UNIVERSITY OF CAMBRIDGE INTERNATIONAL EX
International General Certificate of Secondary Educati

CANDIDATE NAME

CENTRE NUMBER | | | | | |

CAN NUMBER

2121864037

ENVIRONMENTAL MANAGEMENT **0680/43**

Alternative to Coursework **May/June 2013**

1 hour 30 minutes

Candidates answer on the Question Paper.

Additional Materials: Ruler

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 a soft pencil for any diagrams, graphs or rough working.
Do not use staples, paper clips, highlighters, glue or correction fluid.
Electronic calculators may be used.
DO **NOT** WRITE IN ANY BARCODES.

Answer **all** questions.
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.

For Examiner's Use	
1	
2	
Total	

This document consists of **16** printed pages.

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2

World map



Map of Brazil



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Area of Brazil: 965 000 sq km

Population: 203 million

Children per woman: 1.9

Life expectancy: 72 years

Currency: reals (1.9 =1US$)

Languages: Portuguese, Amerindian languages

Climate: Hot wet tropical but more temperate in the south

Terrain: Amazon basin in the north, plateau in the interior and narro

Main exports: metal goods, vehicles and transport equipment, soybeans, ıron ore, cottee.

Brazil is the economic giant of South America. It has well developed agricultural, mining, manufacturing and service sectors. Brazil recovered from the global financial crisis due to the variety of its exports. Unemployment is lower than in most countries. 20% of the population work in agriculture. Brazil has 26 states, including Santa Catarina.

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Answer **all** the questions.

1 (a) (i) Describe the location of the state of Santa Catarina withi

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(ii) Why is the climate of Santa Catarina more temperate th

.....

.....[1]

(b) Recently many orchards of apple trees have been planted in Santa Catarina to meet high demand for apples in Brazil's big cities. Some apples are now exported to Europe.

Apple trees can be planted at different densities. This changes the yield of apples. A plant scientist wanted to find out the planting density that gave the best yield of apples per tree.

He used small plots of land next to each other and planted between 50 and 100 trees on each plot. He recorded the number of apples per tree at the first harvest.

density / number of trees per plot	number of apple fruits per tree at the first harvest
50	240
60	230
70	190
80	150
90	120
100	110

(i) Explain why the plant scientist used plots of land next to each other.

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.....[2]

(ii) Suggest **one** other factor that the plant scientist kept the same for all the plots.

.....[1]

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(iii) Describe how the plant scientist would have carried out t

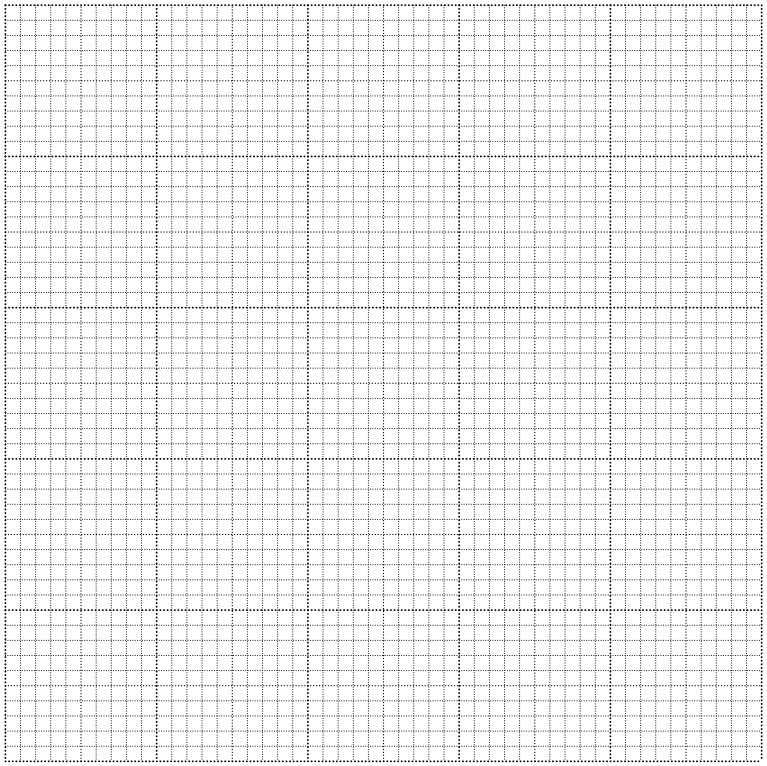
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(iv) Draw a graph to show the data in the table on the grid b



[4]

(v) How many trees per plot would you recommend farmers use to plant apple trees to maximise the overall yield? Give a reason for your answer.

