Crystals and minerals kit Spice up your science!

Student Workbook

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History Historical use of rocks



Palaeolithic (Old Stone Age) flint tools (35,000 to 12,000 years old).

Early in pre-history rocks which could be hit (knapped) to produce a good cutting edge or piercing point, were precious. Flint was the rock of choice.

Tools had to be portable and easily replaced as the "Hunter gatherers" were constantly on the move. In Australia, flint was rare and other silica rich rocks such as quartz, quartzite and chert were used.

This hand axe could cut through animal's skin, hack into wood and break bone.

Rocks have been important throughout the history of mankind. Stone has been used for shelter, fish traps, jewellery, defence and tools. Early man had to study rocks to be able to select which one most suited their purpose. We are not particularly fast runners and our Flake spear heads weapons of teeth and fingernails pale in comparison to those of most other carnivores. Using only teeth or sticks, it was difficult to penetrate the pelts of our prey to kill and butcher animals to obtain the precious protein rich meat within. Stone tools were the answer. However, trying to get a sharp edge by chipping pieces of granite together is indeed – trying!









History How to make a stone tool (flow chart)

Scientists must be able to communicate well. Early peoples would rely on family members passing on useful information by talking and demonstrating. Nowadays we can learn at a distance. Flow charts are a useful method of passing on how to work through steps to create something e.g. "How to make a cup of tea".

To make a cup of tea

Danger. Care must be taken with boiling water and steam.

BOTH CAN BURN!

Pour hot water carefully!

Materials

• Kettle and water, cup, tea bag, milk and sugar.

Method

- 1. Fill a kettle with water and bring it to the boil.
- 2. Place a tea bag in a cup.
- 3. When the kettle has boiled carefully pour the hot water into the cup.
- 4. Leave for 3 minutes.
- 5. Remove tea bag and place in compost bin.
- 6. Add milk and sugar to taste.

What have I forgotten to mention?



1. Boil water in kettle



T ____ S ____ N Or in words and pictures:

- 2. Place tea bag in cup
- 3. Add hot water to cup











What did I forget this time?

P____ C____ and S____ Y!

Under the direction of your teacher, view the information on making stone tools on You Tube then create a flow chart or cartoon using words, pictures or both telling someone else how to make a stone tool.

Hints

- Watch all the way through first to get the ideas in sequence.
- Watch again and pause to make notes on the steps taken.
- Create a rough copy and ask someone else if they could follow your flow chart and make a stone tool. "Adjust, Adapt & Improve" your rough idea.
- Create the good copy and staple your worksheets to it. Due date

Marking Key	Marks Possible	Student Mark
Title	1 mark	
All steps shown	2 marks	
Sequence correct	1 mark	
Clear diagrams or language	2 marks	
Rough copy attached	1 mark	
Safety	1 mark	
Total	8 marks	

Using the "Aboriginal flaked stone tools" sheet provided by the Department of Planning and Community Development in Victoria, answer the following questions.









History Historical use of rocks

1. How are flaked tools made?

2. Draw a diagram of a core and a flake.

Core	Flake
Core	Flake

Core tools were used as hand axes whilst flakes were used to cut, scrape and penetrate.







3. Circle the roo	cks which are go	od for making stone tools	;?		
Chalk	Chert	Conglomerate	Limestone	Pumice	Quartzite
Rhyolite	Slate	Sandstone	Flint	Granite	Talc

4. What are the three characteristics of all rock which make good tools?

5. How do we know that stone for tool making was traded or carried for long distances?



Hand axe from Drenthe in Holland.







This is a flake tool. It has been re-sharpened many times.









10. Give the five characteristics of flaked stone tools.

1	
2	
3	
4	
5	

11. What is the difference between a core tool and a flake tool?

12. Stone tools are different from naturally broken rocks because their sharp edges are retouched leaving a

bulb of percussion. Draw a diagram of a rock which demonstrates a striking platform, a bulb of percussion

and signs of retouch.

History Stone age tool kit

Tools have to be efficient, relatively easy to make and be portable or easy to replace. Hunter gatherer people are constantly on the move following game and other food sources so carry few multi-purpose tools.

Select one of the following tasks for hunter gatherer people and design a Stone Age tool kit.

