



UK Critical Minerals
Intelligence Centre

CRITICAL MINERALS

KS3 lesson 2 plan: life cycle of a mineral



British
Geological
Survey



Department for
Business & Trade

Introduction

[KS3 teacher's notes pages 1 and 2]

[See Powerpoint slides 2 and 3]

Activity 1

Discuss the previous lesson and homework. Which mineral uses have pupils found in the home or on way to and from school?

Introduce this statement: 'If it can't be grown, it has to be mined!' Discuss the statement, then complete the question in the workbook.

Activity 2: critical minerals and mobile phones

[KS3 Teacher's Notes page 1]

[See Powerpoint slides 4 and 5]

Part 1

[KS3 Teacher's Notes pages 2 and 3]

[See Powerpoint slide 6]

Pupils work in pairs or small groups, using an atlas or working online to find the many countries involved in the supply chain for mobile phones. Pupils plot the countries on a world map. Research what resources come from which countries and then plot the cumulative distance all the different parts of a mobile phone have travelled to end up in the UK.

Use the scale 1 cm = 1000 miles.

Please note: this is not 100% accurate but will give the pupils an idea of the global impact of the mobile phone supply chain.

Countries that provide mobile phone parts for Nokia:

- | | | | |
|-----------|------------|---------------|---------------|
| • Austria | • Germany | • Netherlands | • Switzerland |
| • Brazil | • Hungary | • Philippines | • Taiwan |
| • China | • Ireland | • Portugal | • Thailand |
| • Czechia | • Israel | • Singapore | • UK |
| • Denmark | • Japan | • Slovakia | • USA |
| • Estonia | • Malaysia | • South Korea | |
| • Finland | • Mexico | • Spain | |
| • France | • Morocco | • Sweden | |

Consider the implications that this pattern of distribution may cause.

Part 2

[KS3 Teacher's Notes pages 3 and 4]

[See Powerpoint slide 6]

[Play video 'The life cycle of a mineral' from start to end]

Answer the following questions.

- Name some of the raw materials extracted for use in mobile phones.
A mobile phone is 40% metal, 40% plastic and fibreglass and 20% ceramics and trace elements, which may include copper, gold, lead, nickel, zinc, tin and silver.
- What are some of the wider implications of mining for rare, raw materials?
The mining of materials can lead to various types of pollution including visual, water and atmospheric pollution. These materials are also not renewable, meaning that once they are gone, they are not replaceable, which makes recycling incredibly important.
- Consider the use of energy throughout extraction, processing and manufacturing. What effect may this have on the production of greenhouse gases and climate change?
The mining of these materials involves the production of large amounts of greenhouse gases, which further contribute to climate change. This will have a profound effect on the future of life on the planet.
- Name some materials that are used for packaging. Can any of these materials be recycled?
Packaging can use plastics from oil, paper and cardboard.
- What is the average replacement time for mobile phones in the USA? In what ways can we extend the lives of our mobile phones?
The average mobile phone is only used for 18 months on average.
- What are the problems with the disposal of mobile phones in landfill? Why should we recycle our old mobile phones? How could you dispose of an old mobile phone in a responsible way?
If a phone goes to landfill, the toxic components can remain in the ground for hundreds of years and could possibly leak out into water supplies. Between 1999 and 2003, 2.5 million phones were collected to be recycled or reused, accounting for less than 1% of the millions of mobile phones returned or discarded each year.
- How can former quarries and mines be used to recycle the land in a responsible and environmentally friendly way?
A quarry may be filled with water for leisure activities. The old quarry at Minera is now part of Minera Country Park, a beautiful place to enjoy the fresh air and an example of the 'end of life' of the quarry and restoration of the landscape. In Cornwall, the Eden project transformed a former china clay quarry into an educational, botanical garden that also stages summer concerts and family events.

Part 3

[KS3 Teacher's Notes page 5]

[See Powerpoint slides 7, 9 and 9]

Label the diagram to demonstrate the life cycle of a mobile phone.

Activity 3: careers in the geosciences

KS3 Teacher's Notes pages 6, 7 and 8]

[See Powerpoint slides 10, 11 and 12]

Pupils match photographs to job descriptions.

Go through answers on the Powerpoint slides.

Point out to pupils the variety of jobs available in the geosciences. Discuss some of the jobs.

- What would be the expected salary?
- Where in the world may the job take you?
- What qualifications would you need?
- What sort of a person would you need to be?

Homework/extension

Research a geoscience-related job, make a few notes and present back to the class (one or two minutes each) in the following lesson. Try to choose either:

- a job you think would be interesting and perhaps would like to do
- something you think is a different or unique career

Plenary

[Five minutes]

Summarise what you have learned today.

- The wide use of minerals in everyday life and the statement 'If it can't be grown, it has to be mined!'
- The use of 'critical minerals' in today's modern society, for example in mobile phones
- The life cycle of a mobile phone and the parallel life cycle of a mine/quarry
- The implications of each stage of these life cycles
- Why we should consider recycling mobile phones
- Appreciate the 'end of life' use of a mine/quarry and the restoration process
- The range of opportunities that a career in the geosciences can offer