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.....[2]

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(vi) Suggest **one** other measurement the plant scientist sampling the apple trees.

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(c) (i) Some farmers still harvest from low numbers of trees pe that despite picking fewer apples they make more prof years. Explain why this might be so.

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.....[3]

(ii) The apple trees need up to 600 hours during the year when temperatures are below 7.2 °C to produce good yields of apples.

Average monthly and lowest recorded temperature from a weather station in Santa Catarina

month	**J**	**F**	**M**	**A**	**M**	**J**	**J**	**A**	**S**	**O**	**N**	**D**
average daily temperature / °C	25	25	23	21	17	14	14	15	16	18	21	23
lowest recorded temperatures / °C	11	11	9	5	0	–1	–4	–1	0	4	6	8

During which months of the year are temperatures most likely to be below 7.2 °C?

.....[1]

(iii) The apple orchards are planted at heights between 400 and 1000 m. The average recorded decrease of temperature with height is 0.6 °C per 100 m. What is the expected difference in temperature between orchards at 400 m and 1000 m?

Space for working.

.....[2]

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(iv) Suggest why apple farmers are planting new orchar southern Brazil.

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(d) (i) An apple farmer noticed that in two parts of an orchard the yield of apples was below average. He had 3 maximum and minimum thermometers. Describe how the farmer could place the 3 thermometers to investigate differences in temperature within the orchard to see if temperature was affecting yield.

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.....

.....[2]

(ii) Explain how the farmer could use the data recorded to find out why some trees gave below average yield.

.....

.....[1]

(iii) The farmer measured temperatures for one week and recorded the data in a suitable table as shown below.

Complete the **headings** in the table below. [2]

	thermometer 1		.....		.....	
day	.....	.....	.....	.....	.....	.....
1						
2						
3						
4						
5						
6						
7						

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(iv) The farmer measured the temperature every week of t
data on a table for each week.

Explain why the farmer needed to measure the temperat

.....

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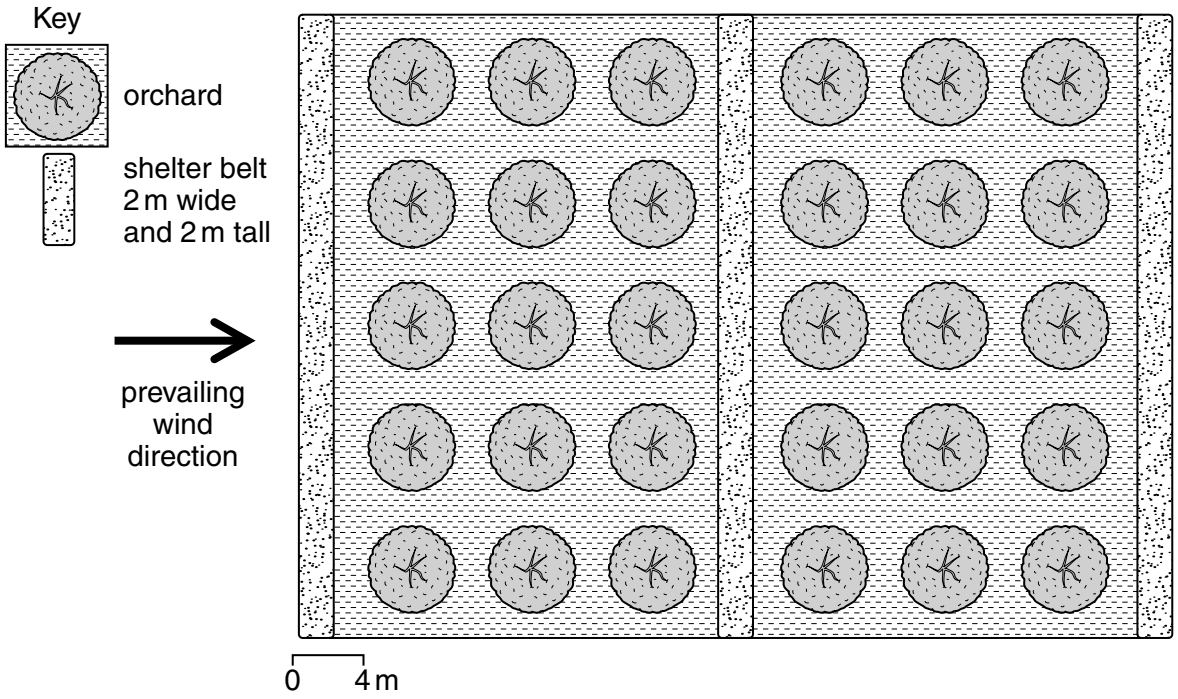
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.....[3]

(e) The apple trees produce many flowers in spring. These flowers are easily damaged by high winds.

