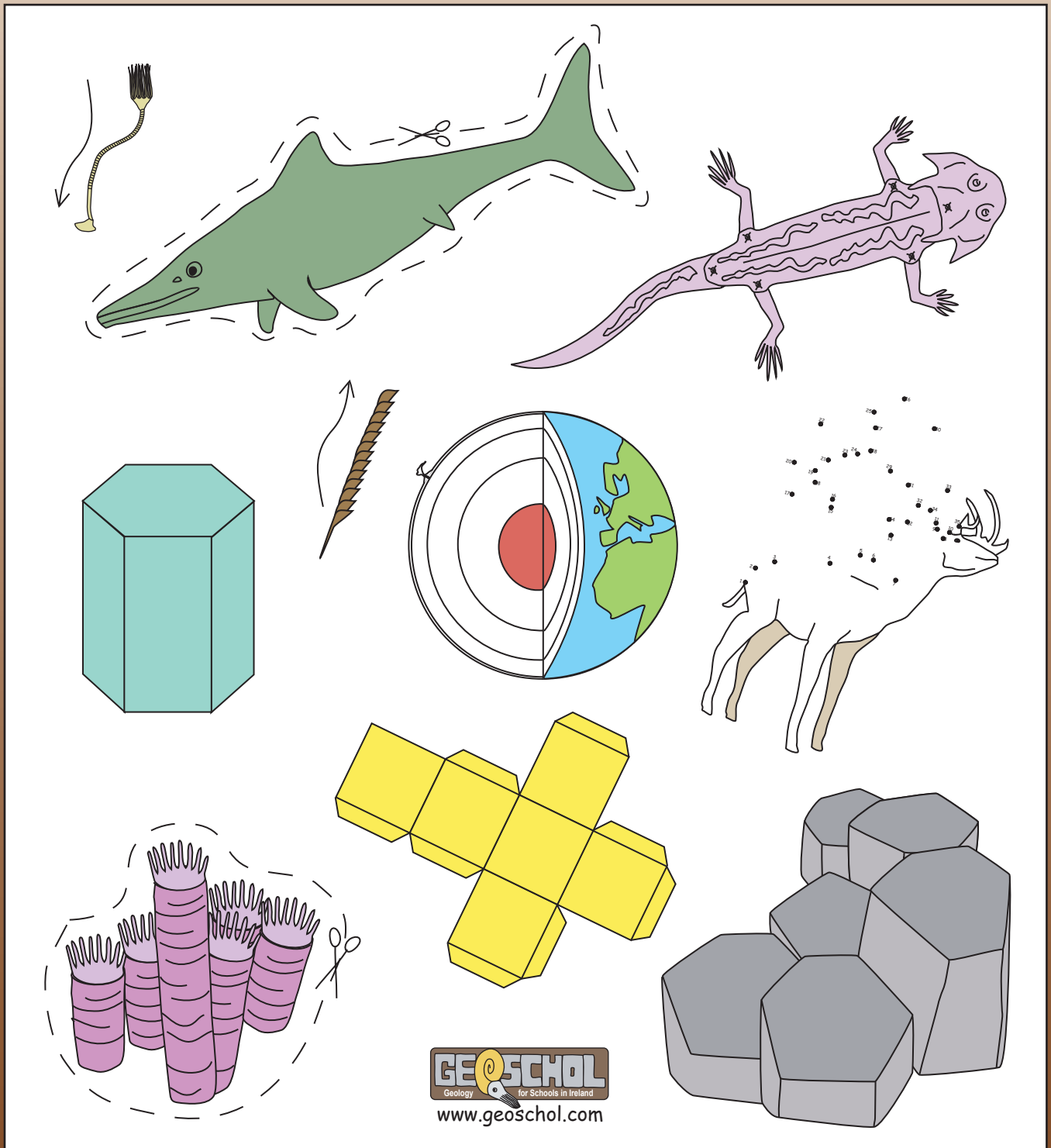


Discovering Ireland's Rocks and Fossils



An activity book by
Adam Stuart Smith and Patrick Wyse Jackson

Discovering Ireland's Rocks and Fossils

Adam Stuart Smith & Patrick Wyse Jackson

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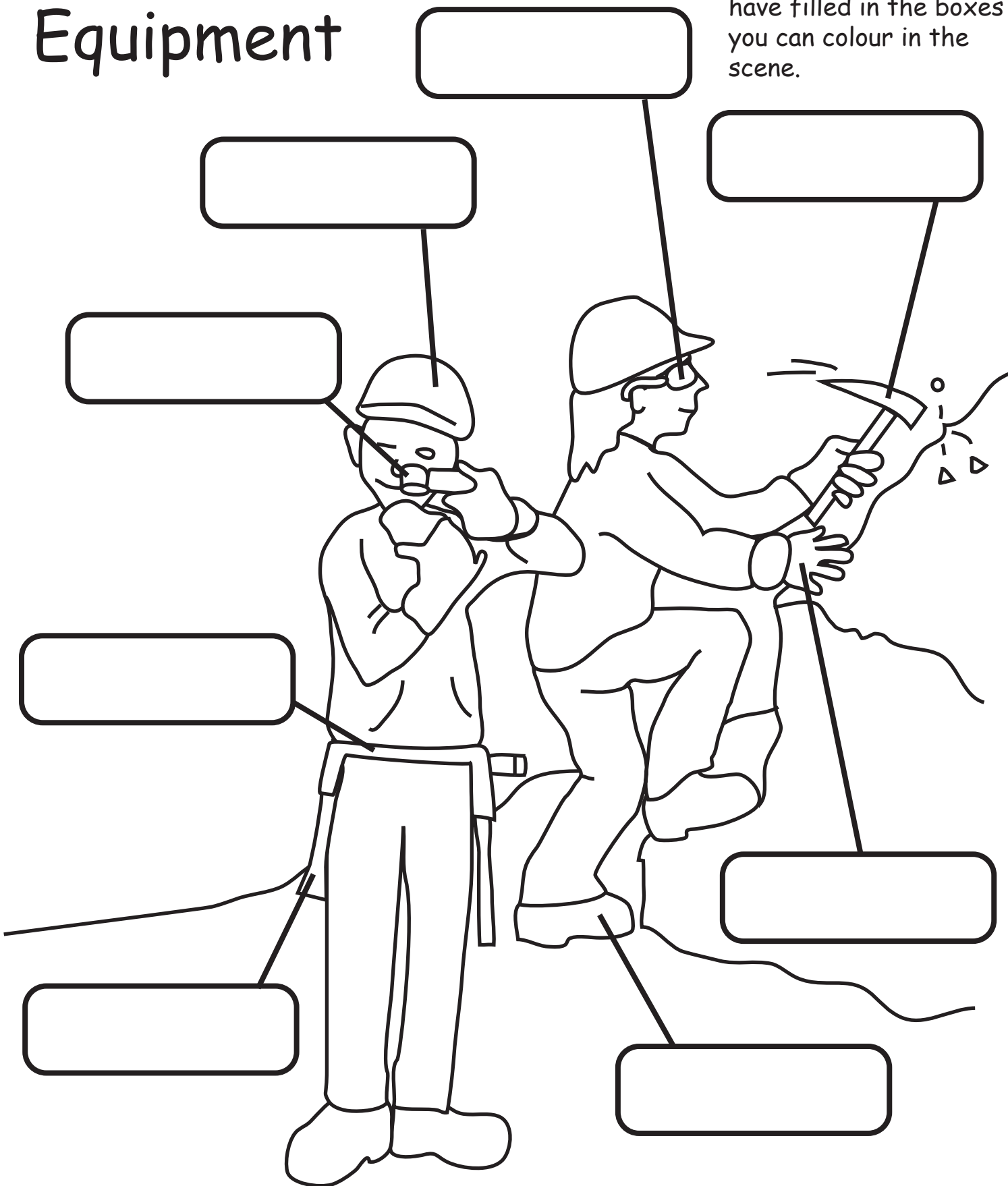
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Multiple copies of the pages from this book can be freely made as required for the use of schools, groups, or individuals. We recommend that the book is kept intact as a resource so that it can be reused many times over time. These pages, as well as other information on the geology of Ireland, may also be downloaded for free from the website: www.geoschol.com

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Geologists' Equipment

Can you identify the different items of equipment the geologists are using in this picture? Once you have filled in the boxes you can colour in the scene.



