars / use public transport / cycling / walking / car pools; insulate houses; use energy-efficient appliances; switch off devices when not in use; use electric cars; AVP;	**2**

Question	Answer	Marks
4(a)	*any two from:* life expectancy highest in north coast countries / North of Tropic of Cancer; lowest between Tropic of Cancer and Equator; majority of countries 60–70; AVP;	**2**
4(b)	*any two from:* *increase due to:* improved healthcare / medicine; improved food / food supply; improved water supply / sanitation; *decrease due to:* disease / epidemic; famine; war; climate change / climate hazards; air pollution;	**2**

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Question	Answer	Marks
5(a)(i)	*any three from:* glass jar buried in soil; organisms, walk / fall / captured into trap; tall/ smooth sides prevent organisms escaping; cover prevents rain filling it up with water / excess heat / gives shade; number of, organisms / species, counted / classified; periodic sampling;	**3**
5(a)(ii)	*any two from:* can only catch organisms that crawl / move on surface; some might fly out; can only catch small organisms (less than 10cm); organisms in the trap might eat each other; glass jar does not allow water to drain out; not representative of the whole population;	**2**
5(b)(i)	61;	**1**
5(b)(ii)	axis labels: *y*-axis: number (of organisms) AND *x*-axis: organisms plus names; linear scale for *y*-axis such that bars occupy at least half the grid; bar heights plotted correctly; bar widths consistent;	**4**

Question	Answer	Marks
6(a)(i)	5 (million tonnes of oil equivalent);	**1**
6(a)(ii)	*any two from:* renewable; reduces carbon footprint / carbon neutral; lower level of air pollution / cleaner; reduces dependency on, other energy sources / foreign oil; helps to conserve fossil fuels;	**2**

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Question	Answer	Marks
6(a)(iii)	*any one from:* production of biofuels replaces food crops; deforestation due to clearing land for biofuel crops; loss of biodiversity / monoculture; may lead to soil degradation; named pollution from processing/ production;	**1**
6(a)(iv)	observation that gasoline production / consumption is much higher than biofuels; *plus any two marks for supported conclusion:* *no:* very large increase in production required; fuel (oil) is cheap in US; familiar with use of gasolene and unlikely to swap; still produces CO_2 (when combusted); agreement needed (from all suppliers) for change to happen; *yes:* gasoline is finite resource and will, run out / become expensive; can be done with government incentive; Can be used in existing technology / vehicles;	**3**
6(b)(i)	column or row headings: (type of) vehicle, number (of vehicles); 5 categories listed correctly; 5 sets of numbers recorded correctly;	**3**
6(b)(ii)	*any four from:* people's environmental concerns / no CO2 emissions; consumer demand; competitive purchase prices / low maintenance; improvements in, range / battery technology / performance; availability of charging infrastructure; rising cost of traditional fuel sources / cheaper to run; government incentives, e.g. emissions charges, reduced road tax, scrappage schemes, free parking/ subsidies;	**4**

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Question	Answer	Marks
7(a)(i)	arable, pastoral, mixed;	**1**
7(a)(ii)	subsistence farms are for own use whereas commercial farms are for profit;	**1**
7(b)	*any two from*: salinisation; waterlogging / flooding; death of plants from under-watering / reduction in yield; soil erosion; leaching of nutrients / run-off causing eutrophication;	**2**
7(c)	*crop rotation – any two from:* planting different crops each year; reduces, pests / disease; so one crop is beneficial to the next; maintains soil fertility / soil structure; *selective breeding – any two from:* breeding plants for desired traits; pest/ disease-resistance; speed of growth; size; drought-resistance / climate tolerance;	**4**
7(d)(i)	*any two from:* no natural predators; no natural diseases; favourable environmental conditions, e.g. temperature; resistant to other methods of control; out-competed other plants;	**2**

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Question	Answer	Marks
7(d)(ii)	*any two from:* destruction of farmland; reduction in crop yield; lack of grazing land for animals; reduction in profit; cost of trying to control;	**2**
7(d)(i)	biological (control);	**1**

Question	Answer	Marks
8(a)(i)	*any one from:* damage to, buildings / homes; debris / obstruction, of, roads / transport; damage to communications networks;	**1**
8(a)(ii)	*any three from:* flood defences / higher banks / walls; raise height of bridge; build houses on stilts; land zoning; monitoring and warning systems; rescue and flood management techniques / emergency rescue teams; disaster preparation (plans, drills, emergency supplies); international aid;	**3**

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Question	Answer	Marks
8(b)(i)	*any two from:* heavy rainfall; snowmelt; land relief; saturated soil; compacted soil; deforestation; cultivation; urbanisation; tsunamis; sea level rise;	**2**
8(b)(ii)	*any four from:* warmer, seas / oceans: increases areas where cyclones can form; increases, frequency of cyclones; longer cyclone season; higher sea levels (mean bigger, storm surges / waves); stronger wind speeds / more extreme cyclones; increased rainfall; current defences not designed for stronger storms; low lying coastal communities have high population density; more people living in high-risk areas;	**4**

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Question	Answer	Marks
9(a)	*any three from:* more demand for drinking; food therefore more agriculture using water; more, productivity / industry, therefore more water used; more people using, showers / pools, therefore more water used; less availability due to more industry therefore more pollution; more waste (sewage) therefore more pollution; increased competition;	**3**
9(b)(i)	(location) 1;	**1**
9(b)(ii)	9.2;	**1**
9(b)(iii)	location 3 (no mark) has highest level of N / P / K; fertiliser contains N / P / K;	**2**
9(c)	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.	**6**

