

- 2 The photograph shows a quarry where sedimentary rock is extracted.



- (a) State the name of **one** sedimentary rock.

..... [1]

- (b) State **two** environmental impacts of the quarry shown in the photograph.

1

2 [2]

- (c) Suggest ways this quarry benefits the local community.

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 [2]

[Total: 5]

- 2 The geology of Senegal is mostly sedimentary rocks. These include large deposits of phosphate rock.

(a) Describe the formation of sedimentary rock.

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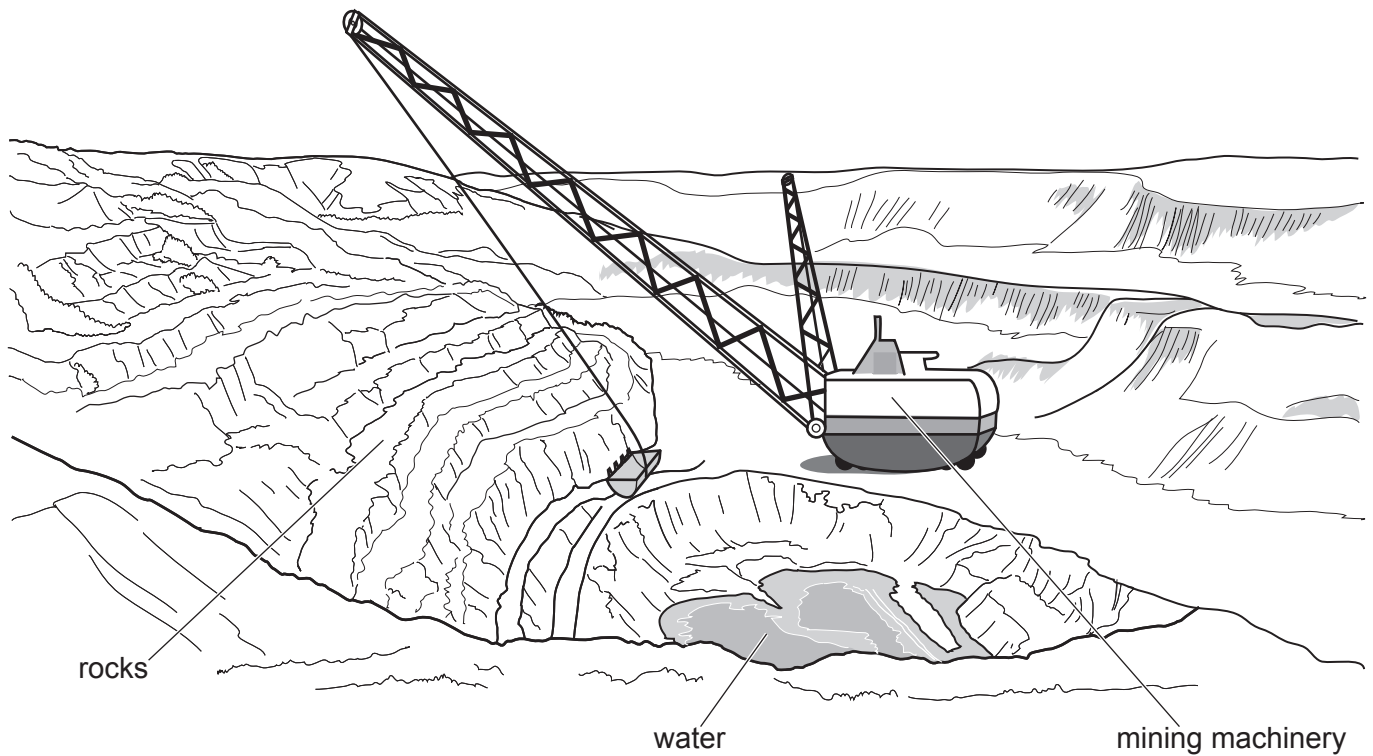
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..... [3]

- (b) The drawing shows phosphate rock being mined in Senegal.

Phosphate rock is a valuable export.



- (i) Name the type of mining shown in the drawing.

..... [1]

- (ii) Describe the environmental damage that can be caused by this type of mining.

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- 2 The Dominican Republic has one of the world's largest surface gold mines. The drawing shows part of this surface mine.



