Cambridge O Level

Cambridge International Examinations
Cambridge Ordinary Level

CANDIDATE NAME	

CENTRE NUMBER						CANDIDATE NUMBER				

3589131559

ENVIRONMENTAL MANAGEMENT **5014/22**

Paper 2 **October/November 2018**

1 hour 30 minutes

Candidates answer on the Question Paper.

No Additional Materials are required.

READ THESE INSTRUCTIONS FIRST

Write your Centre number, candidate number and name on all the work you hand in.
Write in dark blue or black pen.
You may use an HB pencil for any diagrams or graphs.
Do not use staples, paper clips, glue or correction fluid.
DO **NOT** WRITE IN ANY BARCODES.

Answer **all** questions.

Electronic calculators may be used.
You may lose marks if you do not show your working or if you do not use appropriate units.

Study the appropriate source materials before you start to write your answers.
Credit will be given for appropriate selection and use of data in your answers and for relevant interpretation of these data. Suggestions for data sources are given in some questions.
You may use the source data to draw diagrams and graphs or to do calculations to illustrate your answers.

At the end of the examination, fasten all your work securely together.
The number of marks is given in brackets [ ] at the end of each question or part question.

This document consists of **14** printed pages and **2** blank pages.

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CAMBRIDGE International Examinations

map of the world

map of Mexico

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area of Mexico: 1 964 375 km^2

population: 123 million (in 2016)

children per woman: 2.27

life expectancy: 75.6 years

currency: Mexican pesos 19.2 = 1 USD

languages: Spanish, local languages

main economic activities: agricultural products, electronics, chemicals, petroleum, textiles and tourism

1 Mexico's economy depends on modern manufacturing industries, agriculture and tourism. There are abundant reserves of oil, natural gas and minerals. Environmental problems include a shortage of clean drinking water, deforestation and desertification.

(a) Mexico is the world's largest producer and exporter of avocado fruit. More than 1.5 million tonnes are now produced each year. The state of Michoacan is the largest producer of avocado fruit in Mexico.

The table shows climate data from a weather station in the centre of Michoacan state.

month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
average monthly temperature / °C	15.2	16.1	17.8	19.5	20.5	20.2	19.3	19.2	18.8	18.1	17.0	15.7
average monthly rainfall / mm	31	13	6	10	48	267	351	343	341	156	40	19

(i) Calculate the annual average temperature range at this weather station.

..... °C [1]

The altitude of the avocado farms in this state varies from 1300 m to 2300 m.

The decrease in temperature with increase in height is 0.6 °C per 100 m.

(ii) Calculate the expected temperature difference between the highest and lowest avocado farms in the state.

.....[1]

(iii) This weather station is at an altitude of 1920 m. Farm **A** is at an altitude of 1420 m.

Calculate the average expected temperature at Farm **A** in April.

Show your working.

.....°C [2]

(b) The avocado trees produce flowers which then develop into avocado fruits. The main harvest starts in October. The avocado fruits on farm **A** are always harvested before farm **B**. Farm **B** is at an altitude of 2000 m.

(i) State the name of the process that the avocado trees use to capture carbon dioxide.

.....[1]

(ii) Suggest why the avocado fruits are always harvested on farm **A** before farm **B**.

.....

.....

.....

.....[2]

(iii) Avocado trees cannot fix nitrogen from the air. Farmers add nitrogen fertilisers to the base of each tree every year between January and May.

Using information from the table of climate data, explain why farmers add fertilisers at this time of year.

.....

.....

.....

.....[2]

(iv) Suggest the possible impacts on the environment if fertilisers are added to these avocado trees later in the year.

.....

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.....[3]

(v) Suggest **three** reasons why farmers do not grow crops between the avocado trees.

1 .....

.....

2 .....

.....

3 .....

.....

[3]

(c) Up to half of Mexico's total avocado fruit production is exported each year.

Suggest the benefits for the farmers and the government of exporting the avocado fruits.

benefits for farmers .....

.....

.....

benefits for the government .....

.....

.....

[3]

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(d) Avocado fruit production has increased in recent years due to demand. The table shows the changes in avocado fruit production between 2014 and 2016.

	2014	**2016**	**percentage increase**
area planted / ha	168 000	187 000	11.3
avocado harvest / million tonnes	1.47	1.64	.....

(i) Complete the table.

Show your working.

[2]

(ii) The increase in avocado fruit production has led to deforestation in several Mexican states.

Describe how deforestation can result in soil erosion.

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.....[4]

(iii) To reduce the impact of deforestation scientists are trying to develop new varieties of avocado trees to increase the fruit yield per hectare.