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Question	Answer	Marks
9(c)	No response or no creditable response [0 marks] *indicative content for:* Building a dam is the best way to provide a constant water supply. *agree*: can produce HEP resulting in cheap electricity prevents flooding as river is controlled secure water supply / reduces water insecurity provides habitat for fish / fish for food provides recreation (swimming / sailing / canoeing) provides irrigation provides jobs (building / maintenance) income for local people (fish / tourism / recreation) tourist attraction *disagree:* very expensive to build massive engineering undertaking requires dislocation of people flooding of property / farmland geology not always suitable susceptible to earthquake / land movement susceptible to terrorism damage to environment / habitats disruption of fish migration requires / cost of maintenance silt up reduces availability of water downstream causes cross border conflict alternative / cheaper / less disruptive ways exist	

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ENVIRONMENTAL MANAGEMENT **0680/13**

Paper 1 Theory **May/June 2022**

1 hour 45 minutes

You must answer on the question paper.

No additional materials are needed.

INSTRUCTIONS

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

INFORMATION

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

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

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[Turn over

Section A

1 The photograph shows a bund.

(a) Use the photograph to explain why some farmers use bunds.

.....

.....

.....

..... [2]

(b) Describe how the bund in the photograph is constructed.

.....

..... [1]

(c) Suggest **one** disadvantage of bunds.

.....

..... [1]

[Total: 4]

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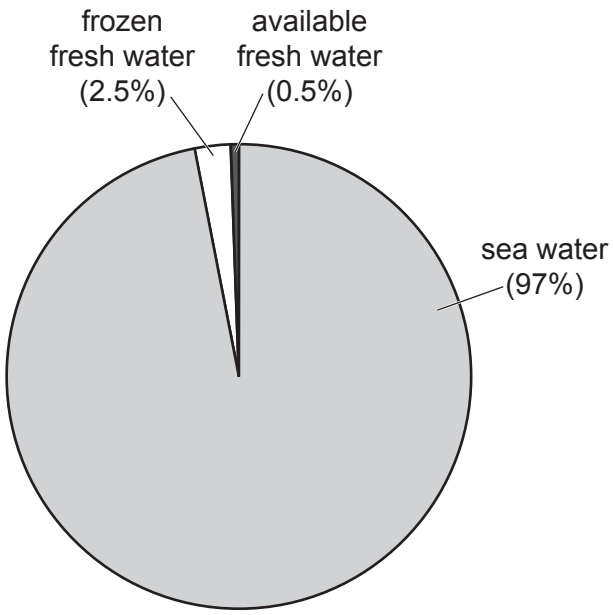
2 The pie chart represents all the water on Earth.



(a) Use the pie chart to calculate the total percentage of fresh water on Earth.

..... % [1]

(b) State **two** sources of fresh water.

1 .....

2 .....
[2]

(c) Suggest how the availability of fresh water may change as the population of the world increases.

.....

.....

.....

.....

.....

..... [3]

[Total: 6]

3 The photograph shows a boom being used to deal with an oil spill.

(a) Use the photograph to describe how the boom is used to deal with the oil spill.

.....

.....

.....

..... [2]

(b) State **two** other methods of dealing with oil spills.

1 .....

2 .....

[2]

(c) State **one** impact of oil spills on birds.

..... [1]

[Total: 5]

4 **(a)** Complete the description of the formation of sedimentary rocks using words from the list.

Each word may be used once, more than once or not at all.

crystallisation	**deposition**	**erosion**
sedimentation	**transportation**	**weathering**

Water in streams and rivers carries small particles of rock and sand. This process is called ..... .

Eventually, the particles reach a lake or the sea, and they sink to the bottom. This process is called ..... .

Over time, the particles build up in layers. The bottom layers are compressed, and the particles stick together to form rock. This process is called ..... .

[3]

(b) State the name of **one** sedimentary rock.

..... [1]

(c) State **one** characteristic of a sedimentary rock.

..... [1]

[Total: 5]

Section B

5 The oceans are a valuable resource. They can be used to generate electricity and to provide food.

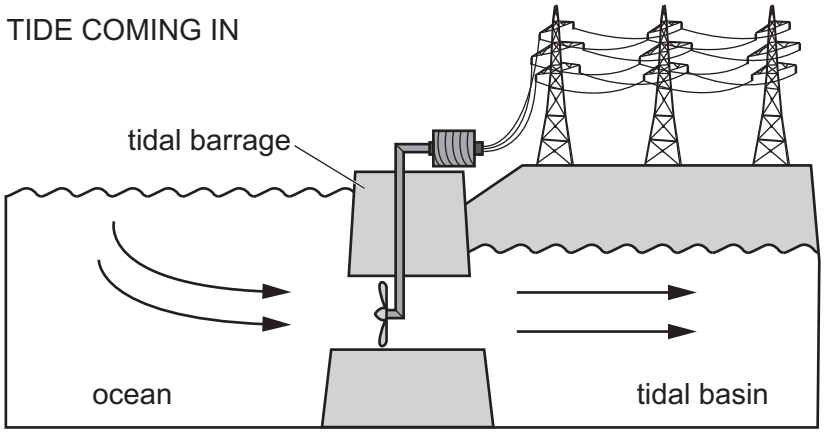
(a) State **two** other ways the oceans are a valuable resource.

