



**Cambridge International Examinations**  
Cambridge International General Certificate of Secondary Education

CANDIDATE  
NAME

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CENTRE  
NUMBER

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NUMBER

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**ENVIRONMENTAL MANAGEMENT**

**0680/42**

Paper 4

**February/March 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 **18** printed pages and **2** blank pages.

map of the world



map of Kazakhstan



**Area of Kazakhstan:** 2.72 million km<sup>2</sup>

**Population:** 18 million

**Children per woman:** 2.31

**Life expectancy:** 70.6 years

**Currency:** Tenge (335 KZT = 1 USD)

**Languages:** Kazakh, Russian

**Climate:** cold temperate interior, very cold winters and very warm summers, desert and semi-desert

**Terrain:** large area of flat grassland (steppe) in the north and west, mountains in the east, deserts in the south

**Main exports:** aluminium, copper, crude oil, iron, uranium

Kazakhstan is dependent on the export of crude oil and related products. It is the world's leading producer of uranium. The country has a high adult literacy rate. Although the wealth of the country is increasing, the health of the population remains low and only one quarter of the population is employed.

1 (a) Calculate the number of people in employment in Kazakhstan.

..... million [1]

(b) The government of Kazakhstan is committed to sustainable development.

One definition of sustainable development is:

*Development that meets the needs of the present generation without harming the ability of future generations to meet their own needs.*

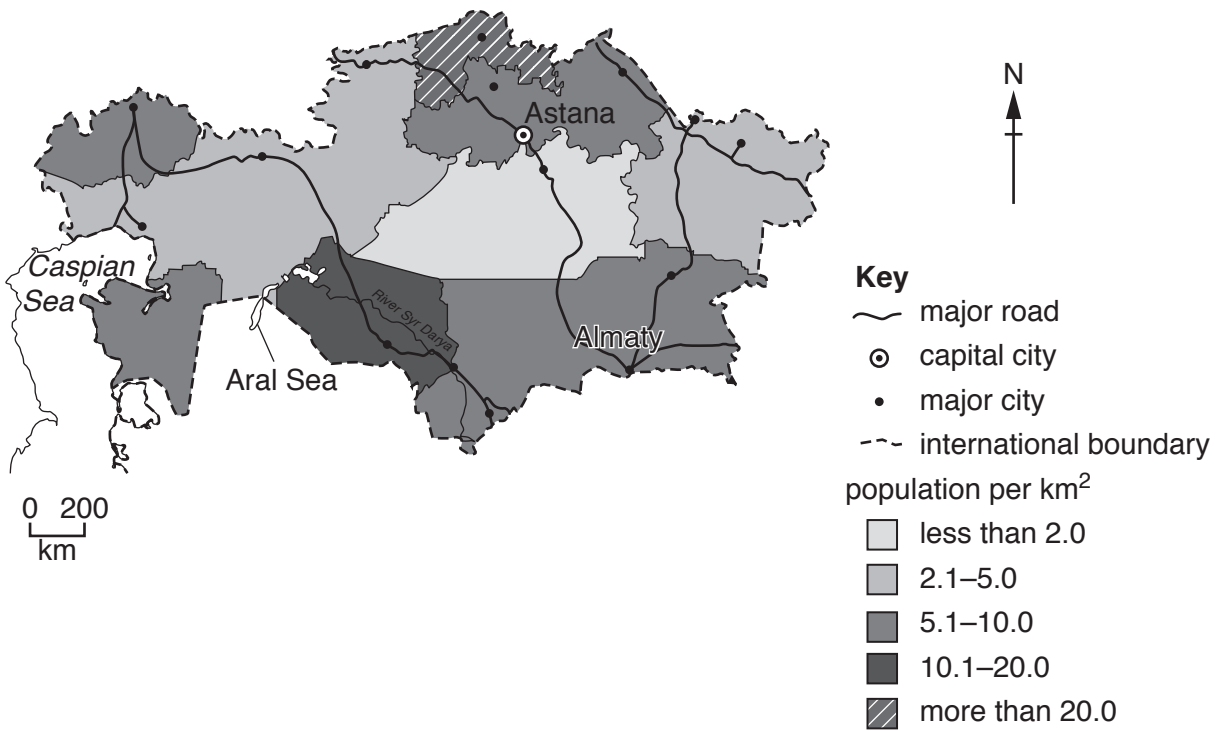
Employment and access to clean water are examples of these needs.