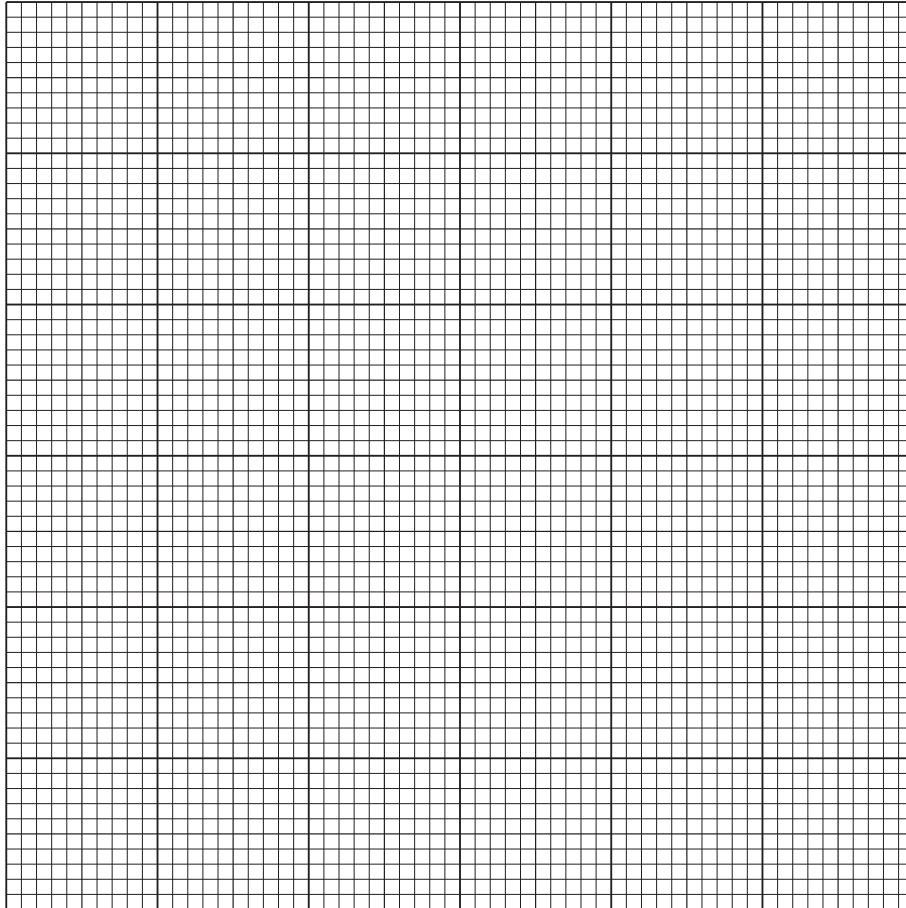
In 2018, the government was asked to give a licence for the first subsurface (underground) gold mine in the Dominican Republic.

The subsurface mine is expected to work for seven years. The cost of developing this mine is expected to be paid back in three years.

(a) The world gold price between 2012 and 2019 is shown in the table.

year	2012	2013	2014	2015	2016	2017	2018	2019
world gold price / 1000 USD per kg	50	53	38	38	34	36	40	40

(i) On the grid, plot a graph of world gold price against year.



[4]

(ii) Suggest why the mining company thinks that the cost of developing the subsurface mine can be paid back in three years.

Use the data to support your answer.

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- (b) (i) Suggest reasons why a subsurface mine is expected to cause **less** damage to the environment than the surface mine shown in the drawing.

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- (ii) Suggest **two** benefits of the proposed subsurface mine to local people.

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- (iii) A mining licence is only given if the mining company agrees to be responsible for the site for several years after the mine has closed.

Suggest reasons why.

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..... [2]

[Total: 13]

- 3 (a) Complete the table by putting each rock in the correct column.

basalt granite marble limestone shale slate

rock type		
igneous	metamorphic	sedimentary

[3]

- (b) Describe how a sedimentary rock such as sandstone is formed.

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..... [3]

(c) The photograph shows a quarry where gravel is extracted.



Describe the impacts of this gravel extraction on the local environment.

