Earth, Rocks and Atmosphere

From the rock cycle to the gases in the air we breathe, this topic explores the Earth beneath and around us — essential KS3 chemistry knowledge for GCSE Science.

12. The drawing below shows a gemstone set in a gold ring.



Crystals of gemstones are found in different rocks.

(a) There are three groups of rocks:

igneous	metamorphic	sedimentary

(i) Crystals can be found in rocks that have been changed into different rocks by high temperature and high pressure.

Which group of rocks is formed in this way?

_____

(ii) Crystals can be found in rocks formed by the cooling of hot magma.

Which group of rocks is formed in this way?

_____

(b) How does the rate at which magma cools affect the size of the crystals formed?

_____

KS3 Science SATs, Tier 3-6, Paper 2 (2008) - Q12(a)-(b)

13. (a) Helen weighed three pieces of rock and soaked them in water.
The next day, she weighed them again.
Her results are shown below.

rock	mass before soaking in water (g)	mass after soaking in water (g)
granite	26.3	26.3
marble	20.4	20.4
sandstone	25.5	27.6

Rocks that have lots of small spaces are described as **porous**.

What evidence is there in the table that sandstone is porous, but granite and marble are **not** porous?

_____

_____

(b) Helen put the soaked sandstone into a freezer for 24 hours.



Water in the spaces in the sandstone froze and expanded.

(i) What would happen to the sandstone as the water froze and expanded?

_____

(ii) In the winter this process happens in rocks in the countryside.
What is the name of this process?

_____

Modern Tuition

(c) Helen placed fresh pieces of granite, marble and sandstone in beakers of dilute sulphuric acid.
Only the marble reacted with the acid.

Use Helen's results to explain why granite is more suitable than marble for a statue in a city centre.

_____

_____

13c
1 mark

(d) (i) Draw a line from the name of each rock below to the group of rocks it belongs to.

(ii) Draw a line from each group of rocks below to the way the group of rocks was formed.

name of rock	group of rocks	way the group of rocks was formed
granite	sedimentary	the effect of high temperature and pressure on limestone
marble	igneous	formed when magma cools
sandstone	metamorphic	particles are deposited in layers

13di
1 mark

13di
1 mark

13dii
1 mark

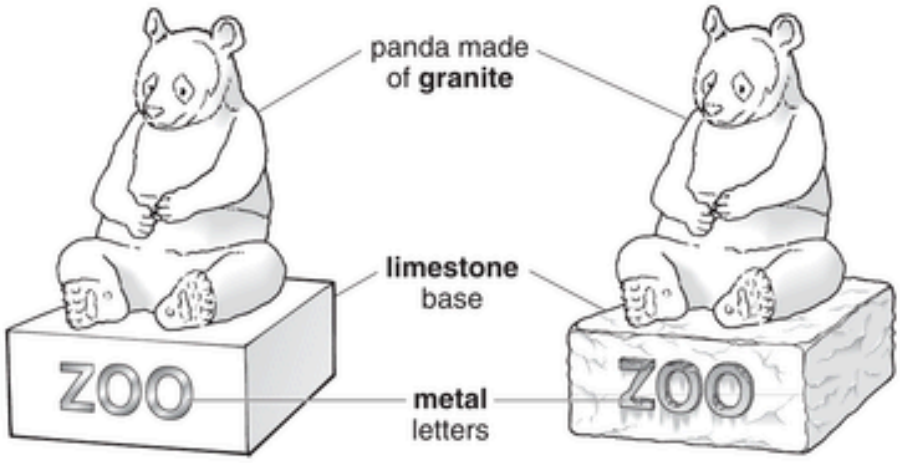
13dii
1 mark

Modern Tuition

4. A statue outside a zoo was made from two types of rock.

The panda was made of granite.
The base was made of limestone.

The drawings show the statue as it was in 1936 and in 2006.



statue in 1936 statue in 2006

(a) The surface of the limestone base has changed over the years.

(i) Which process caused this change?
Tick the correct box.

evaporating	☐	melting	☐
reflecting	☐	weathering	☐

☐ 4ai
1 mark

(ii) The surface of the panda made of granite has **not** changed.

Suggest why granite does **not** change in the same way as limestone.

_____

_____

☐ 4aii
1 mark

Modern Tuition

3. Raj put a piece of chalk in one container and a piece of granite in another container.
He shook both containers for two minutes.
The photographs below show what happened.

chalk
before shaking





chalk
after shaking

granite
before shaking





granite
after shaking

3ai
1 mark

(a) (i) Give **two** ways the **chalk** had changed.

1. _____

2. _____

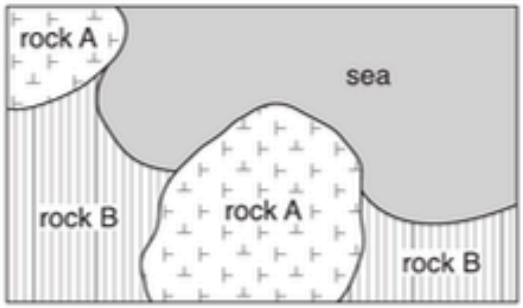
3ai
1 mark

(ii) Suggest why the **granite** did **not** change.