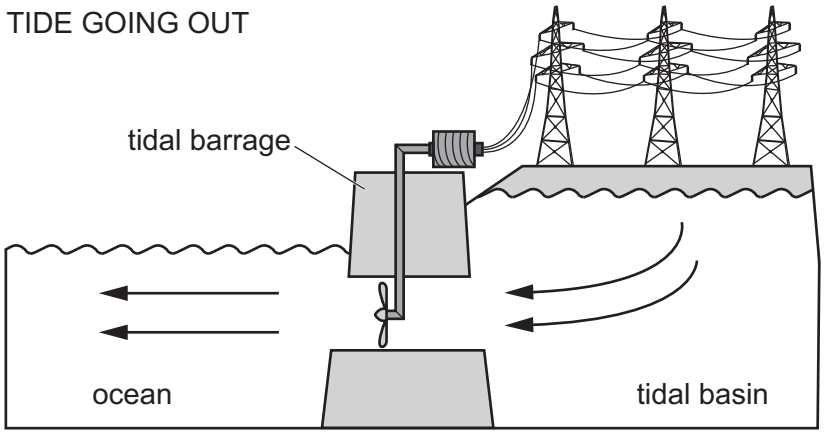
1 .....

2 .....

[2]

(b) The diagrams show how a tidal barrage is used to generate electricity.





Use the diagrams to describe how a tidal barrage is used to generate electricity.

.....

.....

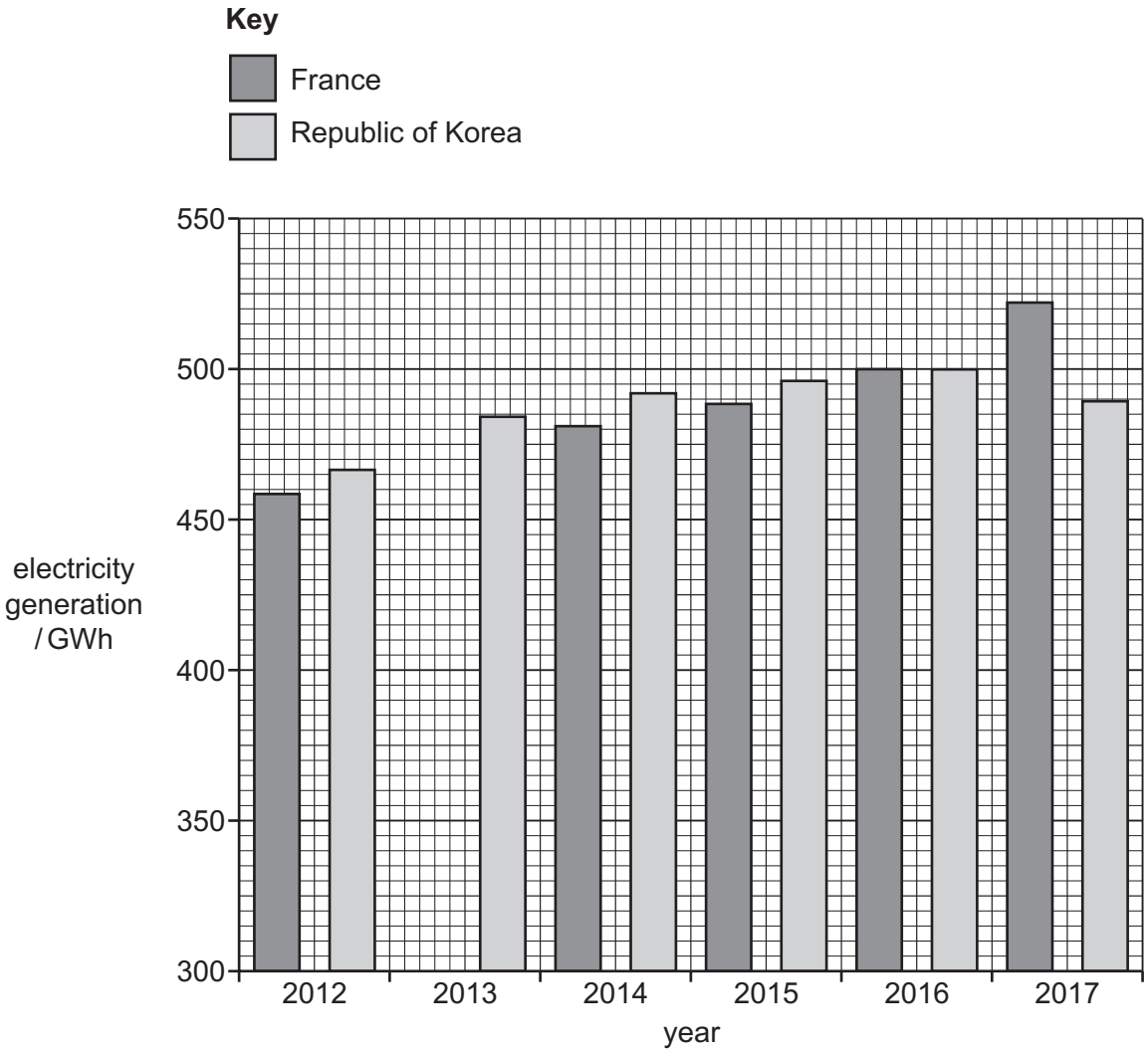
.....

.....

.....

..... [3]

(c) The bar chart shows the amount of electricity (GWh) generated by tidal power stations in France and the Republic of Korea from 2012 to 2017.