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..... [2]

[Total: 8]

- 1 (a) Name the types of rock formed by each of the following:

heat and/or pressure deep in the Earth's crust

magma or lava cooling and solidifying

the deposition of rock fragments, usually beneath the sea.

[3]

- (b) (i) Describe how a mineral, such as iron ore, is extracted from an open-pit (opencast) mine.

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.....[3]

- (ii) Describe how the land can be restored after open-pit mining.

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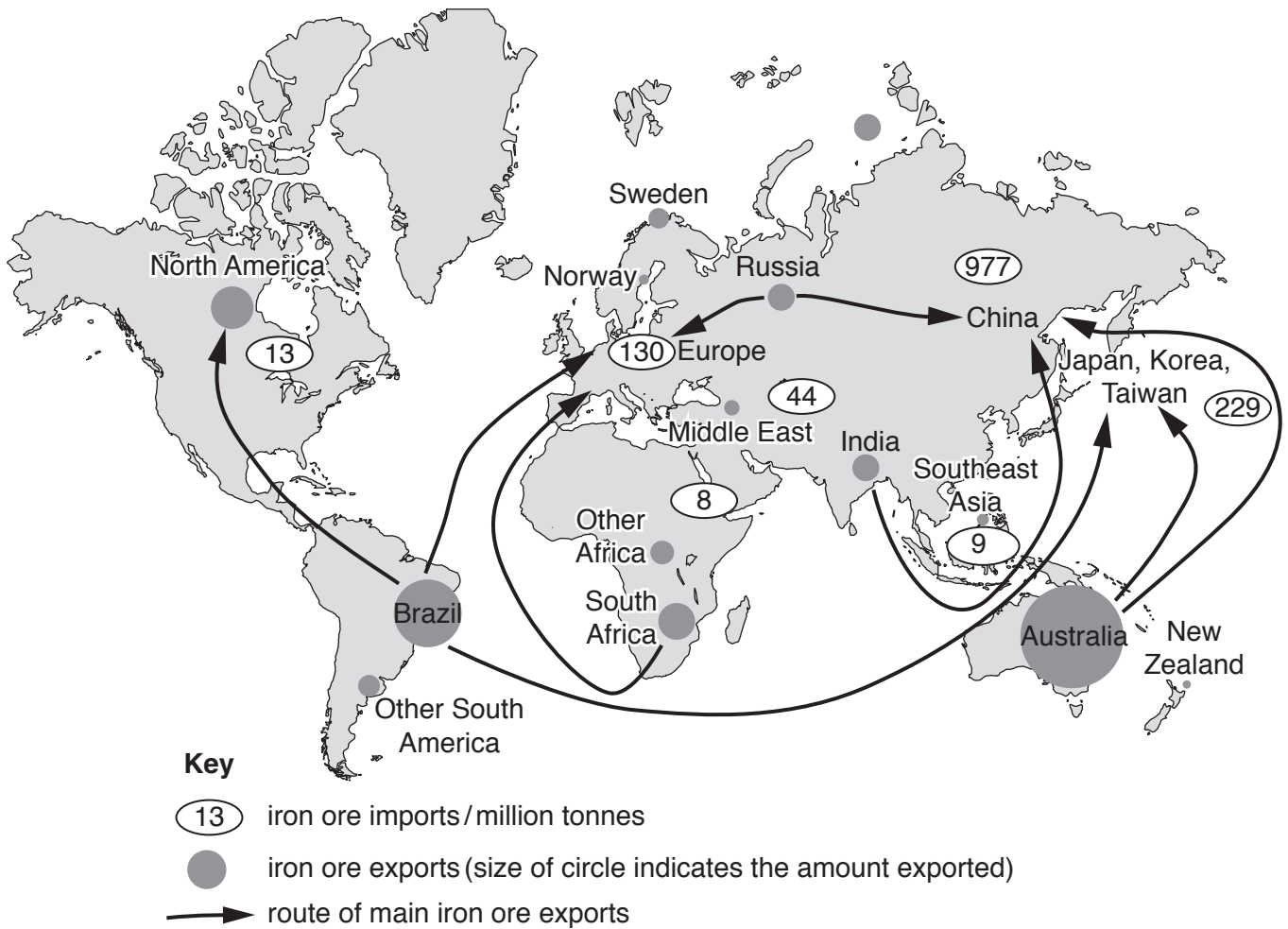
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(c) The map shows recent iron ore exports, transport routes and imports for one year.



