

ACTIVITY Minerals

SKILLS > Processing and analysing data and information

1 Determine if each of the following statements is true or false.

- a Minerals may be solid or liquid.
- b Minerals are inorganic.
- c Minerals are not made of crystals.
- d Minerals are all rocks.
- e Quartz is made of silicon dioxide.

TRUE FALSE

<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>

2 List five common minerals found on Earth.

3 What mineral is found in the following items?

- a glass _____
- b iron ore _____
- c aluminium ore _____

4 Use Mohs hardness scale to identify each of the following:

- a the softest mineral _____
- b the hardest mineral _____
- c the mineral with a hardness of 4 _____
- d the minerals that are harder than topaz _____

Mohs hardness scale

Hardness	Example
1	Talc
2	Gypsum
3	Calcite
4	Fluorite
5	Apatite
6	Feldspar
7	Quartz
8	Topaz
9	Corundum
10	Diamond

5 Write out the mineral property that:

- a measures the shape of the crystal _____
- b is measured by scratching _____
- c is described as grey, blue, silver, etc. _____
- d is the same as density _____

6 Identify the chemical that makes up quartz, and explain whether it is an element or a compound.

7 An unknown mineral scratches apatite but not ruby. Identify the property being measured here and give the approximate value of this on Moh's hardness scale.

8 Granite is a mixture of crystals of quartz and feldspar, but other minerals, such as micas, pyroxene and amphiboles, may also be found in it in lesser amounts. Is granite a rock or a mineral? Explain.

9 Complete the table below using the following words/phrases.

inorganic sand is a non-living compound
 naturally occurring definite chemical composition
 crystalline salt is composed of the compound sodium chloride (NaCl)

Property	Meaning	Examples
	Is found in nature	Shells are made of calcium carbonate
	A non-living substance, not formed by living processes	
	Has a crystal structure	The atoms composing the solid have an orderly and repeated pattern, such as cubic
	The chemical composition is fixed, it is a pure substance	

ACTIVITY Internet activity: Birthstones

SKILLS

- > ICT
- > Critical and creative thinking

1 Name the gemstones shown in Figure 6.1

a _____ c _____
 b _____ d _____



Fig 6.1

2 Use a dictionary or online dictionary to write out an appropriate definition in your own words of the following.

a Gemstone

b Mineral

3 Use the Internet to find information on birthstones, such as by month, by astrological sign and spiritual/mystical properties. The following search terms may be useful: 'crystal realm birthstones', 'galleries birthstones', 'thinkquest birthstones'.

4 Write out your birth date and birth month.

5 Examine the lists of birthstones on the Internet pages, and write out your birthstone by:

- a month (modern) _____
- b the zodiac (astrological) _____

6 Complete the table below for your month of birth, and the surrounding months. For example, if your birthday is in April, then complete the table for March, April and May.

	Month 1	Your month	Month 3
Birthstone by month			
Birthstone by zodiac			
Spiritual/mystical properties (by month)			
Physical properties (colour, hardness, density, element/compound)			

7 Compare the physical properties with the spiritual/magical properties. Identify the more scientific property, and explain the difference between these two.

8 Find your mineral birthstone (they have often have more than one form, so choose *one* mineral form). Using an A4 sheet of paper, make a poster on your mineral birthstone with the pictures you found from the Internet. The following must be present on the poster:

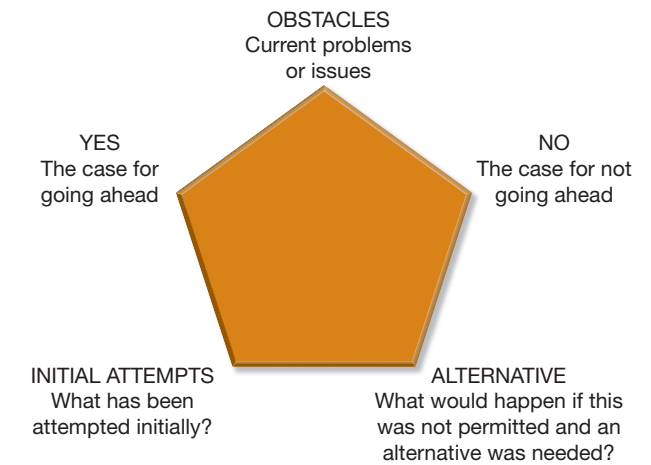
- a Heading
- b Pictures of birthstone mineral and associated jewellery
- c The chemical formula of the compound that the mineral is made from
- d Physical properties (includes colour, hardness and density or specific gravity)
- e Spiritual/magical properties
- f Historical origins

ACTIVITY Mining resources

SKILLS

- > ICT
- > Personal and social competence
- > Communicating
- > Questioning and predicting

Many issues have to be looked at from all different sides before you can decide whether they benefit society or not. The diagram below shows some of the points that should be addressed.



In this activity you will look at issues surrounding mining our precious resources.

- 1 Divide into teams of five.
- 2 Photocopy and cut out the cards on the next page.
- 3 Assign each team member one of the cards. Team members complete this activity by putting forward their own opinions as well as carrying out research on the Internet.
- 4 List the benefits of the mining industry.



<p>YES</p> <p>The case for going ahead with mining resources. Discuss the gains and benefits that may occur with a go-ahead.</p>	<p>NO</p> <p>The case for not going ahead with mining resources. Discuss the benefits of not going ahead.</p>	<p>OBSTACLES</p> <p>Discuss the current problems stopping the go-ahead. These may be technical, economic or societal problems.</p>
<p>INITIAL ATTEMPTS</p> <p>What work has been attempted or carried out so far? This may have been done in the past or currently.</p>	<p>ALTERNATIVES</p> <p>What are the alternatives to this?</p>	

5 List the drawbacks of the mining industry.

6 Explain why mining is a big issue in Australia.

7 List the benefits of group work.

ACTIVITY 6.4

The rock cycle

SKILLS Processing and analysing data and information

Examine Figure 6.25 of the rock cycle in Unit 6.2 of the textbook and answer the following questions.

- 1 Determine whether each of the following statements is true or false.
- | | TRUE | FALSE |
|--|--------------------------|--------------------------|
| a Molten rock that solidifies is called igneous rock. | <input type="checkbox"/> | <input type="checkbox"/> |
| b Rocks on the Earth's surface cannot be recycled. | <input type="checkbox"/> | <input type="checkbox"/> |
| c After rock is uplifted and exposed, it forms metamorphic rock. | <input type="checkbox"/> | <input type="checkbox"/> |
| d The wind and rain can both cause erosion. | <input type="checkbox"/> | <input type="checkbox"/> |

2 List the three main types of rock.

3 Complete the following passage:

The rock cycle shows that the _____ of rock formation is cyclical. The Earth uses older rock to make _____ rock, just like aluminium cans being recycled. Weathering and erosion at the Earth's surface can _____ down rocks into small particles. The _____ are moved about and deposited as sediments, eventually cementing together into _____ rock. Burial, with rising pressure and temperature, can alter any rock to form what is called _____ rock. The hot molten _____ inside the Earth will cool to form _____ rock.

4 Outline what occurs during lithification.

5 Explain how magma forms different types of igneous rock.



6 Write out the steps involved when metamorphic rock is turned into igneous rock.

7 Write out the stages that occur in the rock cycle and explain how the changes occur at each stage.

8 What type of rock is generally hard and banded in appearance? Explain why.

9 Explain the importance of wind and rain to the formation and breakdown of sedimentary rock.

10 Explain why the formation of rock is represented as a cycle.

Extension

11 Which parts of the rock cycle could occur on the Moon and which could not? Research what Moon rocks are made of. Describe how they formed and whether or not they have changed over time.