(i) Complete the bar chart to show that France generated 410 GWh of electricity in 2013. [1]

(ii) State which year France generated more electricity than the Republic of Korea.

..... [1]

(d) **(i)** Tidal power is a renewable source of energy.

State **one** other benefit of tidal power generation.

..... [1]

(ii) Describe **one** environmental impact of tidal power generation.

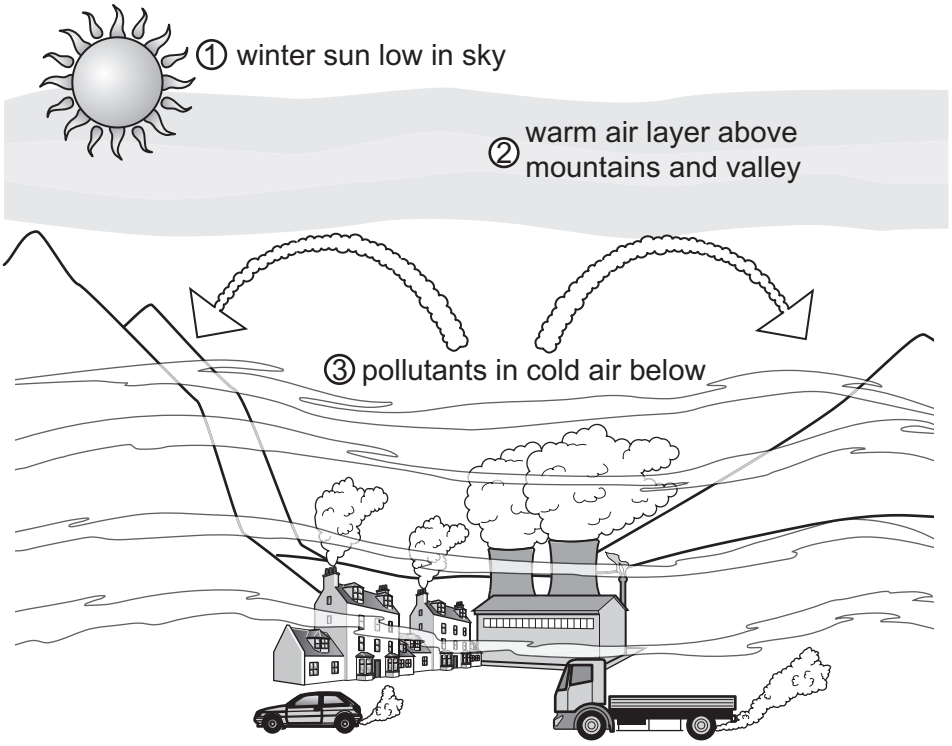
.....

.....

..... [2]

[Total: 10]

6 **(a)** The diagram shows features that may lead to the formation of smog.



(i) Use the diagram to describe how the features shown may lead to the formation of smog.

.....

.....

.....

.....

.....

..... [3]

(ii) State the names of **two** pollutants that form smog.

1 .....

2 .....

[2]

(b) Describe transport policies that governments can use to reduce atmospheric pollution in cities.

.....

.....

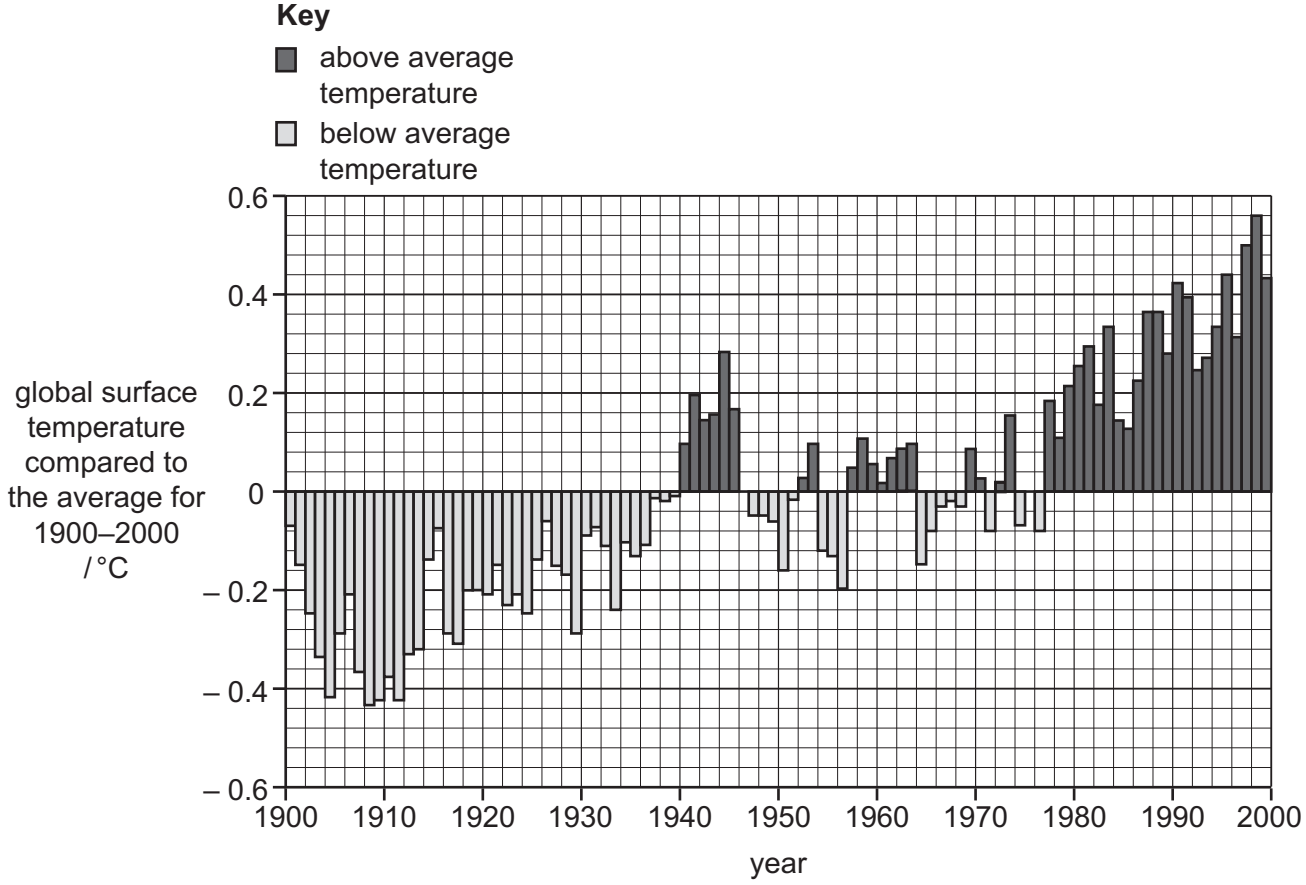
.....