Suggest **two** ways new varieties of avocado trees can be developed.

1 .....

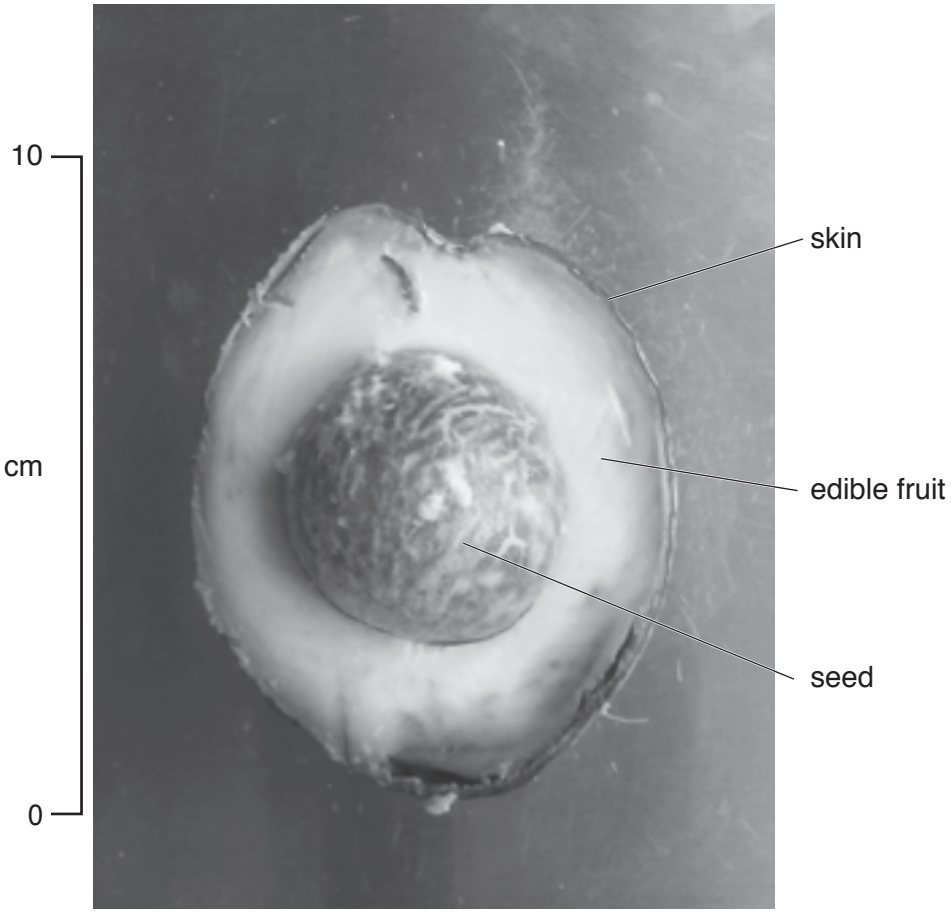
.....

2 .....

.....

[2]

(e) A student wanted to find out how much of the avocado fruit could be eaten. The seed and skin cannot be eaten.



The following method was used:

- find the mass of one avocado fruit
- cut the fruit in half and remove the seed
- find the mass of the seed
- remove the edible fruit from the skin
- find the mass of its skin.

	mass / g
whole fruit	307
seed	59
skin	56
edible fruit	.....

(i) Calculate the mass of the edible fruit. Write your answer in the table.

[1]

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(ii) Calculate the percentage of the avocado fruit that can be eaten.

.....% [1]

(iii) Suggest **one** safety instruction that should have been included in the method the student used.

.....

.....[1]

(iv) The people living on avocado farms eat avocado fruits every day.

Suggest **two** ways the seed and skin could be used on a farm.

1 .....

.....