ACTIVITY 6.5 Sedimentary rock

SKILLS > Processing and analysing data and information

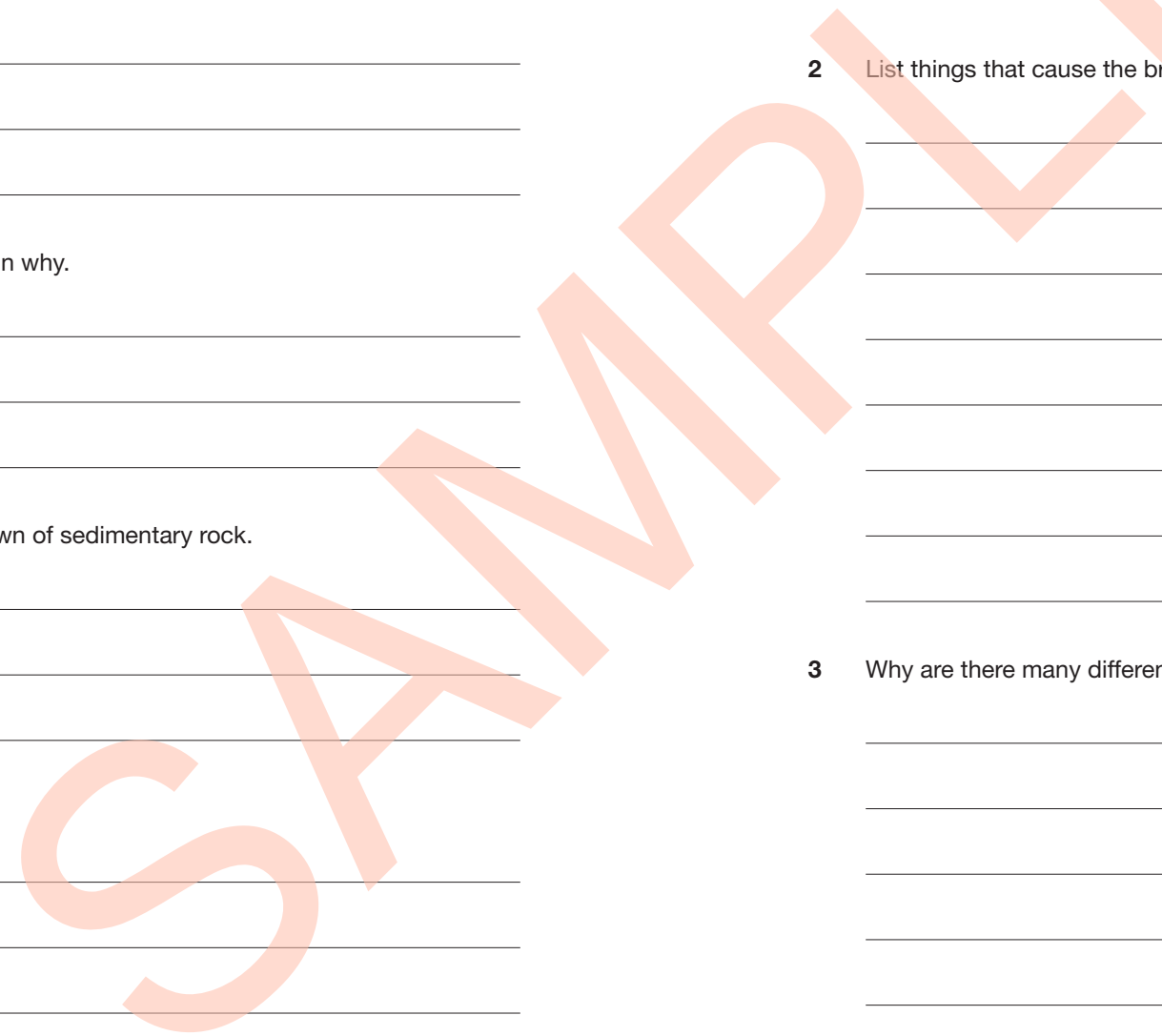
1 Determine whether each of the following statements is true or false.