- 1. Killing and butchering small game. (wallabies and lizards)
- 2. Scraping kangaroo skins and sewing them together to make a cape.







- 3. Cutting cereals (wild wheat and oats) and grinding the seed for flour.
- 4. Making a spear and woomera.

For each tool, explain why you have chosen specific materials for specific parts.

Organisation sheet hints

Example: Preparing and cooking meat

Activity	Stone Age Tool	Sketch	Reason for choice of material	Modern tool
Removing skin	Fire to burn it off Sharp flint blade to slice it off		Burning of skin with fire is quicker and uses less energy than skinning with a knife Flint stone blade is sharp and saves the skin for clothing	Knives
Butchering meat	Hand axes to break joints Stone blades to cut	As above	Hand axe is flint which is hard and sharp and will pierce the bone and break the joints As above	Saws Knives











Marking Key	Marks Possible	Student Mark
Rough notes	2 marks	
Heading and introduction	2 marks	
Sketch of tool or tools with labels	8 marks	
List of materials with reason for choice	8 marks	
Bibliography	4 marks	
Organised and on time	4 marks	
Total	28 marks	

STUDENT NAME_

ASSIGNMENT DUE







History

Discussion "Respecting our past"



People have different opinions on what parts of our past are important to preserve and what are not. The use of land is particularly important at this time. Our courts are presently deciding whether land on the Pilbara coast should be used for industry of remain with the Aboriginal groups who claim it as their own. Our laws should reflect the views of our population and permit people to voice a **reasoned** argument supporting their own opinions.

How important do YOU think it is to preserve Aboriginal artefacts such as stone tools?

Select another subject for discussion

Suggestions for debate:

- 1. We should all have/not have access to Aboriginal sites.
- 2. Stone tool working areas should be fenced off from public access.
- 3. Only Aboriginal people should be guardians of Aboriginal sites.
- 4. "Finders keepers" when it comes to Aboriginal artefacts.
- 5. Leave the past and move on to the present.

Rules of debate

Members of group









Our position or our task is to:

Supporting evidence/research (Put best case/ first)

Points to counter/argue against

History Revision and wordsleuth

You have been studying the historical use of rocks by mankind. Answer the following questions

Name three different uses of rocks by Aboriginal Australians

1._









2._____3.

What is the difference between a core tool and a flake tool?

Name one rock type which is good for making stone tools

Why did people stop using stone tools?

Draw a stone tool below and explain what is was used for.







WORDSLEUTH Stone Tools

С	D	Q	v	Ε	W	Ε	Α	G	L	J	С	К	Ν	Α
G	I	Ν	U	G	L	G	к	Α	U	Ε	н	Ν	ο	R
S	х	н	Α	Α	E	В	Ν	Α	G	В	Ε	Α	I	E
С	Ε	S	т	н	R	I	Α	Α	L	R	R	Ρ	S	М
R	D	Ε	Α	I	G	т	т	т	I	F	т	Ρ	S	0
Α	Α	w	н	I	L	н	z	F	R	R	М	I	U	0
Ρ	R	В	R	U	Ε	ο	v	I	Ε	ο	J	Ν	С	w
E	т	0	U	R	Ν	J	Ε	т	т	ο	Ρ	G	R	L
0	В	Ρ	Ε	Ν	Ε	т	R	Α	т	Ε	К	D	E	0
Α	J	R	Α	Х	E	Α	Ε	z	L	т	R	Ρ	Ρ	0
R	Ρ	Y	R	I	т	E	S	R	S	Α	I	С	J	т
G	Ν	Α	Q	S	w	R	R	т	E	E	Ρ	ο	U	к
N	Α	I	D	I	S	В	ο	Ρ	R	F	L	I	Ν	т
F	Y	0	ο	М	В	Ν	S	С	z	т	R	Α	U	Q
S	w	ο	С	Z	E	н	E	R	0	с	Α	S	к	к

There are 30 words







Minerals and resources in Western Australia

Minerals are naturally occurring crystalline solids which are not formed by living things.

Resources are minerals and other materials which can be extracted for economic gain.

Ore is a rock or mineral from which metal and other valuable resources can be extracted.