Using the map:

(i) name the country which exported the most iron ore.

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[1]

(ii) name the country which imported the most iron ore and state how much it imported.

name

quantity imported million tonnes

[2]

(iii) Suggest why Japan, Korea and Taiwan imported such large quantities of iron ore.

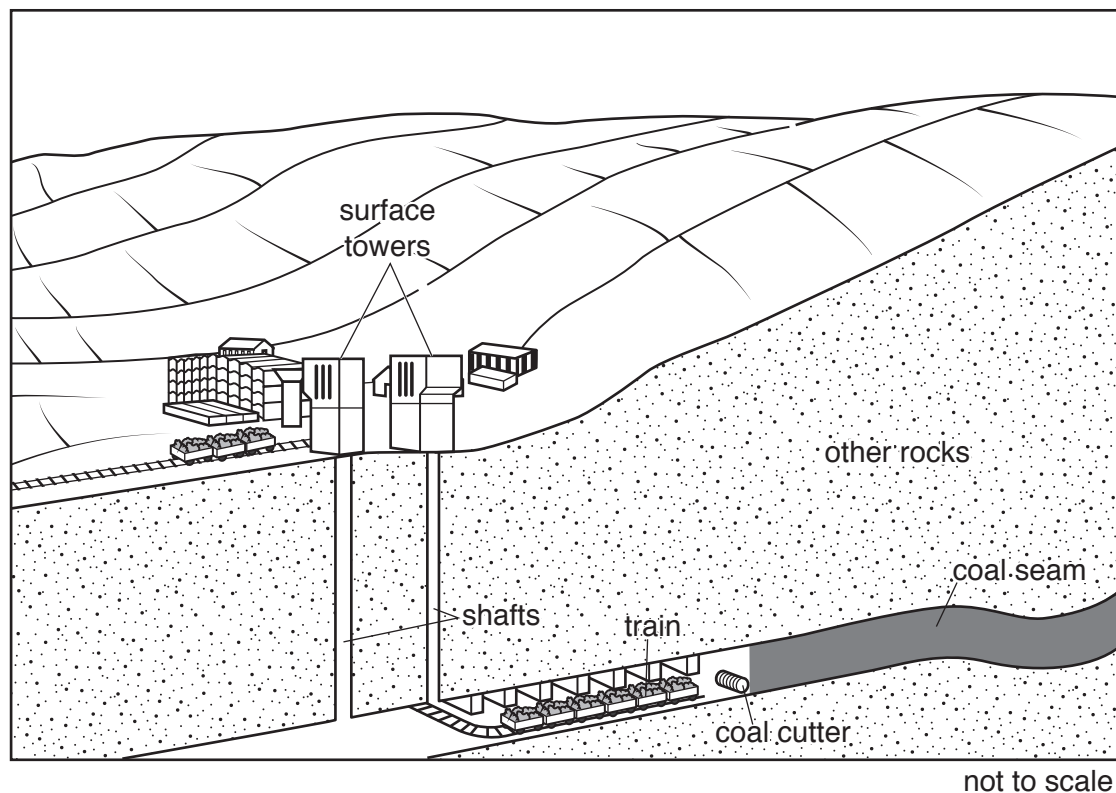
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(d) The diagram shows a deep coal mine.



(i) Describe how the coal shown in the diagram was formed.

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(ii) Using the diagram, describe how the coal is mined.

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- 2 (a) Rocks and minerals have many uses for people. Here is a list of nine useful rocks and minerals.

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Use

bauxite coal diamonds iron ore lead

limestone oil (petroleum) phosphates uranium

- (i) From the list, choose the rock or mineral for each of the uses named below.

use	rock / mineral
concrete and cement
plastics and synthetic fibres
steel girders
nuclear power [2]