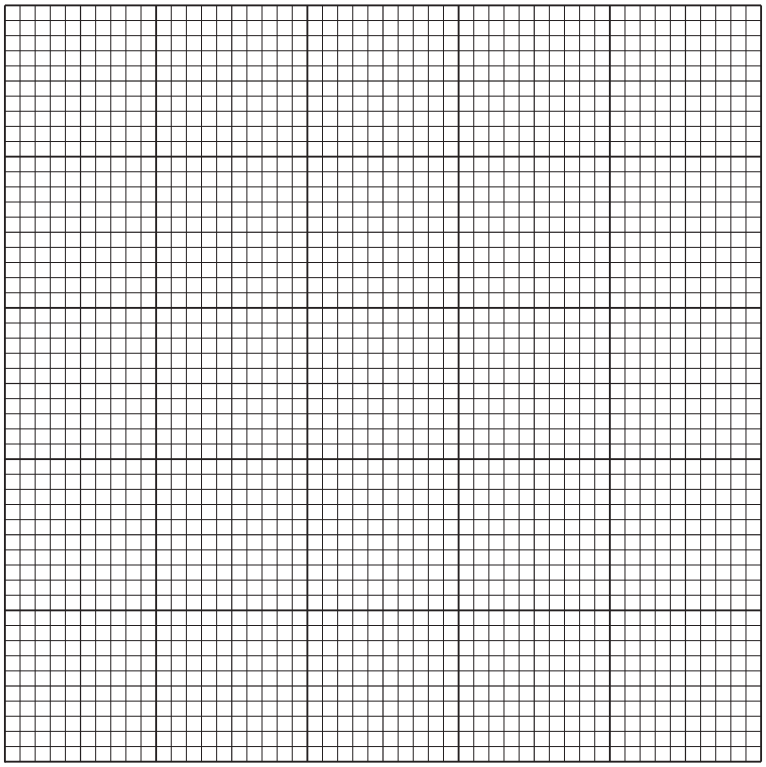
2 .....

.....
[2]

2 **(a)** Mexico is rich in mineral resources including copper ore. The table shows the world price of copper over a six-year period.

year	2011	2012	2013	2014	2015	2016
price / USD per tonne	9600	7200	7400	6900	5400	4700

(i) Plot a bar graph of the data on the grid.



[4]

(ii) Describe the trend shown by the graph.

.....

.....[1]

(iii) Suggest **two** possible reasons for this trend.

1 .....

.....

2 .....

.....

[2]

(b) The life of a mine has four stages of operation.

exploration → development → production → closure

The table shows information about some mines at different stages.

mine	mineral	stage
A	copper, gold	exploration
B	copper	exploration
C	copper, gold	production
D	copper	production
E	copper, gold, silver	development
F	copper, gold	development stopped
G	copper	closure

(i) Suggest possible reasons why development at mine **F** has stopped.

.....

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.....[2]

(ii) Suggest why an environmental impact assessment is required as the first stage in the development of a mine.

.....

.....[1]

(iii) Describe strategies that can be used to reduce the impact on the environment after closure of a mine.

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.....[3]

(c) The Angangueo underground mine in Michoacan state stopped production of copper, lead and zinc ores in 1992. Local people only earn money from tourism for part of the year as well as legal and illegal logging of the nearby pine forests.

A mining company has applied to start production again. The plan is to extract 3000 tonnes of ore each day for the next 12 years.

(i) Suggest why many people want the mining to start again.

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.....[2]

(ii) Suggest how this mining activity may reduce the impact of logging on the pine forests.

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.....[2]

(iii) There are two rivers and several streams flowing near the mine.

Explain why some local people are worried about water pollution if mining starts again.

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.....[3]

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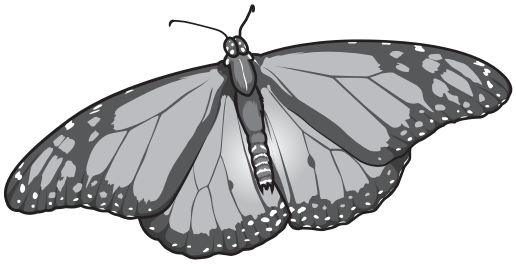
(d) The pine forests near the mine have been made into a biosphere reserve for the monarch butterfly.



monarch butterfly

The butterflies migrate from the USA to the state of Michoacan to spend the winter on the pine trees. An increasing number of tourists come to see the butterflies each year. The tourists are only allowed to visit two areas of the pine forest. The butterflies that survive the winter fly back to the USA in the spring, to breed.

A student used a questionnaire to interview some local people about tourism. The results are shown in the table.

question	% yes	% no
Is tourism good for local people?	80	20
Is the monarch butterfly being protected for the future?	70	30
Should tourists be allowed to visit more areas of the pine forest?	40	60

(i) The student interviewed a sample of 30 local people.

Describe a method the student could have used to select this sample.

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.....[2]

(ii) Suggest why local people think tourism will benefit them.

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.....[2]

(iii) Suggest why most local people think this tourism is sustainable.

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.....[2]

(iv) Suggest **one** further question about tourism that the student could have included in the questionnaire.

.....

.....[1]

(e) Local people hold a festival in February to celebrate the butterflies leaving the forest to migrate north.

Suggest how this festival and tourism may lead to the conservation of the monarch butterfly in Mexico.

.....

.....

.....

.....[2]

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