Complete the table with **two** other human needs.

<b>human need</b>
employment
clean water
.....
.....

[2]

(c) The map shows the population per km<sup>2</sup> in Kazakhstan.



(i) Use the map to describe the pattern of population per km<sup>2</sup> in Kazakhstan.

.....

.....

.....

.....[2]

(ii) The south of Kazakhstan is a desert but contains a high population per km<sup>2</sup>.

Suggest **two** reasons for this.

1 .....

.....

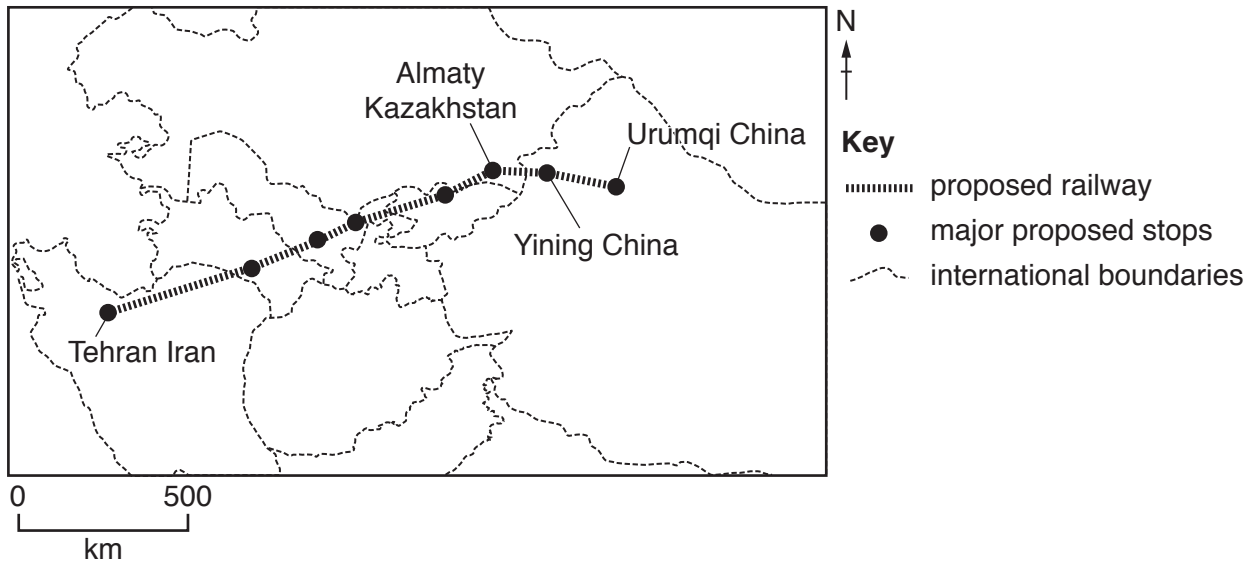
2 .....

.....

[2]



(e) The map shows a proposed high-speed railway. The railway would link China to western Asia, through Kazakhstan.



(i) Suggest why the governments of Kazakhstan and China want to build the proposed high-speed railway link.