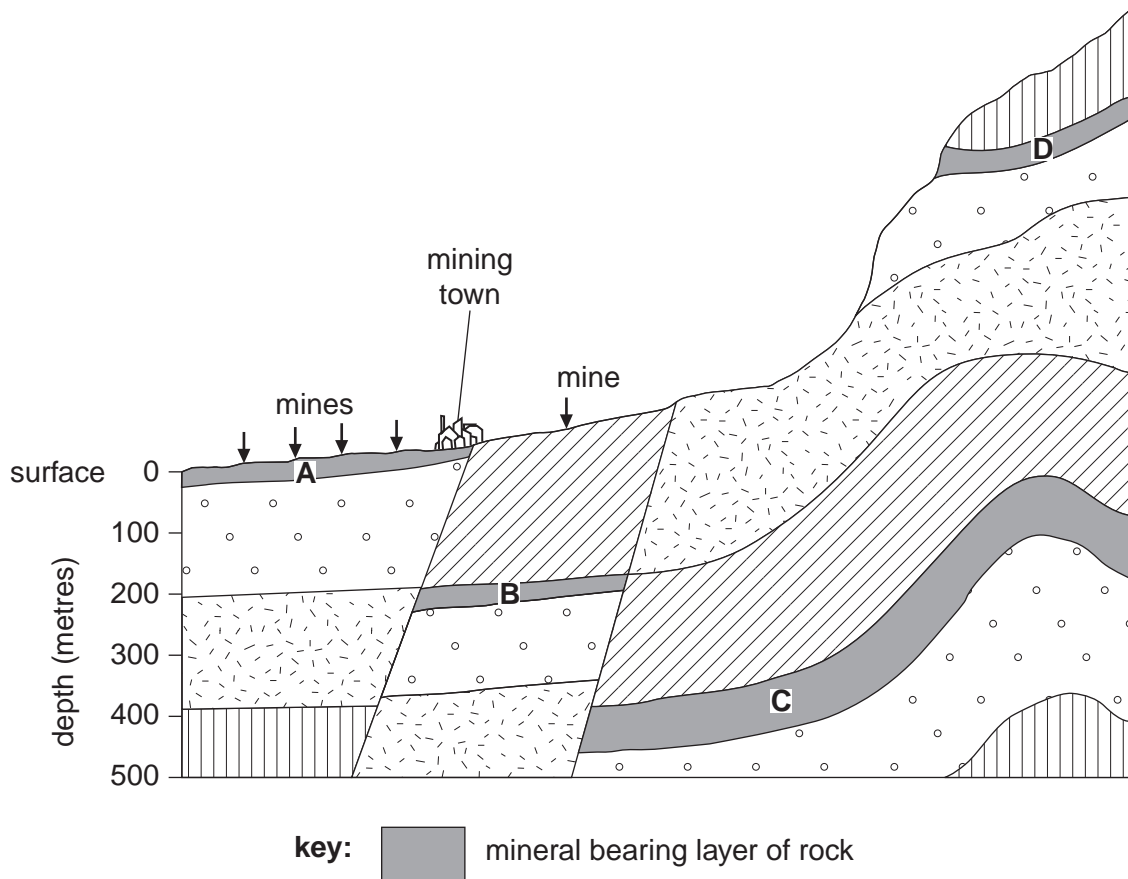
- (ii) Choose any two of the other five rocks and minerals in the list, which were not used in answering part (i). Give a use for each of them.

rock / mineral	use
1

2
 [2]

(b) Look at the diagram which shows rock formations in a mining area.

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Use



(i) Name the type of mining used to take minerals out of rock layer A.

.....[1]

(ii) Describe the methods of mining used to take minerals out of rock layer B.

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[3]

- (iii) Explain why four mines are being used to take the minerals out of rock layer **A**, compared with only one for rock layer **B**.

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.....[3]

- (iv) All mining causes environmental problems. Would you expect the environmental problems to be greater from mining rock layer **A** or **B**? Explain your answer.

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.....[2]

- (v) When mining finishes at **A** and **B**, the mining company will need to look at rock layers **C** and **D**. Describe how the problems for mining layers **C** and **D** are likely to be greater than they were for **A** and **B**.

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.....[3]

- (vi) Which rock layer would you expect them to mine first, **C** or **D**? Explain your answer.