Farmers plant hedges to act as shelter belts to protect the flowers as shown in the diagram below. The shelter belts reduce wind speed for a distance 10 times greater than their height.



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(i) Calculate the distance protected by the shelter belts
Comment on the position of the shelter belts in the diagr

Space for working.

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.....[2]

(ii) Shade in, on the diagram, **one** of the areas where the flowers are most likely to be damaged in spring.

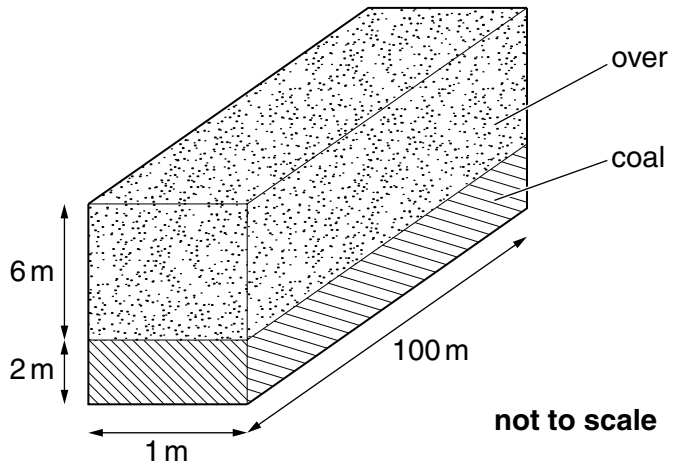
Put your shading on the diagram opposite. [1]

[Total: 33]

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2 Coal has been mined in the state of Santa Catarina for more than removed by open cast mining. It has been estimated that more th rivers have been polluted by coal mining.

(a) (i) The surface layers of soil and rock above the coal is call to be removed before the coal can be extracted.



Calculate the volume of overburden and coal that can be removed from the 1 m ×100 m strip shown in the diagram.

overburden .....

coal .....[2]

(ii) Describe the surface environmental problems caused by removing the overburden.

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.....[2]

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(iii) The exposed coal seam contains several pollutants that
The pollutants then enter streams and rivers. A survey o
carried out. The results are shown below.

stream	discharge / cubic metres per hour	manganese / mg per dm^3	iron / mg per dm^3	alumi / mg pe	
A	9	1.6	25	32	
B	80	7.6	152	31	
C	17	1.5	1	11	3.1
D	257	4.0	61	15	3.4
E	50	0.2	2	1	5.0

Use the information given above to complete the table below.

stream with the	stream
highest discharge	.....
highest manganese content	.....
highest iron content	.....
highest aluminium content	.....
lowest iron content	.....
highest acidity	.....

[2]

(iv) All the streams have increased concentrations of the metals aluminium and manganese. Describe the possible changes to organisms living in these streams as a result of this form of pollution.