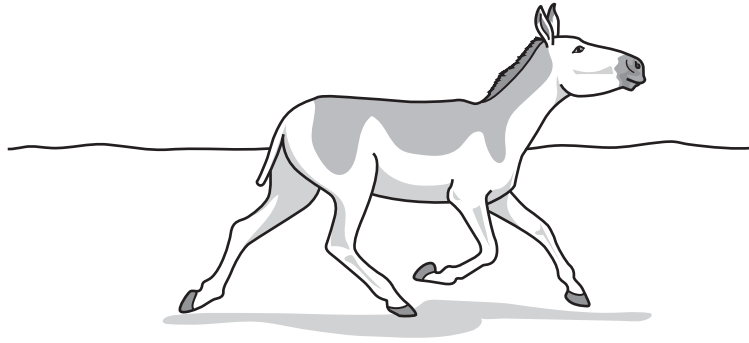
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.....[2]

- (ii) This proposed high-speed railway link will pass through the Kazakhstan steppe, where the threatened Wild Ass, or Kulan, live.



Explain how the Kazakhstan government could protect the Wild Ass.

.....  
.....  
.....  
.....[2]

- (iii) Wild Ass is on the International Union for Conservation of Nature (IUCN) Red List of threatened species.

Suggest how being on the IUCN Red List could benefit the population of Wild Ass.

.....  
.....  
.....  
.....[2]

- (iv) Apart from threatening the Wild Ass, suggest **one** other reason why this proposed high-speed railway link might **not** be built.

.....  
.....[1]



- (f) In 1997, the capital city of Kazakhstan was changed from Almaty in the southeast of the country to Astana in the north, an underdeveloped part of the country.



A student wants to carry out a survey to find out people’s views about the change of capital city and record their answers using a questionnaire. The student proposed three plans.

**plan A**

Visit one street in the north of Almaty and ask 20 people their views about the change of the capital city.

**plan B**

Visit one street in the north, south, east and west of Astana and ask 20 people in each street their views about the change.

**plan C**

Visit one street in the north, south, east and west of Astana and of Almaty and ask 20 people in each street their views about the change.

- (i) Explain why **plan A** will give the least valid results.

.....  
.....  
.....  
.....[2]

- (ii) Give **two** reasons why **plan C** is better than **plans A** and **B**.

1 .....  
.....  
2 .....  
.....[2]

(iii) The student wanted to use a questionnaire to find out:

- if people thought the change of the capital city was a good idea
- how people have benefited or been disadvantaged by the change of the capital city.

Here is part of the questionnaire:

1. Which age group are you in?

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
20 – 29	30 – 39	40 – 49	50 – 59	60 – 69	70 and over

2. What is your sex?

<input type="checkbox"/>	<input type="checkbox"/>
male	female

3. ....  
.....

4. ....  
.....

5. ....  
.....

Complete the questionnaire by writing **three** more suitable questions the student could have asked about the change of the capital city. [3]

(iv) Describe how the student could have selected the people for the questionnaire.

.....  
.....[1]

(g) One of the reasons for changing the capital city was that Almaty is located in an earthquake zone.

(i) The government was concerned about having a capital city in an earthquake zone.

Describe economic reasons why the government was concerned.

.....  
.....  
.....  
.....  
.....  
.....  
.....  
.....  
.....  
..... [4]

(ii) Suggest why some people chose to stay in Almaty despite the threat of earthquakes.

.....  
.....  
.....  
.....  
.....  
.....  
.....  
.....  
.....  
..... [4]

(h) Between 1949 and 1989 the Soviet Union conducted more than 400 nuclear tests in the northeast of Kazakhstan. After the tests ended, large amounts of radioactive material were left on the abandoned area.

Suggest why people in the northeast of Kazakhstan are still concerned about this area.