- a Sedimentary rock forms from a molten state.
- b Sandstone is an example of sedimentary rock.
- c Fossils will occur abundantly in all types of rock.
- d Sedimentary rock layers are only ever found in horizontal layers.

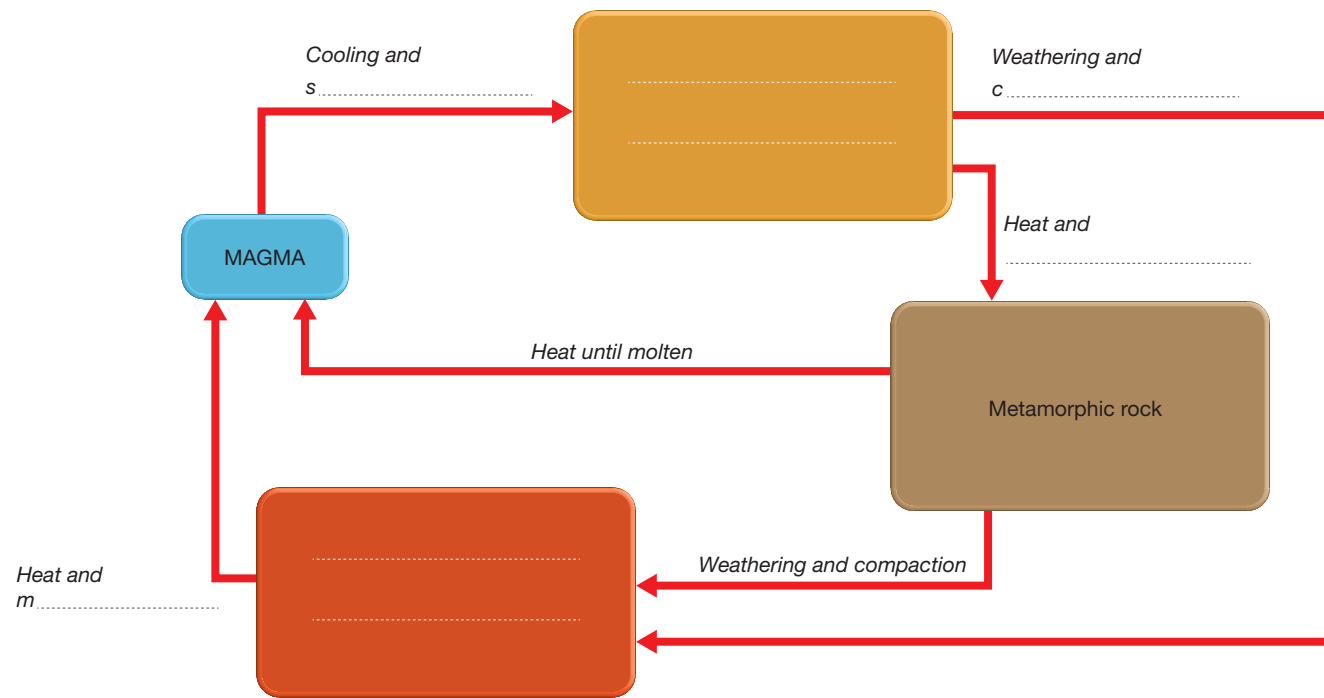
TRUE	FALSE
<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>

2 List things that cause the break-up of the Earth's crust into small sediments.

3 Why are there many different types of sedimentary rocks but fewer types of igneous rock?



4 Complete the partial rock cycle diagram below.



5 Explain how sedimentary rock turns into metamorphic rock.

6 Identify the type of rock that fossils usually form in and explain how fossils form.

ACTIVITY Modelling rocks with food

SKILLS

- > Planning and conducting
- > Evaluating

Modelling conglomerate rock using chocolate crackles

What you need

- 1 tablespoon icing sugar
- 1 tablespoon shredded coconut
- 1 teaspoon cocoa
- ½ cup of rice bubbles
- ¼ cup of cornflakes
- ¼ cup of melted copher butter

What to do

- 1 Pour the dry ingredients (icing sugar, coconut, cocoa, rice bubbles, corn flakes) into a mixing bowl.
- 2 Pour in melted copher butter.
- 3 Stir well until the mixture is evenly combined.
- 4 Pour into the patty cakes.
- 5 Refrigerate until set.