.....

.....

..... [3]

(c) The bar chart shows annual variations in global surface temperatures compared to the average global surface temperature for 1900–2000.



(i) State the highest temperature above average shown on the bar chart.

..... °C [1]

(ii) Use the bar chart to describe the trends in global surface temperatures for 1900–2000.

.....

.....

.....

.....

.....

..... [3]

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(iii) Between 2000 and 2020, global surface temperatures increased.

Suggest the future impact on agriculture if global surface temperatures continue to increase.

.....

.....

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.....

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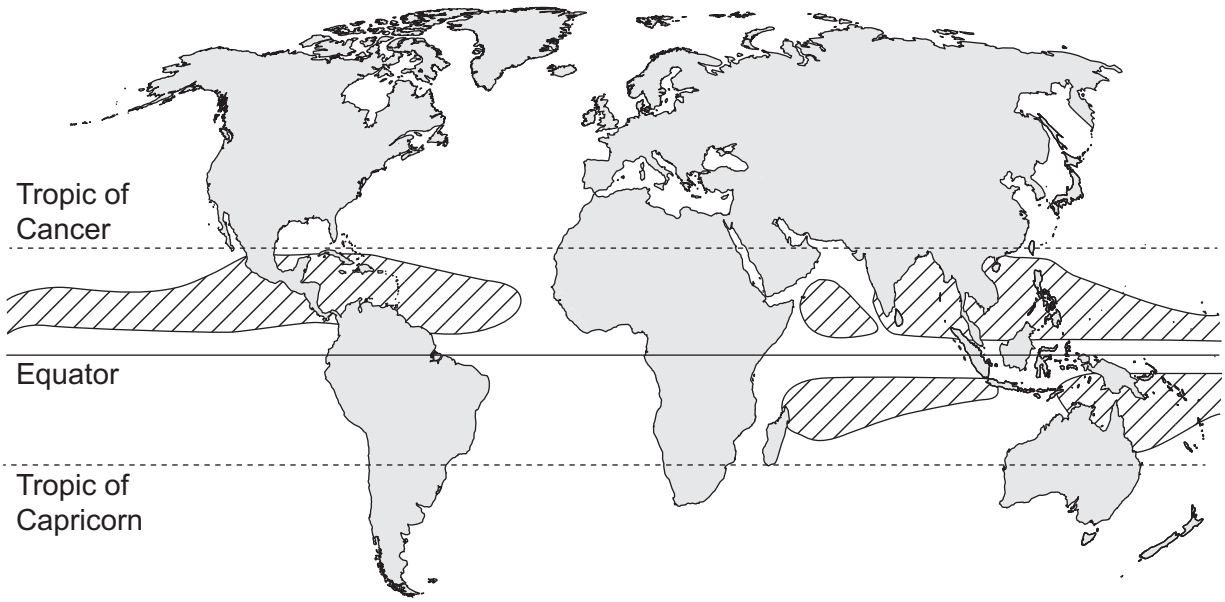
..... [4]

[Total: 16]

7 The world map shows areas where tropical cyclones form.

Key

areas where tropical cyclones form



(a) (i) Describe the distribution of areas where tropical cyclones form shown on the map.

.....

.....

.....

.....

.....

..... [3]

(ii) State **two** ocean conditions required for tropical cyclones to form.

1 .....

2 .....

[2]

(b) The table shows data on the number of tropical cyclones recorded in the 2018–2019 South Pacific cyclone season.

The tropical cyclones are classified in categories. The category depends on the maximum wind speed of the tropical cyclone.

category	maximum wind speed / km per hour	number of tropical cyclones recorded
1	119–153	2
2	154–177	2
3	178–208	1
4	209–251	1
5	>251	0

Calculate the percentage of tropical cyclones recorded with wind speeds greater than 177 km per hour.

..... % [2]

(c) (i) State **three** impacts of a tropical cyclone.

1 .....

2 .....

3 .....

[3]

(ii) Describe strategies for managing the impacts of a tropical cyclone.

.....

.....

.....

.....

.....