Utility belt

Hand lens

Hard hat

Goggles

Boots

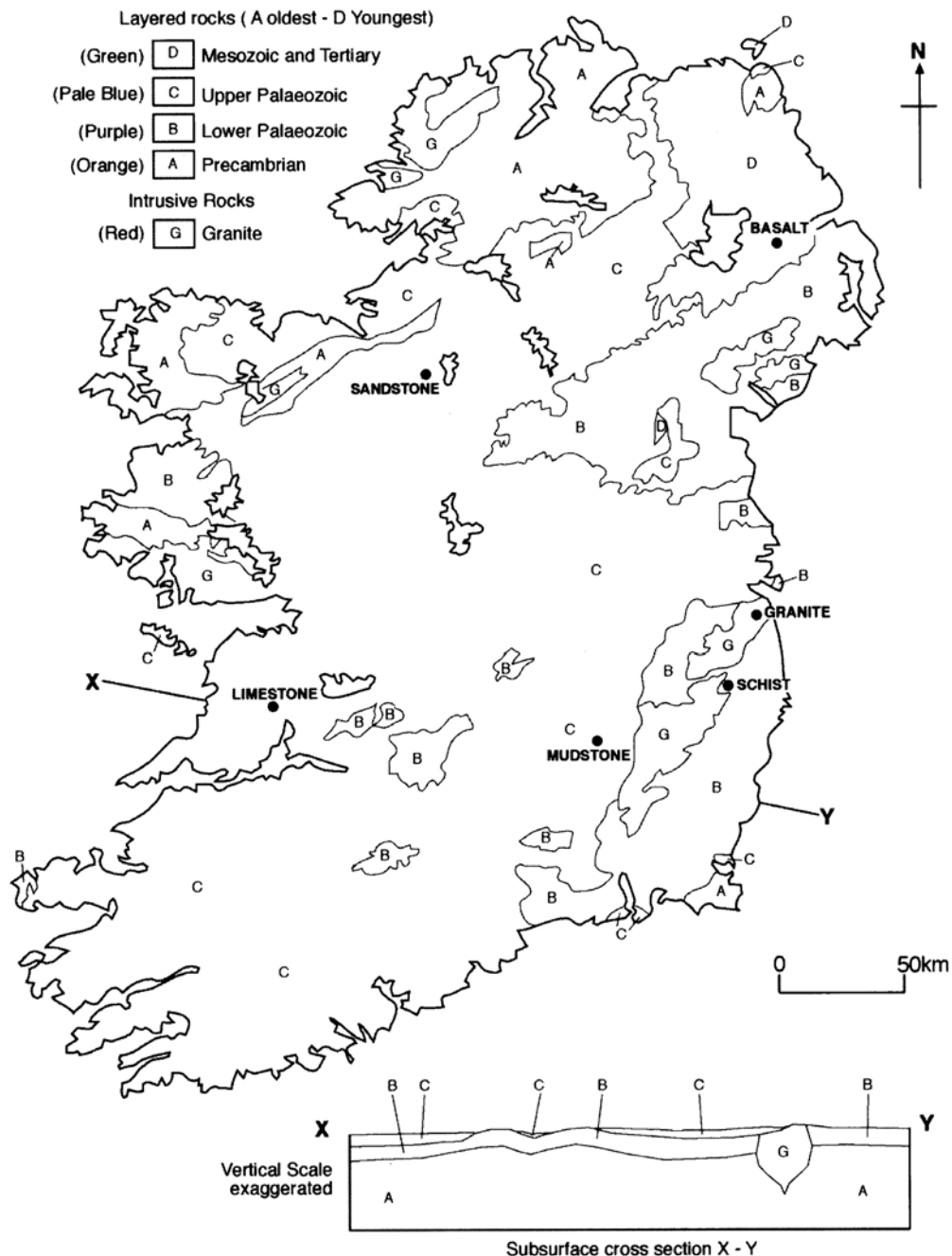
Gloves

Hammer

Chisel

Geological Map of Ireland

Colour in the map to produce your own geological map of Ireland and put an X where you live. The six rock types marked on the map are those given to every school in Ireland together with an accompanying booklet. Ask your teacher to let you and your class look at these.