How is your chocolate crackle like a conglomerate rock?

Modelling igneous rock using toffee

What you need

3 cups of sugar

1 cup of water

2 spoons of molasses

¼ cup of white vinegar

What to do

- 1 Pour the water and vinegar into a saucepan and heat on a hotplate.
- 2 Add the sugar and molasses to the solution as it warms up.
- 3 Stir on low heat until the sugar crystals dissolve.
- 4 Increase to high heat and boil without stirring for about 12 minutes.
- 5 Remove the saucepan from the heat slowly, allowing the bubbles to disappear, and pour the hot toffee into patty pans.
- 6 Allow to set at room temperature.

How is your toffee like igneous rock?

ACTIVITY

SKILLS > Processing and analysing data and information

Review: The changing Earth

- 1 Which scientific area is the study of rocks and minerals a part of?
 - A physics
 - B chemistry
 - C biology
 - D geology
- 2 Which of the following is a mineral?
 - A water
 - B rust on metal
 - C paper
 - D amethyst
- 3 In general, what is a mineral composed of?
 - A a compound
 - B one kind of atom
 - C two kinds of atom
 - D a mixture
- 4 What is the name of the Earth's outermost solid layer?
 - A crust
 - B mantle
 - C outer core
 - D inner core
- 5 What is the name of the molten rock material inside the Earth?
 - A crust
 - B mantle
 - C lava
 - D magma
- 6 What is the name of the process by which rock is broken down into small pieces?
 - A lithification
 - B melting
 - C weathering
 - D erosion
- 7 The lustre of a mineral could be described using what words?
 - A metallic
 - B green
 - C cubic
 - D soft
- 8 What is the most common mineral in the Earth's crust?
 - A iron
 - B quartz
 - C gold
 - D sandstone
- 9 Which of the following is an example of a sedimentary rock?
 - A sandstone
 - B granite
 - C marble
 - D oil
- 10 Which of the following is an example of an igneous rock?
 - A sandstone
 - B granite
 - C marble
 - D coal
- 11 Write each word in the list next to its matching statement in the table on the next page.

sedimentary	metamorphic	crystal shape
weathering	igneous	

Word	Statement
	Rock formed from molten material
	A mineral property expressed as cubic, rhombic, tetrahedral
	The breaking down of rocks into smaller particles by wind and rain
	Rock that has been changed by heat and/or pressure
	Rock that is made from layers of particles compacted together

12 Write in the word(s) needed to complete each sentence:

- a All igneous rock starts out in the _____ state.
- b The _____ is a diagram showing how rocks can change.
- c The Earth's _____ is responsible for the formation of sedimentary rock.
- d Sedimentary rock can change into metamorphic rock when it is subjected to _____.

13 Use Moh's hardness scale to answer the questions below.

Moh's hardness scale			
1	Talc	6	Orthoclase
2	Gypsum	7	Quartz
3	Calcite	8	Topaz
4	Fluorite	9	Corundum (ruby)
5	Apatite	10	Diamond

- a Which is the hardest mineral?

- b Which mineral has a hardness of 4?

- c What mineral property is measured by this scale?

- d Which mineral will scratch calcite but not apatite?

- e What is the hardness of wood if it can be scratched by fluorite and apatite but not by calcite?

14 Explain why some igneous rock is made up of large crystals but other types have small crystals.