..... [3]

[Total: 13]

8 A student reads a blog about extractive reserves in the Amazon rainforest of Brazil.

> Extractive reserves in Brazil are protected areas of the Amazon rainforest. Local tribes and communities are given the right to use the land for subsistence farming and traditional practices. Other people are not allowed to access the land without permission.
>
> The idea of extractive reserves came from environmentalists, who wanted to help conserve the Amazon rainforest and ensure sustainable use of natural resources.
>
> The first reserve was established in 1983 and covered an area of 2 845 km^2. More reserves were created in 1990 to add an extra area of 21 630 km^2. An additional area of 22 008 km^2 was established in 1992. In 1997, a further eleven reserves were created, adding 25 108 km^2.

(a) (i) Present the data from the blog in a suitable table to show the total area (cumulative) of extractive reserves in Brazil in each of the years listed.

[3]

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(ii) Suggest ways that extractive reserves benefit local tribes and communities.

.....

.....

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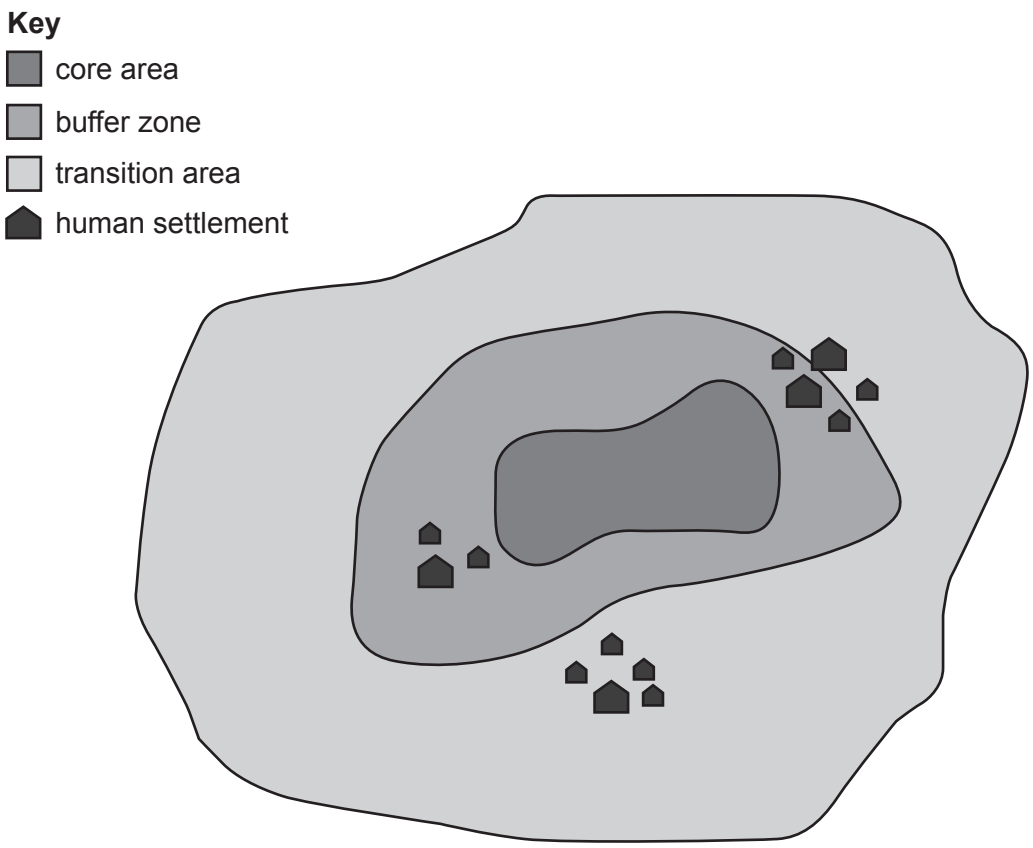
..... [3]

(b) Biosphere reserves are similar to extractive reserves.

Biosphere reserves have three main zones: the core area, the buffer zone and the transition area.



Explain the functions of the three main zones of a biosphere reserve.

.....