Material	Resource	Mineral	Use	Comment
Gold ore	Yes	Yes	Jewellery, coins and bullion, electronic conductors, dentistry, medicine & art	One of the earliest minerals worked by humans. The second resource exported from WA.
Coal				
Iron Ore (Haematite)				
Clay				
Oil & Gas				
Quartz sand				
Copper ore				
Diamond				

NAME__









Minerals What does my crystal look like?

A. Crystal structure Sketch and observations

My crystal is shaped like
My crystal hasfaces,edges andvertices.
My crystal is (solid, liquid or gas)
My crystal is (transparent, translucent, opaque)
My crystal is coloured
My crystal has cleavage angles of
Other observations









Minerals What does my crystal look like?

B. Crystal size Sketch and observations

Solute + Solvent = Solution

We used the solute
We used the solvent
We made the solution
What is meant by a "super saturated solution"?

Fair Test

What things did we keep the *same*? _____

What things did we change? _____

Rapid crystallisation (sketch)	Slow crystallisation (sketch)

Does crystal shape change with different chemical solutions?

Minerals Gems and precious stones (Option)







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Gemstones are precious or semi-precious minerals and other stones which have been cut and polished to make attractive jewellery. Some stones such as amber (fossil resin) and jet (fossil coal) are organic and therefore cannot be minerals.

Interesting teacher information

There are more than 3,000 different minerals but only about 50 are commonly used as gemstones. Good gemstones are colourful, resistant to scratching and rare. Opaque stones such as opal are usually cut or polished into rounded shapes called cabochons. Transparent stones such as sapphire are cut and faceted to produce the attractive "twinkle" by bending or refracting light passing through. Layered stones such as agate are carved to produce raised images. Many gemstones are heated to intensify their colour.

Synthetic diamonds and sapphires are created in laboratories under great heat and pressure. Diamonds and garnet are commonly used for industrial cutting purposes and sapphires as semiconductors and insulators. .

Traditionally only four stones were considered precious, Ruby, Emerald, Sapphire and Diamond.

In the past it was believed that gems had magical and healing powers. Certain stones are associated with the months of the year and signs of the zodiac. Other stones display life events. Widows wore black jet jewellery when in deep mourning. (Jet is not a true mineral as it is fossilised wood, which is organic). After a while, dark red garnet stones could be worn. According to Indian belief emeralds bring bad luck to the family of the owner.

If a computer's micro-chip were made of diamond rather than silicon it would run up to one thousand times faster.

Your task

Create a poster demonstrating your choice of attractive minerals.



Early gems were rolled and polished with grit to make rounded domes called "cabochons". Many pieces of ancient Egyptian jewellery used carnelian (red) and lapis lazuli (blue) cabochons. Cabochons were popular up to the middle ages. People also made them from glass and paste (a mixture of ground glass and salts). Opaque stones such as opal are still polished into cabochon shapes.

1. Research both lapis lazuli and opal or two other minerals of your own choice. In your report mention:

npbilliton

esourcing the future

- Their names
- Their chemical composition





- Which of their characteristics makes them useful as gemstones
- Describe how the mineral was used in jewellery or ornaments
- 2. Later, advances in technology allowed craftsmen to split and cut crystals along their cleavage planes and cut facets into them to reflect light and sparkle. These stones are usually described using 4Cs.

Colour Cut Clarity Carat

Many people think that "carats" represents the size of a precious stone, when carats are really a weight classification. A carat is one fifth of one gram.)

Select two precious jewels and collect research information as you did for the cabochon gems.

Use this information on four gems to create the poster. Data for cabochon gem stones.



Name	
Chemical composition	
Characteristics which makes it useful as a gem stone	
Used for	



Data for precious stones

Name	









Chemical composition	
Characteristics which makes it useful as a gem stone. 4Cs.	
Used for	

Assignment due

Birthstones

January	Garnet	July	Ruby
February	Amethyst	August	Peridot
March	Aquamarine	September	Sapphire
April	Diamond	October	Opal
May	Emerald	November	Topaz
June	Pearl	December	Turquoise







Minerals Sand and Sunscreen

Beaches are wonderful places where you can get both sunburn and the minerals you need to make sunscreen At the core of the geology of Western Australia lie two ancient cratons, the Pilbara and the Yilgarn cratons. These ancient enormous masses of granite, pegamtites and greenstone have remained virtually unchanged for many millions of years. They appear as large pink masses on the Geology of Western Australia map... The structural interpretation map at the side shows their position more simply. Using the geology map, colour and label these two cratons on the map below.