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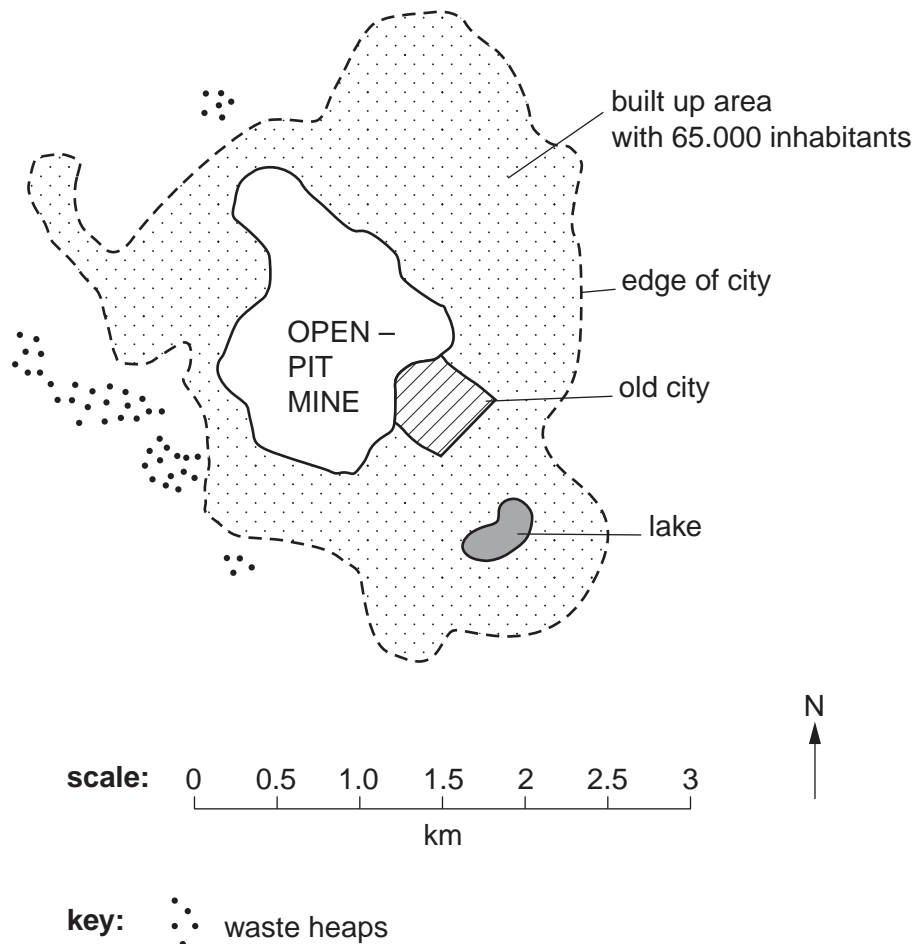
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- (c) Cerro de Pasco is a mining town in the Andes of Peru. At a height of 4,380 metres above sea level, mining is the only reason for the existence of the town. Silver, lead and zinc have been mined here for over 400 years from a large open pit mine in the centre of town. The town clings to the edges of the 380 metre deep pit, as the map below shows. The mine produces 60,000 tonnes of lead and 150,000 tonnes of zinc a year and reserves are plentiful. The streets of poor houses, with their corrugated iron roofs black with mining dust, suddenly stop at the edge of the pit. Houses near the edge of the pit show many cracks.

Cerro de Pasco



- (i) Look at the map and its scale. Describe how it shows the large size of the mine.

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..... [2]

- (ii) Describe the location of the mine.

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.....[2]

- (iii) Suggest a reason for the large number of cracks reported in the houses near the edge of the pit.

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.....[1]

- (iv) Where does the waste from the mine go?

.....[1]

- (v) A health report in 2007 showed that over 90% of children and 80% of women of child-bearing age had high blood levels of toxic substances like lead. Diseases of lungs and heart were found to be common in older residents.
Explain how the mining here can cause great health problems like these for the inhabitants of Cerro de Pasco.

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.....[4]

- (d) The mining company wants to increase the size of the open pit to mine in the area under the old city. This will involve the destruction of the main church, historical buildings and many houses.

There are two plans.