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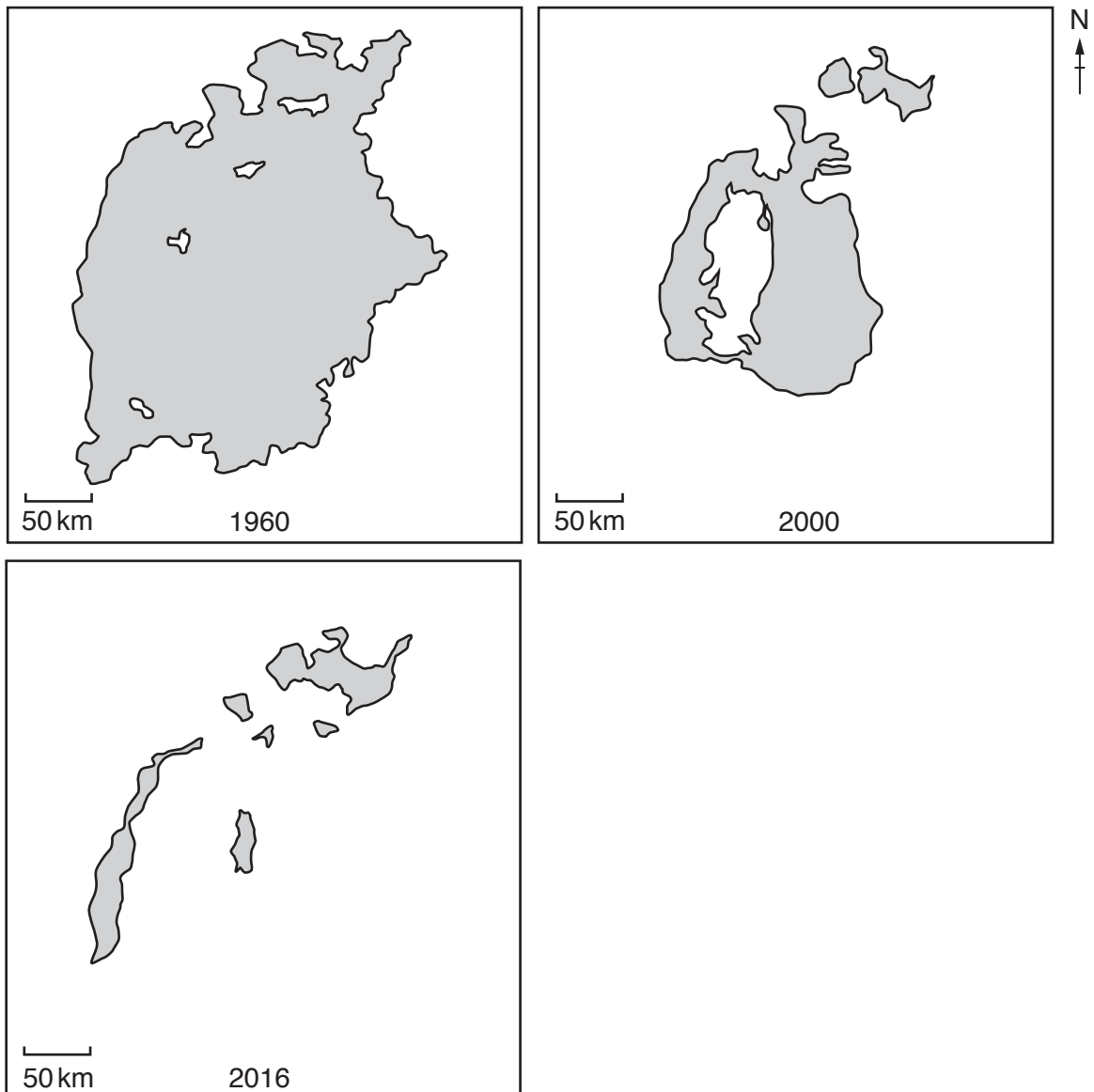
[3]



- 2 (a) The Aral Sea is in the southwest of Kazakhstan on the border with Uzbekistan.

In the 1960s, the two rivers that flowed into the Aral Sea were diverted to irrigate the desert region surrounding the sea. This diversion led to less water reaching the sea, water levels in the sea decreased and the concentration of salt in the water (salinity level) increased. The surrounding land became contaminated with toxic levels of salt. These changes have been described as an environmental disaster.

The diagrams show the changes to the surface area of water in the Aral Sea between 1960 and 2016.



(i) Use the diagrams to estimate the percentage decrease in surface area of the Aral Sea from 1960 to 2016.