Title	
Кеу	
Craton	
Mineral Sands	

Weathering removes other less resistant minerals and increases the concentration of heavy minerals such as zircon, rutile and ilmenite. Rivers swept these resistant remnants to the sea where the interplay of tides, wind and longshore drift further concentrated them further. When there is a drop in energy of the sea, as in the lee behind headlands, more dense fractions are deposited. Although most WA beaches have mineral sands, the best reserves are found along a stretch of present and ancient beaches that run from Geraldton to Augusta.









To mimic this process, place a variety of materials of different density in a shallow tray or panning dish.

Suggestions:

- Sand
- Rice, dried peas and beans
- Dry leaves
- Marbles
- Paper chads from the hole punch
- Metal washers or nuts

Gently swirl the mixture round the dish in the same motion for panning gold.

If you keep the motion consistent, the materials will separate.



Aboriginal Yandy or coolomon These were used to separate seed from husks and sand







Minerals Extra for experts: Web search

Using the information from your library or the internet, fill in the blanks in the following table.

Name	Colour	Crystalline habit	Elements	Streak	Hardness	Lustre	Magnetism	Specific Gravity
Diamond		Cubic		Nil	10	High	Nil	3.52
Sodalite		Massive		White			Nil	
	Black				5.5		Magnetic	
	Clear or white	Trigonal		White	7			
Topaz		orthorho mbic		White			Nil	
(Your choice)								

What does a mineralogist do?









Minerals Review and wordsleuth

What is the difference between a rock and a mineral?

My bones are made of calcium carbonate (with a little magnesium thrown in). Is bone a mineral?



Join the label with the minerals in the picture above.

Slow crystallisation

Infill crystals







Crystals and minerals wordsleuth

F	G	Χ	Т	S	H	Ε	Т	F	H	Т	Ρ	L	Z	S
R	V	Α	0	D	Т	С	R	Т	R	В	Y	A	I	E
G	H	L	R	I	Q	Q	A	A	В	L	R	R	R	С
S	I	0	С	N	U	L	N	Ε	С	U	I	Ε	С	R
D	E	L	Μ	A	Ε	S	S	L	В	Ε	Т	N	0	U
0	A	G	R	В	L	Т	Ρ	G	Α	Y	Ε	I	N	0
С	D	Т	D	U	0	N	A	L	0	Т	V	Μ	A	S
A	Z	F	С	Ε	С	H	R	С	Α	L	S	A	V	E
С	L	Ε	A	V	A	G	Ε	Μ	I	Т	D	Y	Ε	R
U	N	S	Ε	С	A	F	N	D	D	Μ	Y	Ε	R	H
Т	R	0	Т	С	A	R	Т	0	R	Ρ	Y	U	Т	С
Μ	U	I	N	A	Т	I	Т	D	F	0	A	Q	I	E
D	Μ	H	L	U	S	Т	R	Ε	Μ	K	N	A	С	В
S	E	L	G	N	A	W	H	I	Т	Ε	D	Ρ	Ε	U
K	Y	Α	N	I	Т	Ε	K	С	0	R	Y	0	S	С







Classification General Classification Activity

Scientists classify things into groups which have similarities.



Why do we not classify dogs, dingoes and doors into the

same group even though their names all begin with "D"?

2. Why is it not a good idea to classify things because of their size? Explain your answer.

3. Why is it not a good idea to classify things because of their colour? Explain your answer.







4. Cut out the cards in your "Cards for classification sheet" which your teacher has in their guide.
Select the six pictures of "Living things" and place them in a separate pile.
Discuss with your group why you classified them as living.
Again classify this "living things group into "Warm blooded" and "Cold blooded" as below.

Living things



Do the same for non-living (never having lived) things









When you have finished, brainstorm what criteria could be used to scientifically classify rocks.









Classification Get to know your rock

Scientists can recognise rocks if they are described scientifically. Your Task is to select a rock and describe it so that another person can recognise it.