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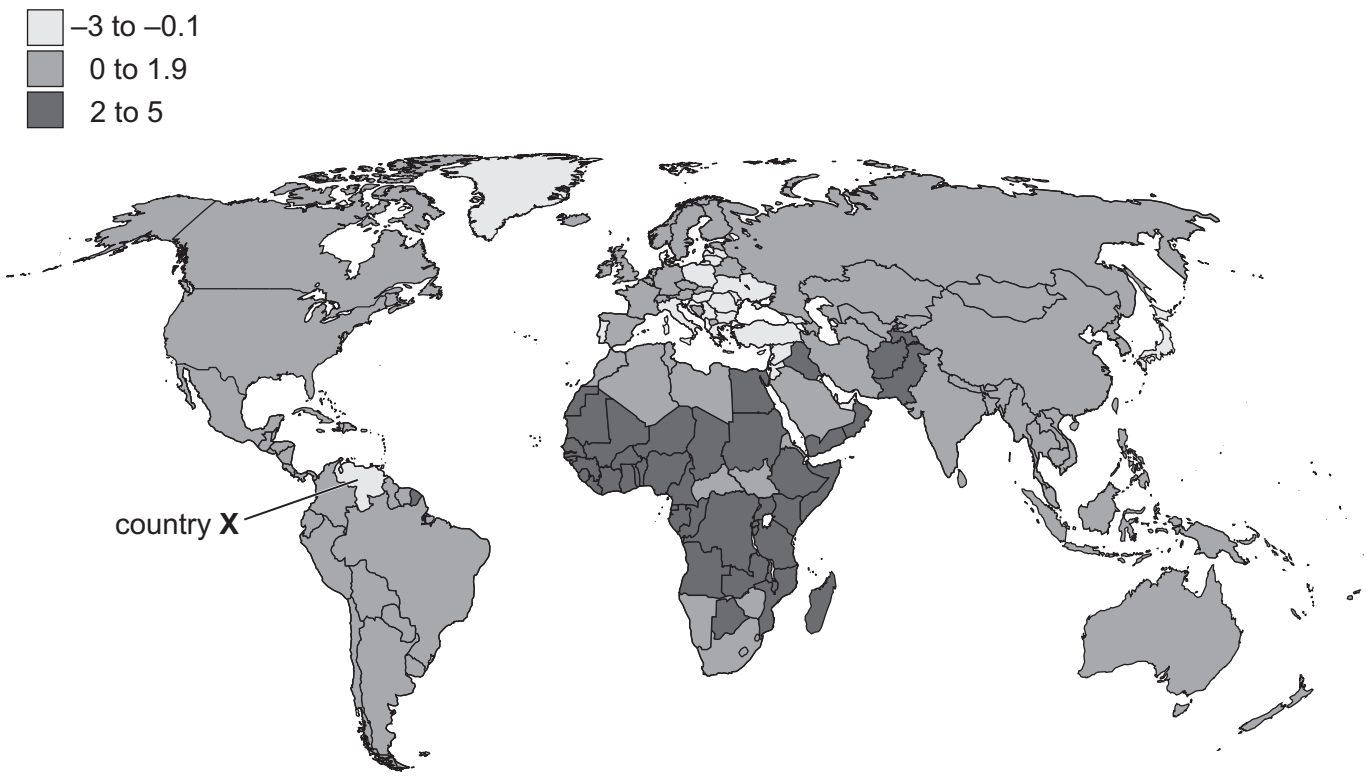
..... [3]

[Total: 9]

9 **(a)** The world map shows the average annual percentage population growth rate by country for 2015–2020.



(i) State the name of the **continent** with the highest average annual percentage population growth rate for 2015–2020.

..... [1]

(ii) Use the map to explain how the population of country **X** changed in 2020.

.....

.....

.....

..... [2]

(b) Suggest **one** reason why birth rates are often low in more economically developed countries (MEDCs).

.....

..... [1]

(c) The population of a country can decrease because of migration.

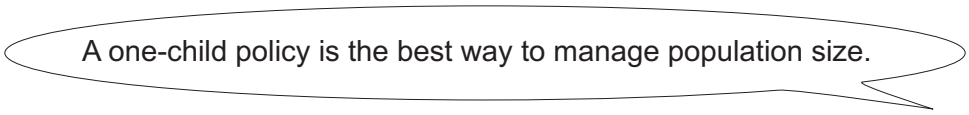
State **two** reasons why people migrate.

1 .....

2 .....

[2]

(d) A student says:



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

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..... [6]

[Total: 12]

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ENVIRONMENTAL MANAGEMENT **0680/13**

Paper 1 Theory **May/June 2022**

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.

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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.

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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.

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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.

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Question	Answer	Marks
1(a)	*any two from:* to hold / capture / store water / keep(in the field); to collect surface run-off; / rainwater; irrigation/ to increase water infiltration / absorption; to prevent soil erosion / plant / minerals being washed away;	**2**
1(b)	*any one from:* idea of raising up the soil e.g. ridge / line / mound; built along contour lines;	**1**
1(c)	*any one from:* hard physical work; time-consuming; needs to be maintained;	**1**

Question	Answer	Marks
2(a)	3.0 ;	**1**
2(b)	*any two from:* aquifers; lakes; wells; rivers; reservoirs; rainfall; oasis; desalination plants;	**2**

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Question	Answer	Marks
2(c)	*any three from:* **reduce due to:** greater consumption (by people) ; (used by) industry / domestic; pollution of water sources; global warming / temperature rise / greater evaporation; climate change / less rainfall / drought; **increase due to:** technological advances; glaciers / ice sheet / permafrost melting;	**3**

Question	Answer	Marks
3(a)	boom (ends) connected to / towed by boats; boom, surrounds / collects / traps, oil spill;	**2**
3(b)	*any two from:* skimmers; dispersants / detergent;	**2**
3(c)	*any one from:* coats feathers so, unable to fly / may sink / cannot retain heat; disruption to the food chain / web; death / poisoning / kills if eaten;	**1**

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Question	Answer	Marks
4(a)	transportation; deposition; sedimentation;	**3**
4(b)	shale / limestone / sandstone; AVP	**1**
4(c)	layered / contains (rounded) grains / may contain fossils;	**1**

Question	Answer	Marks
5(a)	*any two from:* transport; tourism; source of, chemicals / building materials / minerals; desalination for fresh water;	**2**
5(b)	*any three from:* difference in water level causes water to flow; flow of water causes turbine to spin; (turbine) drives a generator; converts kinetic energy to electrical energy / electricity; works in both directions / as tide comes in AND as tide goes out;	**3**
5(c)(i)	bar chart completed correctly to 410 GWh;	**1**
5(c)(ii)	2017;	**1**
5(d)(i)	*any one from:* predictable / consistent / not weather dependent; (machine / barrage has) long life span; low running cost;	**1**