_____

3aii
1 mark

(b) A map of a coastline is drawn below. Waves crash against the rocks.



Which rock is chalk and which rock is granite?
Give the letters from the map.

chalk _____ granite _____

3b
1 mark

Modern Tuition

(c) The photograph below shows the remains of an animal found in chalk rock.



(i) What are the remains of living things found in rock called?

_____

3ci
1 mark

(ii) Look carefully at the animal remains in the photograph.
Which animal could it be related to?
Tick the correct box.

snail	starfish	ladybird	slug
☐	☐	☐	☐

Give a reason for your answer.

_____

3cii
1 mark

(d) Granite is formed underground from very hot melted rock.

(i) Animal remains are **not** found in granite.
Give the reason for this.

_____

_____

3di
1 mark

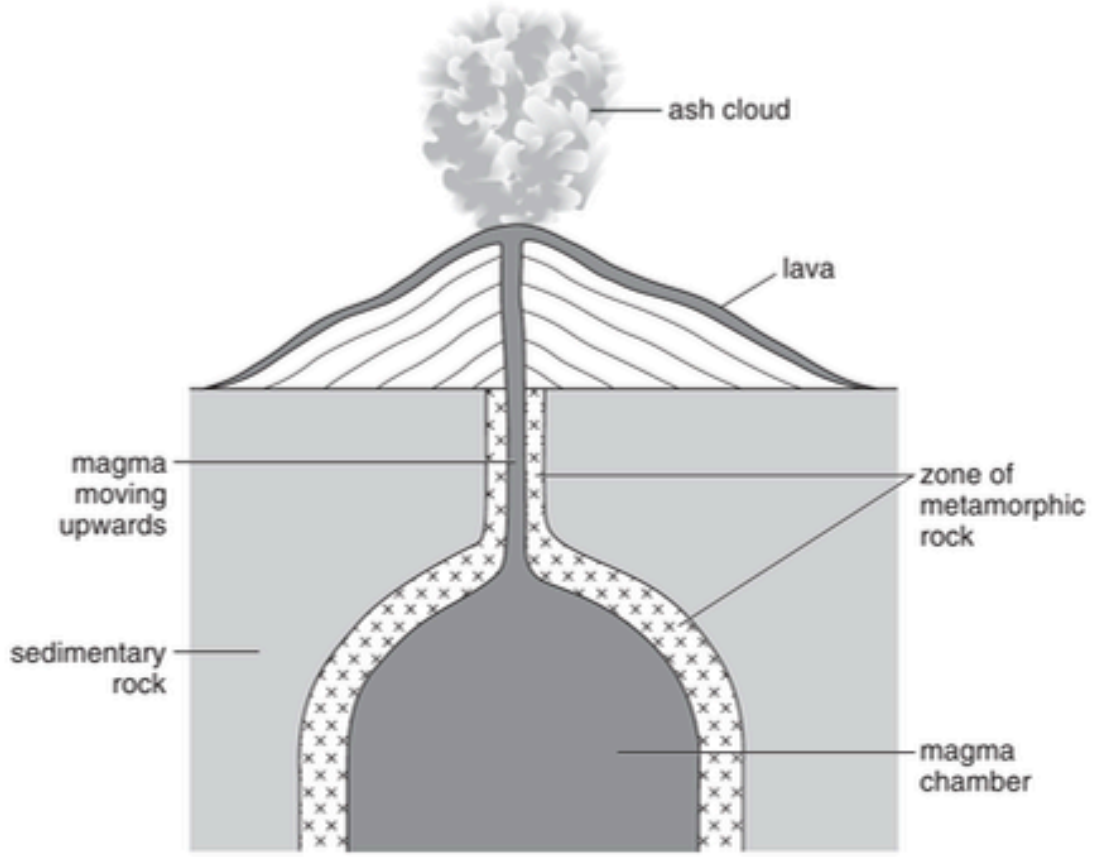
(ii) What is hot melted rock called when it is **underground**?
Tick the correct box.

sand	magma	lava	mud
☐	☐	☐	☐

3dii
1 mark

Modern Tuition

11. The diagram below shows a section through a volcano.
Magma is moving up from a magma chamber.
Some of the magma erupts to form lava.
The liquid lava cools and becomes solid rock.



(a) Explain why magma deep underground stays liquid longer than lava on the surface.

11a
1 mark

Modern Tuition

(b) As the magma cools underground, it solidifies and crystals are formed.

(i) In what way will these crystals be different from the crystals formed when lava solidifies above ground?

_____

11bi

1 mark

(ii) Give the reason for your answer.

_____

_____

11bi

1 mark

(c) A zone of rock surrounding the magma has become a metamorphic rock.

(i) What conditions would cause this to happen?

_____

_____

11ci

1 mark

(ii) Give the name of the metamorphic rock which is formed from limestone in this way.

_____

11ci

1 mark

Modern Tuition