Rock Word Search 1

Circle the names of **7** different rocks

B	G	C	A	N	I	M	E	E	F
A	L	I	H	H	M	U	Y	L	S
S	Z	E	N	A	T	S	D	U	A
A	G	X	R	S	L	E	D	W	N
L	T	B	I	D	T	K	C	M	D
T	L	H	T	F	S	C	K	H	S
E	C	G	R	A	N	I	T	E	T
L	I	M	E	S	T	O	N	E	O
T	D	O	S	C	A	L	Q	A	N
O	E	T	A	L	S	K	L	M	E

IGNEOUS:

BASALT - a black rock from a volcano

GRANITE - pale rock containing quartz crystals

SEDIMENTARY:

CHALK - a pure limestone used in school

LIMESTONE - often contains fossil shells

SANDSTONE - made of sand cemented together

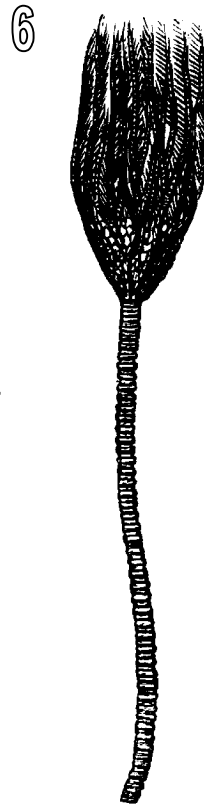
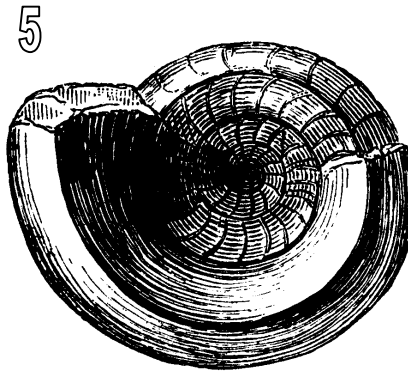
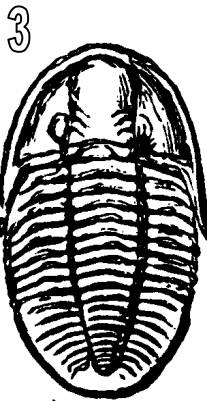
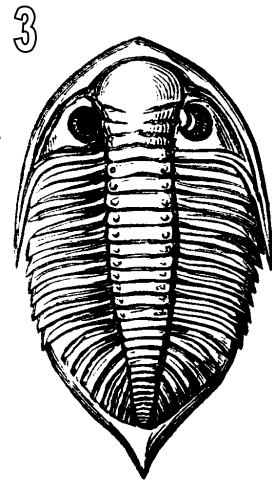
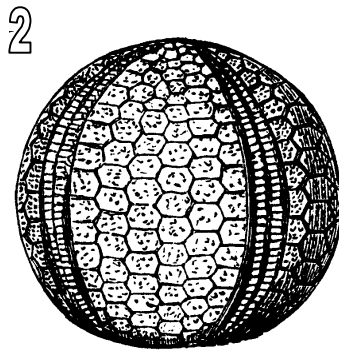
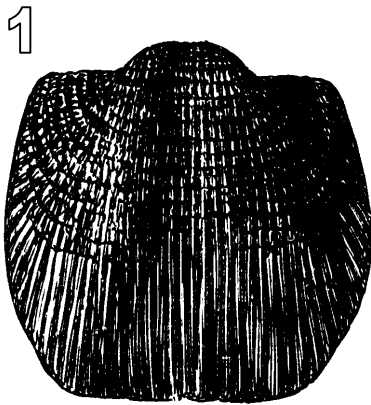
METAMORPHIC:

MARBLE - altered limestone used for statues

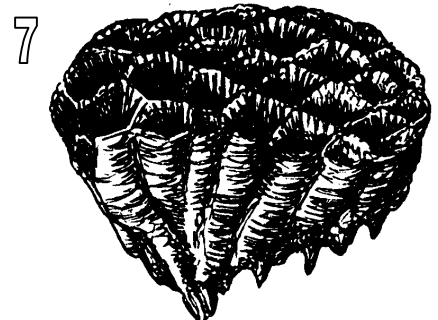
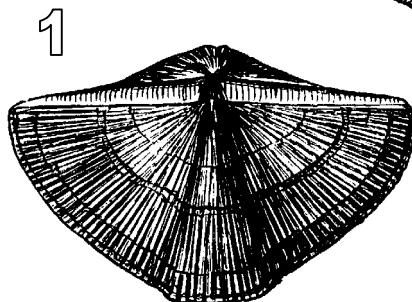
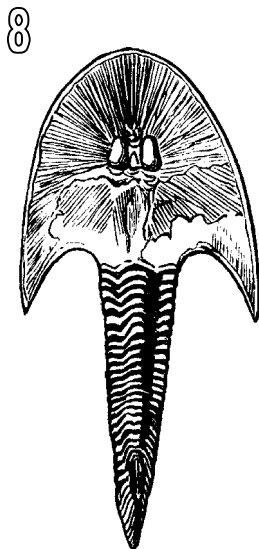
SLATE - a flattened rock used for roofs

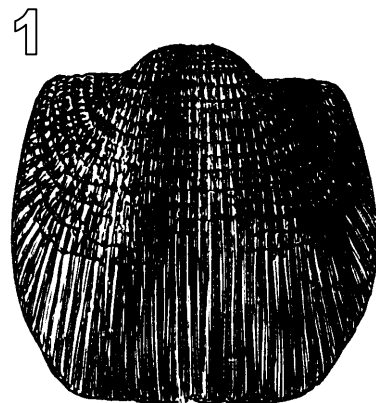
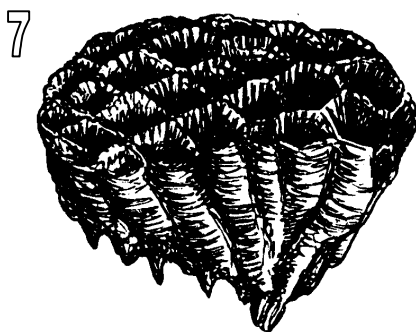
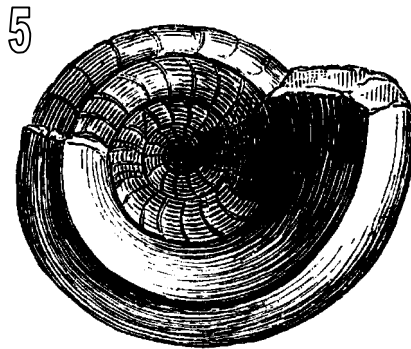
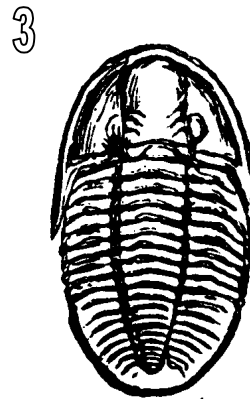
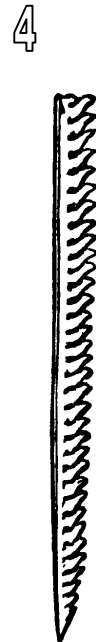
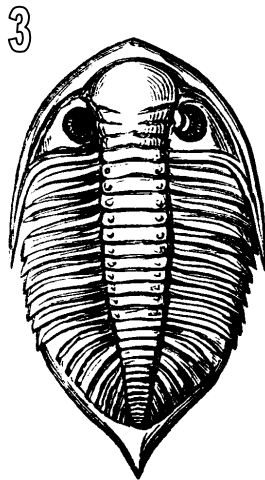
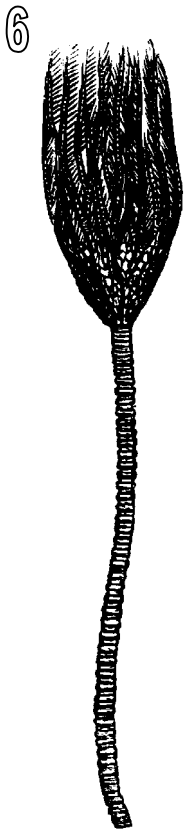
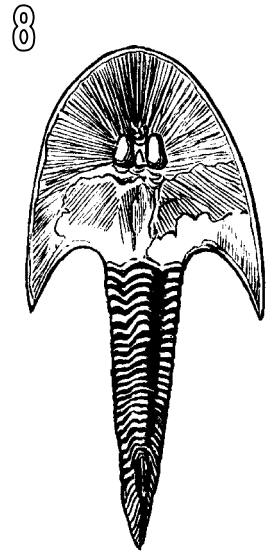
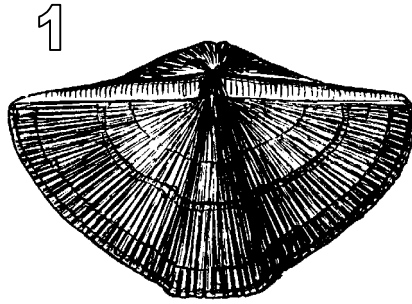
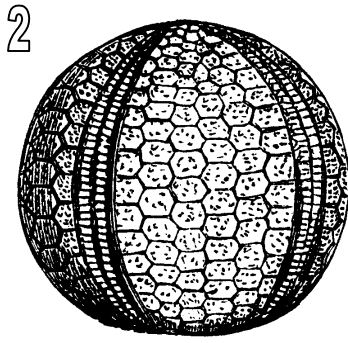
Make Your Own Fossil Mobile