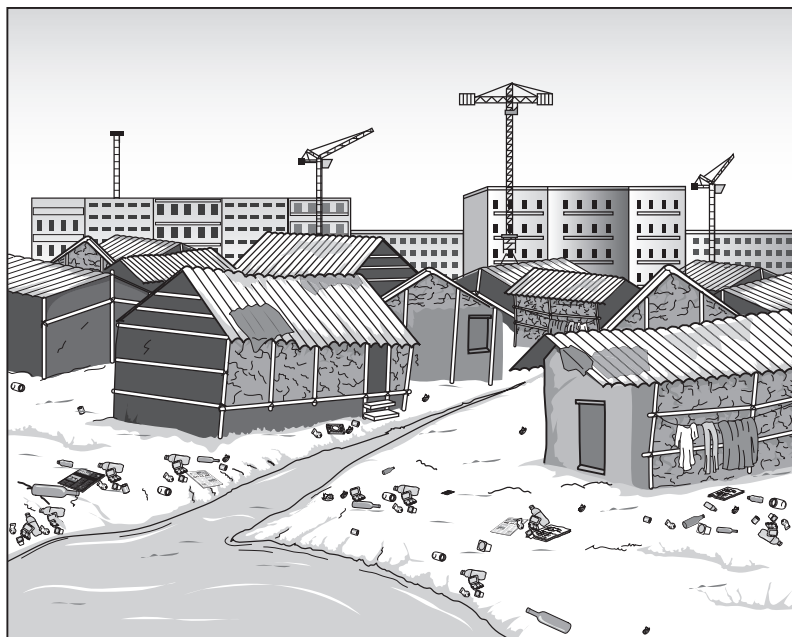
Circle the best estimate.

10%                      25%                      75%                      90%                      [1]

(ii) Suggest the impacts on the Aral Sea ecosystem as a result of decreasing water levels.

.....  
.....  
.....  
.....  
.....  
.....[3]

(b) Local fishermen were forced to travel 2000km to Lake Balkhash in eastern Kazakhstan to find work when the water levels of the Aral Sea decreased. Many fishermen lived in informal settlements (shanty towns).



Suggest **three** problems faced by people living in informal settlements.

1 .....  
.....  
2 .....  
.....  
3 .....  
.....

[3]

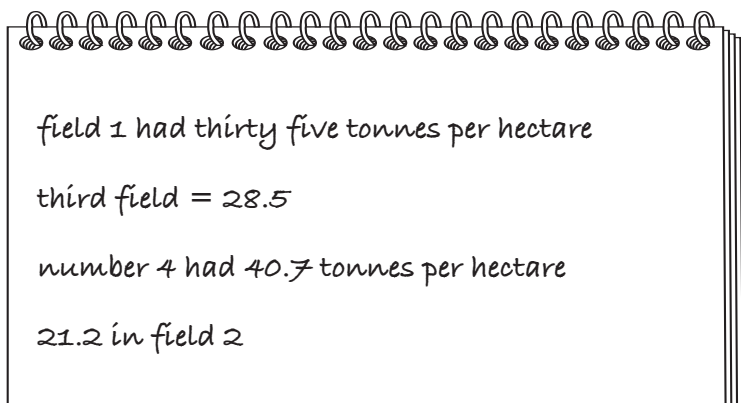
- (c) Some of the fishermen from the Aral Sea region became sugar beet farmers.

Sugar beet is a commercial crop grown in Kazakhstan.

Sugar beet will only produce a good crop when grown in soil with a pH between 6.5 and 8.0.

A student wanted to find out which field had the best soil pH for growing sugar beet.

The student recorded the yield of sugar beet from four different fields in a notebook.



- (i) Present the student's data in a suitable table.

[2]

- (ii) Suggest which field had the best pH for growing sugar beet. Give a reason for your answer.

field number .....

reason .....

.....

[1]

- (iii) Suggest what the student should have measured as well as yield in each field.

