UK Critical Minerals Intelligence Centre

CRITICAL MINERALS

KS3 lesson 1 plan: minerals in everyday life

British Geological Survey

Department for Business & Trade

The pupil workbook will need to be printed before the lesson.

Introduction to minerals

[KS3 Teacher's Notes pages 1 and 2]

[See Powerpoint slides 1 and 2]

[Play video 'Minerals in everyday life from start to 00:40]

What is a mineral?

[Take answers]

A mineral is a solid substance that occurs naturally. Minerals can be made from one or multiple elements.

What is the difference between rocks and minerals?

[Take answers]

Rocks are aggregates or combinations of one or more minerals. Some rocks such as marble contain only one mineral (calcite), but most consist of more than one.

Discuss any other questions arising from pupils about minerals: where they come from, how we get them, what is an economic mineral, etc.

Activity 1: minerals in everyday life

[KS3 Teacher's Notes pages 3 and 4]

[See Powerpoint slide 5 to 8]

[Play video 'Minerals in everyday life' from 00:40 to 01:20]

This activity is best printed off and cut into cards as a matching game. In small groups, pupils will match the photos to the statement provided. As an extension, pupils can also try to match the photo to the mineral name. Full answers are provided in the teacher notes on page 3.

Activity 2: critical minerals

Part 1: critical minerals questions

[KS3 Teacher's Notes pages 4 and 5]

[See Powerpoint slide 10 and 11]

[Play video 'Minerals in everyday life' from 01:20 to 03:45]

Pupils answer questions from the video about critical minerals and the UK's strategy.

Questions:

- What are critical minerals?
  A critical mineral is a metallic or non-metallic element that is essential for modern technologies, economies or national security, and has a supply chain at risk of disruption. Some minerals are more important than others, especially for developing new clean technologies for the future, and these are referred to as critical minerals.Name some of the critical minerals of the past and some of the modern-day critical minerals.During the Industrial Revolution, iron and steel were critical minerals. Before that, flint was a critical mineral used by Stone Age humans to make tools. Nowadays, it is minerals such as cobalt, lithium, graphite, tin and rare earth metals (see Part 2) that are the critical minerals.
- Why are critical minerals so important today?
  We need lithium, cobalt and graphite to make batteries for electric cars; silicon and tin for our electronics, and rare earth elements for electric cars and wind turbines. Almost every part of modern daily life relies on minerals, often mined thousands of miles away. Critical minerals will become even more important as the world is expected to need four times as much critical minerals for clean energy technologies in 2040 as it does today.
- What problems exist with the supply chain for critical minerals?
  Critical mineral supply chains are complex, the market is volatile and distorted, and China is the dominant player. This creates a situation where UK jobs and industries rely on minerals vulnerable to market shocks and political events, at a time when global demand for these minerals is rising faster than ever.
- Explain the UK Government critical minerals strategy.
  - Accelerate growth of the UK's domestic capabilities
  - Collaborate with international partners,
  - Enhance international markets to make them more responsive, transparent and responsible.

Part 2: critical mineral potential in the UK

[KS3 Teacher's Notes pages 6 to 9]

[See Powerpoint slides 13 to 16]

The teacher will lead pupils and introduce the three main rock groups: igneous, metamorphic and sedimentary. More complex definitions are found on page 6 of the teacher's notes.

Pupils add lines to the labels and colour in the relevant area to identify areas where critical minerals are explored, extracted and processed across the UK.

Pupils describe the links between the critical minerals areas on their map and a geology map showing the three major rock types.

Pupils see the geology of the main areas for the exploration, extraction and processing are igneous and metamorphic rocks.

Part 3: formation of critical minerals

[KS3 Teacher's Notes page 9]

[Play video 'Minerals in everyday life' from 03:45 to end]

[See Powerpoint slide 18]

Fill in the missing words in pupil workbook for each paragraph describing the formation and main uses of these critical minerals:

- graphite
- lithium
- cobalt
- tungsten
- rare earth elements

Full answers are on page 9.

Activity 3: critical minerals and electric cars

[KS3 Teacher's Notes Pages 10 and 11]

[See Powerpoint slide 20]

Introduce the importance of lithium, graphite, nickel and cobalt in electric vehicles. Introduce the importance of rare earth elements (REE) including neodymium permanent magnets in electric vehicles (also used for mobile phones, laptops, aeroplanes and wind turbines).

Draw a bar graph of key minerals in electric vehicle batteries using the table of data provided.

Homework/extension

Pupils look for items at home and on their journey to and from school that are made from minerals and make a note of them to report back to the class next lesson in a general discussion at the start of lesson 2.

Plenary

Discuss and summarise what the pupils have learned today:

- what are minerals?
- what is the difference between a rock and a mineral?
- why are minerals important and what are they used for?
- why are critical minerals so important for our future?
- what is the UK Critical Minerals Strategy?
- what is the potential for critical minerals exploration, extraction and processing in the UK?
- what critical minerals are in an electric vehicle battery?

Loan kit box of minerals (if available)

As part of this project there is a loan kit available from BGS. Please email BGSengage@bgs.ac.uk to enquire about borrowing it. If you have this kit you can use the box set of ore minerals throughout this session to show examples. Beware of handling the minerals – wash your hands afterwards.