Colour in the pictures below and those on the second mobile page opposite. Cut them out and then paste the two halves together. Then hang them from threads tied to a coat-hanger to make your own fossil mobile. Hang it in your bedroom.



1. Brachiopods
2. Sea Urchin
3. Trilobites
4. Graptolite
5. Cephalopod
6. Crinoid
7. Corals
8. Fish





Mineral Word Search

Circle the names of **8** different minerals that are of use to man

B	G	C	A	N	I	M	E	E	F
C	C	A	S	E	T	I	R	Y	P
H	L	L	N	A	T	S	D	U	A
C	G	A	A	S	U	Q	T	W	D
A	T	G	Y	P	S	U	M	N	I
L	L	H	T	F	S	A	A	H	A
C	M	M	I	C	A	R	D	X	M
I	I	C	E	S	E	T	T	E	O
T	D	O	S	C	A	Z	Z	A	N
E	E	T	A	L	C	K	L	M	D

CALCITE - a soft white mineral that makes up limestone.

CLAY - made of different minerals. Used for bricks.

DIAMOND - The hardest mineral known. Used in jewellery.

GYP SUM - a white to pink coloured mineral used in plaster board.

MICA - a flat silvery mineral used for Christmas glitter.

PYRITES - also called Iron Pyrites or 'Fool's Gold'.

QUARTZ - a clear mineral used for glass and computer chips.

TALC - a soft mineral used in talcum powder.

Mineral Hardness - Mohs' Scale

Mohs' scale is a way of describing mineral hardness. The scale ranges from 1 (the softest) to 10 (the hardest) and each of the 10 numbers is represented by a certain mineral. Follow along the lines to work out the order of minerals. The lines for diamond (the hardest mineral) and gypsum (a soft mineral) are both missing; can you draw them in?