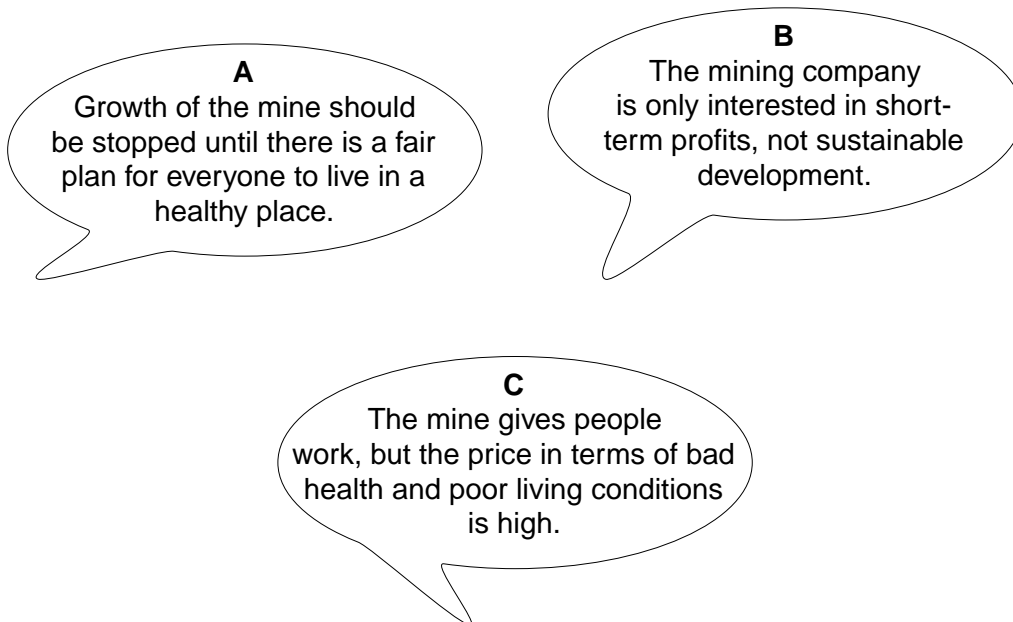
Plan 1 The big move

- Build a new town for 70,000 people 35 km away, along the main road
- Cost estimates range from US\$500 million to US\$3500 billion; who will pay?
- Expected time for doing this 10–15 years

Plan 2 Local resettlement by the mining company

- Build a new church, public buildings and houses not far from the mine
- Cost estimates are US\$5-10 million
- Expected time for doing this 2–3 years

Views of residents



- (i) What are the advantages of Plan 1 compared with Plan 2?

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..... [5]

.....[5]

.....[1]

..... [4]

- (iii) The main cause of the drop in world copper price was the recession in developed world countries. Why would a producer of copper (used in electrical wiring) and platinum (used in catalytic converters), located more than 12,000km away like Zambia, be so badly affected?

For
Examiner's
Use

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..... [2]

[Total: 40 marks]

- 6 In 2015, a new tungsten mine was opened in the United Kingdom. Tungsten is a metal used in many industries.

Before the mine opened, the United Kingdom imported the majority of its tungsten from overseas. The new mine will be the fourth-biggest tungsten mine in the world. The tungsten is found very close to the surface.

There is an increased world demand for tungsten.

The new mine created approximately 200 jobs in the local area.

The photograph shows this type of mining.



- (a) (i) State the type of mining shown in the photograph.

..... [1]

- (ii) Explain why this type of mining is suitable for the new tungsten mine.

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 [1]

- (b) Describe **three** impacts of this mine on the local area.

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[3]

- (c) Recycling is one strategy for the sustainable use of rocks and minerals.

Describe another way rocks and minerals can be used sustainably.

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 [1]

- (d) A student read an article in a scientific journal about e-waste.

E-waste

E-waste consists of electrical and electronic equipment and their components, which have been thrown away rather than being reused.

E-waste is difficult to manage because it is made-up of many different components, many of which are toxic. Typical toxins include heavy metals such as mercury, chromium and lead, acidic gases from burning plastics and CFCs from refrigeration units. These toxins can have negative environmental and health effects. Some e-waste contains useful metals such as tungsten, gold, silver, iron, aluminium and copper.

Some countries have take-back systems where consumers can safely recycle their e-waste and even have their e-waste collected from their homes. However, most e-waste is incinerated, buried as land-fill or dumped illegally.

- (i) Describe what is meant by e-waste.

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 [1]

- (ii) Suggest and explain **two** negative effects of e-waste.

1

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 [2]