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Question	Answer	Marks
5(d)(ii)	*any developed impact for two marks, e.g.:* floods mudflats; which causes erosion; disrupts food chains; results in habitat loss / change; disrupts tidal flow / acts as a barrier; which restricts fish spawning / migration; causes collision risk ; disrupts food chains; increases siltation; so less light for photosynthesis by aquatic plants; results in habitat loss / change; AVP;;	**2**

Question	Answer	Marks
6(a)(i)	*any three from:* houses / factories / vehicles, emit pollutants / gases; winter / low sun provides less warmth to Earth's surface; (temperature) inversion / warm air layer, holds cold air near ground; cold air is denser and unable to rise; pollutants trapped (by the inversion); mountains and valleys increase strength of inversion;	**3**
6(a)(ii)	*any two from:* volatile organic compounds / (VOC); sulphur oxides; carbon monoxide; smoke / soot / particulate matter; ozone;	**2**

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Question	Answer	Marks
6(b)	*any three from:* encourage use of public transport / cycles / walk; encourage use of electric vehicles; introduce taxation of fuels / lower tax on alternative transport ; (introduce / use legislation) to have vehicle emissions filters / regular testing; introduce / use congestion charges / pedestrian zones; encourage people to work at home;	**3**
6(c)(i)	0.56;	**1**
6(c)(ii)	*any three from:* 1900 to 1939 below average; 1900 to 1939 decreased then increased; 1940 to 1976 fluctuating; 1977 to 2000 above average; 1977 to 2000 increasing; overall increase in temp;	**3**
6(c)(iii)	*any four from:* higher temperature means: longer growing season; faster growth rate of plants; crops can be grown in higher latitudes / at greater altitude; plants preferring cool climates will have less geographic range; regional change in type of plants grown; melting of ice / glaciers / permafrost (meaning rise of sea-level); causing flooding and loss of agricultural land; faster evaporation; causing water shortages / drought; changes in atmospheric circulation / weather patterns; some areas too dry for / limits agriculture; some areas become too hot for / limits / reduces agriculture; favourable conditions for increase in pests; favourable conditions for increase in diseases;	**4**

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Question	Answer	Marks
7(a)(i)	between 5 ° and 20 ° north and south of the Equator / between tropics; *any two from:* North of the Equator in the Atlantic Ocean; in the Indian Ocean; in the Pacific Ocean; north of Australia; AVP;	**3**
7(a)(ii)	(surface) temperature of (at least) 27 °C; depth of (at least) 60 m;	**2**
7(b)	2 ÷ 6 × 100; 33(.3 %);	**2**
7(c)(i)	*any three from:* flooding; loss of life / injury; financial losses / loss of jobs / employment; damage to buildings / infrastructure; loss of crops / livestock; loss of habitats; water-related disease / unsafe water / contaminated water;	**3**
7(c)(ii)	*any three from:* monitoring / early warning to allow for; evacuation plans; (preparation of emergency) shelters; stockpiling of supplies / food / water / electricity generators; (preparation of) rescue teams; (preparation of) medical teams / supplies / support; design of buildings / infrastructure, to withstand high winds / floods / storm surges; establishing communications; involvement of international aid agencies;	**3**

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Question	Answer	Marks
8(a)(i)	column or row headings: year, area; unit for area / km^2 in heading; four sets of area data recorded;	**3**
8(a)(ii)	*any three from:* right to follow traditional practices / way of life; continue fishing / hunting / gathering / farming; preserve their culture and way of life; prevent destruction of their environment / area e.g. deforestation; can live where ancestors lived ; reduce risk of infection from outside contact;	**3**
8(b)	*any three from:* idea of: different amounts of human activity allowed in each zone; **Core area:** monitoring / research activities / no settlements / protect the ecosystem; **Buffer zone**: controlled / limited access for people / eco-tourism / recreation / research, / education and training / some limited settlements / local tribes / communities ; **Transition area**: research / tourism / recreation / greater settlements / controlled human activities e.g. sustainable farming;	**3**

Question	Answer	Marks
9(a)(i)	Africa;	**1**
9(a)(ii)	(population) decreased; (because average annual percentage population growth) rate was, negative / –3 to –0.1;	**2**
9(b)	*any one from:* greater use / availability of contraception; more awareness of family planning; women focus more on education / career (and so have children later in life); people get married later in life; high cost of raising children;	**1**

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Question	Answer	Marks
9(c)	*any two from:* economic migration: find work / employment; better standards of living / quality of life; better services / hospitals ; better education; poverty; environmental migration: natural disasters / flood / drought / earthquake; famine / crop failure; better climate; political migration: war / conflict / unrest; high crime rate; (religious) persecution; social migration: family ties;	**2**

Question	Answer	Marks
9(d)	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:* A one-child policy is the best way to manage population size. *agree:* simple, straightforward easy to manage more freedom for women better education for female children financial benefits for family state benefits given: extra land, free homes irrigation higher pensions cheap loans	**6**

Question	Answer	Marks
9(d)	better government jobs priority service at hospital subsidised education longer maternity leave more jobs became available more food became available more housing available more land available *disagree:* creates mandatory contraception and sterilisation creates gender imbalance emphasis on boys / abandonment of girls increase in orphanages mainly for girls difficult to enforce in rural communities elderly had less support young have large burden of care for ageing parents severe penalties: large fines property seized jail applied inconsistently: government officials wealthy can be exceptions: rural families allowed two children some ethnic minorities allowed three children birth defects learning disabilities unexpected tragedies Twins / multiple births both parents from only child households financial burden for government tin administration	

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Question	Answer	Marks
9(d)	other strategies might be better e.g. two-children policy still results in population decrease	

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