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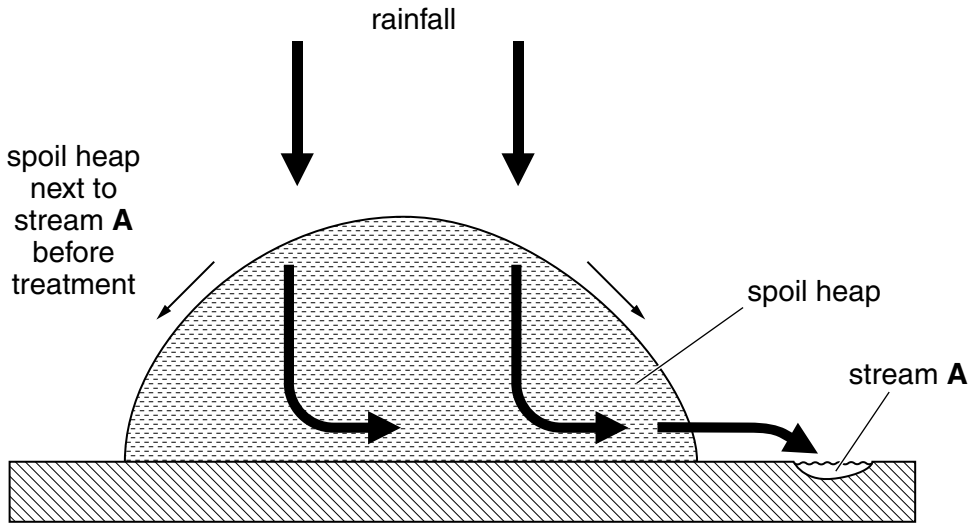
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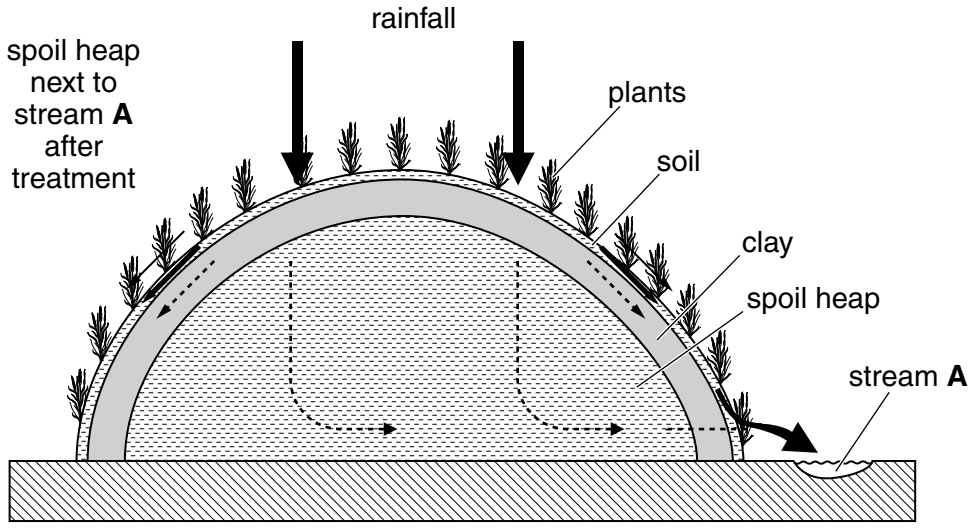
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.....[4]

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(b) Some of the old mines are now closed including the mine n Houses built near the old mines are supplied with drinkin polluted streams. A reclamation programme has been start and to cover spoil heaps to reduce water pollution. Spoil h layer of clay followed by a thin layer of soil. The next stage i heavy metals.





(i) Suggest the values that might be recorded in a table like that on page 11, for stream **A** after the reclamation treatment of the spoil heap next to the stream has been completed.

Write your answers in the table below. [1]

stream	discharge / cubic metres per hour	manganese / mg per dm^3	iron / mg per dm^3	aluminium / mg per dm^3	pH
A	.....	.....	.....	.....	.....

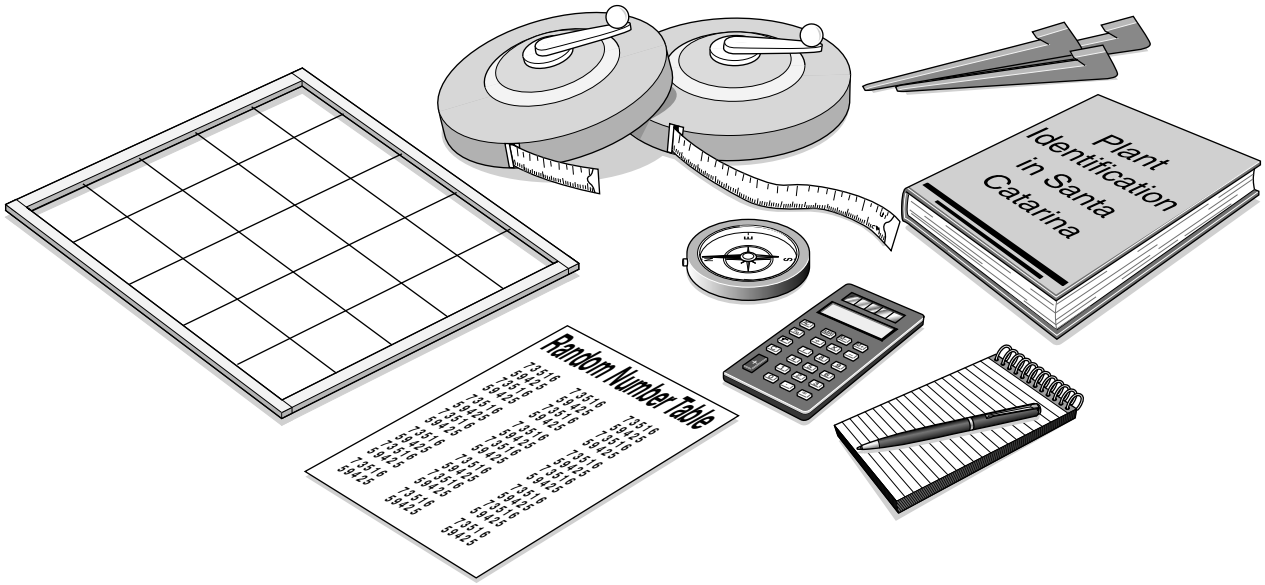
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(ii) A scientist carried out a survey of the vegetation cover The surveys after 2 and 4 years showed that the plant heap slowly. The results are shown below.