.....[1]



(iv) Give **two** reasons why the student cannot be sure that the results show a link between soil pH value and sugar beet yield.

1 .....

.....

2 .....

.....

[2]

(d) The table shows climate data from a weather station near Astana.

month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
average monthly temperature /°C	-16.5	-16.6	-9.7	3.9	12.7	18.5	20.7	17.8	12.5	3.2	-6.8	-13.2
average monthly precipitation /mm	17	12	13	22	35	33	53	32	23	30	20	18

(i) Sugar beet plants stop growing at temperatures lower than 6 °C.

Determine the length of the growing season for sugar beet grown near Astana.

..... months [1]

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

.....°C [1]

(iii) Suggest problems that the climate near Astana causes for farmers.

.....

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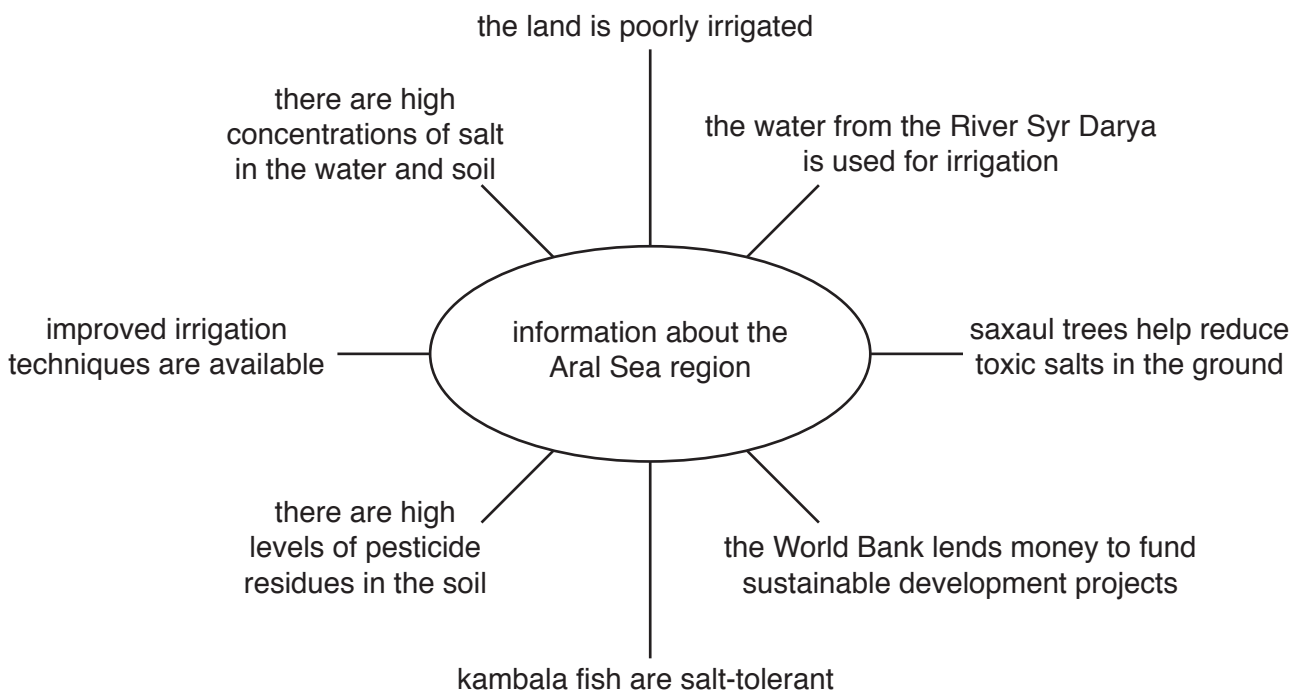
.....

.....

.....[4]

(e) The government of Kazakhstan wants to reduce the environmental and economic damage to the Aral Sea region.

The diagram shows some information that the government of Kazakhstan is using to decide how best to help the Aral Sea region.





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