So your description must be:

OBSERVABLE, MEASUREABLE, REPORTABLE AND REPEATABLE

Once you have written down all your observations, see if a friend can recognize your rock from your description.

HintChoose the most accurate and scientific words you can.HintWet your rock and the colours will be more apparent



Test A

What does it look like generally (macroscopically)?

What **colour** is it? _____

What **shape** is it?______

What size is it? _____

What texture does it have? (Smooth flaky, rough, angular, rounded?)







Draw a scale diagram of your rock below.

	Scale = 1 :
L	



Test B

What does your rock look like microscopically? (Use a hand lens)

Hint when you are using a hand lens or magnifying glass always make sure the object is well lit. Place the lens close to your eye and mover the object close to your eye until it comes into focus.

Wet your rock and see if you can see any of the following features:

	Example	Describe if present in your rock
Bedding or banding	Different layers in the rock	
Crystals or minerals	Regular grain shapes	







	Example	Describe if present in your rock
Fractures	Breaks	
	Cracks	
Weathering	Change on outside	
Fossils	Indications of plants	
	or animals	
Other		

Test C

What is the density of your rock?

Density is a measure of how much matter is packed into how much space.

Use the weighing machine estimate the rock's mass.

MASS ______g

We can estimate the volume of your rock by filling the beaker completely with water. Place the rock in the beaker and collect the volume of water displaced by it in the measuring cylinder. The volume of water in the measuring cylinder is the volume of your rock

VOLUME	mL	Mass				
Density is mass per	unit volume. (Mass divided by volume)					
Density of rock _		Volume	Density			







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Test D

Do any parts of my rock react to mild acid?

Place the rock into a Petri dish. You are going to drip a little vinegar onto the rock. Before you test it, make a prediction on what *might* happen.

Prediction					
I think that					
Now test your prediction					
Observation					
Hint Please rinse your rock after this test!					
Check if other students can recognise your rock from your description.					
How could this experiment be improved or the observations made more accurate?					







Classification "Eggsamples"

Rock type	Diagram of egg	Changes made	Named examples
Sedimentary Rock			
Contact Metamorphic Rocks			
Regional Metamorphic Rocks			
Igneous rocks			







Classification Revision and wordsleuth

You have been studying how to classify rocks. Use your notes to answer the following questions.

Rocks are classified into three groups. What are they?

1	 	 	
2			
۷	 	 	
3	 	 	

Which group would granite belong to?_____

Which rock pictured below is GRANITE? Circle the correct answer.



Α

В

С

What do geologists mean by metamorphosis? Metamorphosis is ______ Sediments of the Perth Basin are slowly being buried under the weight of other sediments laid down on top of them. Lower rocks are partially recrystallised. If the original rock was a limestone, what would the new

metamorphosed rock be

called?_____

Rock Classification







Y	Е	С	R	Y	S	Т	А	L	S	F	R	Ε	Μ	Е
G	Т	L	U	R	Е	Ρ	Е	А	т	А	В	L	Ε	т
0	I	W	В	Е	Ν	0	т	S	D	U	М	В	т	А
L	Ν	Ρ	S	А	Ν	D	S	т	0	Ν	Е	А	А	R
0	А	U	S	J	V	Ρ	U	М	I	С	Е	R	М	Е
Е	R	U	т	С	U	R	т	S	J	Y	А	U	0	М
G	G	Н	А	R	D	Ν	Е	S	S	С	I	S	R	0
С	R	U	S	т	D	Е	Ν	S	I	т	Y	А	Ρ	L
С	Е	Μ	Е	Ν	т	Ε	D	D	В	L	S	Ε	Н	G
С	0	Μ	Ρ	А	С	Т	Е	D	А	0	Т	Μ	Ι	Ν
Ν	0	Ι	т	А	С	I	F	Ι	S	S	А	L	С	0
Е	Ν	0	т	S	Е	Μ	I	L	Е	L	А	Н	S	С
Y	R	А	т	Ν	Ε	М	I	D	Е	S	Т	А	Ε	н
Е	R	U	S	S	Ε	R	Ρ	S	U	0	Е	Ν	G	I
E	L	В	А	т	R	0	Ρ	Ε	R	Е	A	R	т	н