years after reclamation	average number of different species
2	9
4	12

aver

The scientist had the equipment shown below.



Describe a method the scientist could have used to collect the data for the first survey using the equipment above.

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.....[5]

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(iii) How did the scientist make sure the first and seco compared?

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(iv) Calculate the percentage increase in number of spec second survey.

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.....[1]

(v) The manager in charge of the reclamation programme was worried about the high percentage of bare ground after four years. Suggest why.

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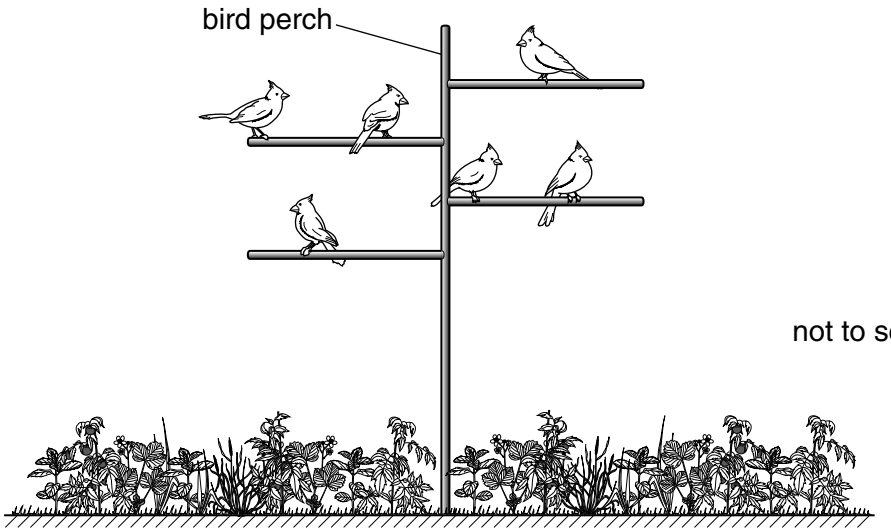
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.....[2]

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(c) A biologist living near the waste heaps noticed that many bird growing on a reclaimed spoil heap. To make observations perches on different parts of the waste heap.



She recorded fifteen species of seed eating birds. She noticed that more plants were growing within ten metres of the perches. She reported her observations to the manager of the reclamation programme.

	average number of plant species	average percentage of bare ground
less than 10 metres from a bird perch	16	27
more than 10 metres from a bird perch	12	42

Suggest why

(i) the number of plant species was greater near bird perches

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(ii) the percentage of bare ground had decreased near bird perches.

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[2]

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(d) Coal mining is carried out in Santa Catarina.

- coal is of low value
- most is sold to generate electricity in Brazil
- none is exported
- the coal seams that extend under the sea have not been
- the coal has a high ash and sulfur content
- mine waste causes water pollution
- mining provides many jobs

A newspaper carried out a survey to find out what local people in Santa Catarina. It found that opinion was divided, some people strongly supporting mining, other people strongly against it.

Suggest reasons why the opinions of people in Santa Catarina about coal mining were divided.

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.....[5]

[Total: 27]

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