1 Talc

2

3

4

5

6

7

8

9

10

Calcite

Topaz

Diamond

Gypsum

Apatite

Talc

Orthoclase

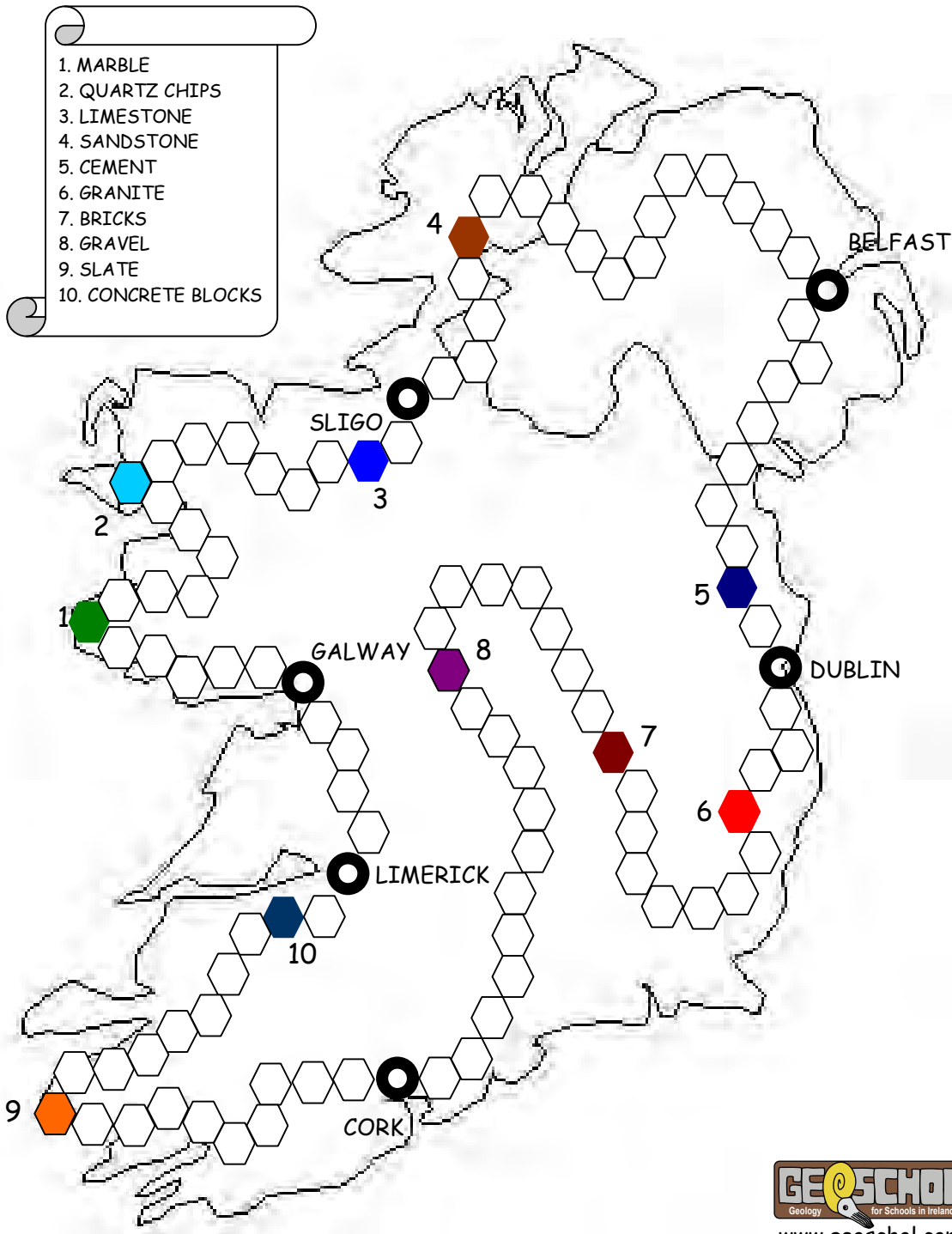
Corundum

Quartz

Fluorite

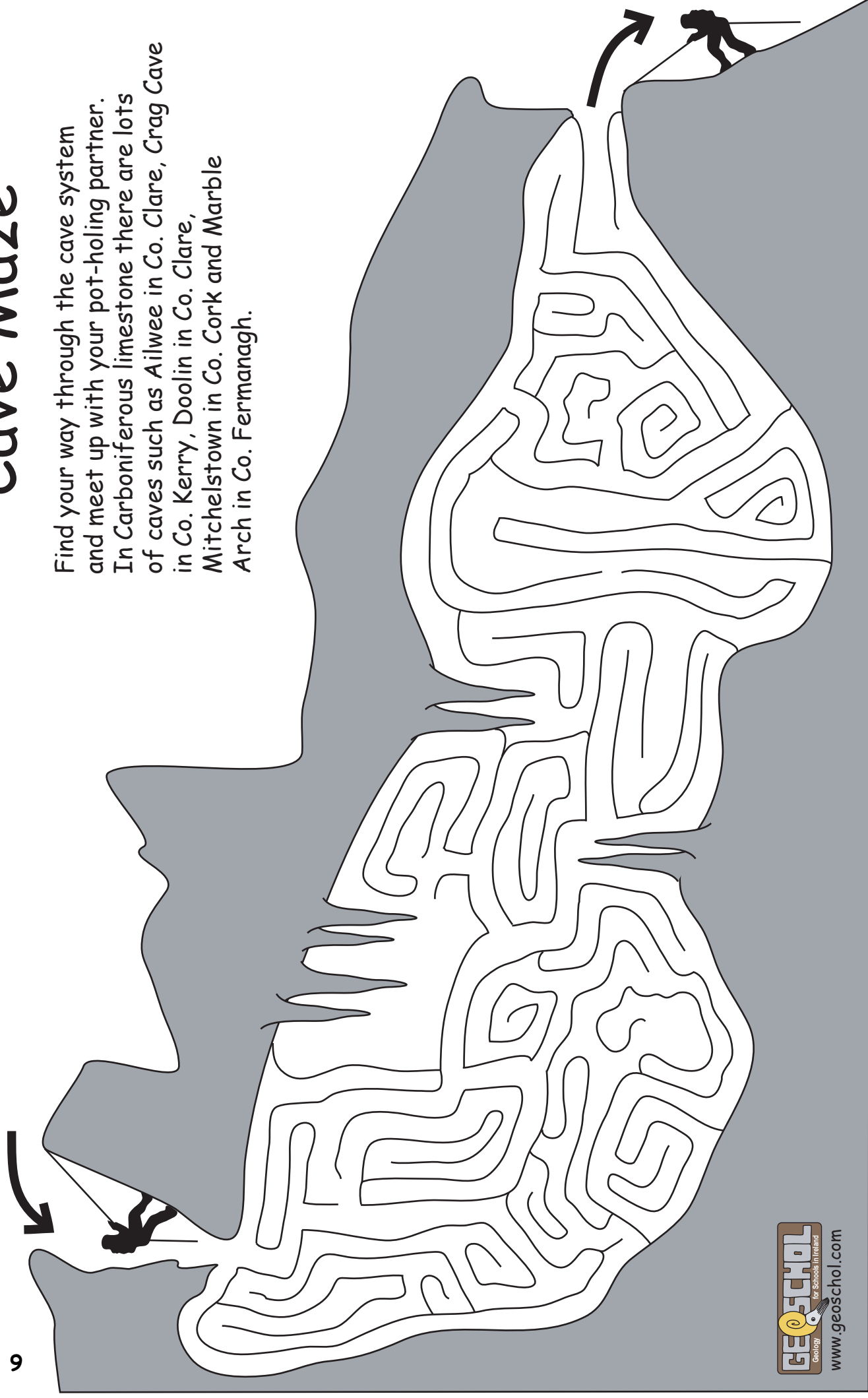
Touring Ireland Game - to collect building materials

A game for up to 6 players. Be the first to collect all the material that you need to build your house. Each player starts at a different city. Throw the die once - the person throwing the lowest number starts. Then in turn throw the die and move clockwise around Ireland. Collect your building material as you pass each numbered hexagon. The first player back to their city is the winner!

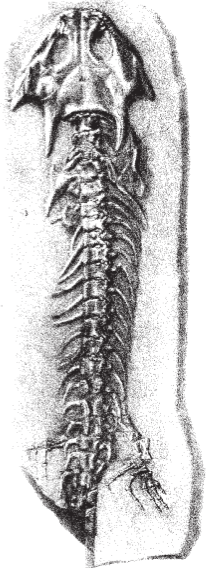


Cave Maze

Find your way through the cave system and meet up with your pot-holing partner. In Carboniferous limestone there are lots of caves such as Ailwee in Co. Clare, Crag Cave in Co. Kerry, Doolin in Co. Clare, Mitchelstown in Co. Cork and Marble Arch in Co. Fermanagh.

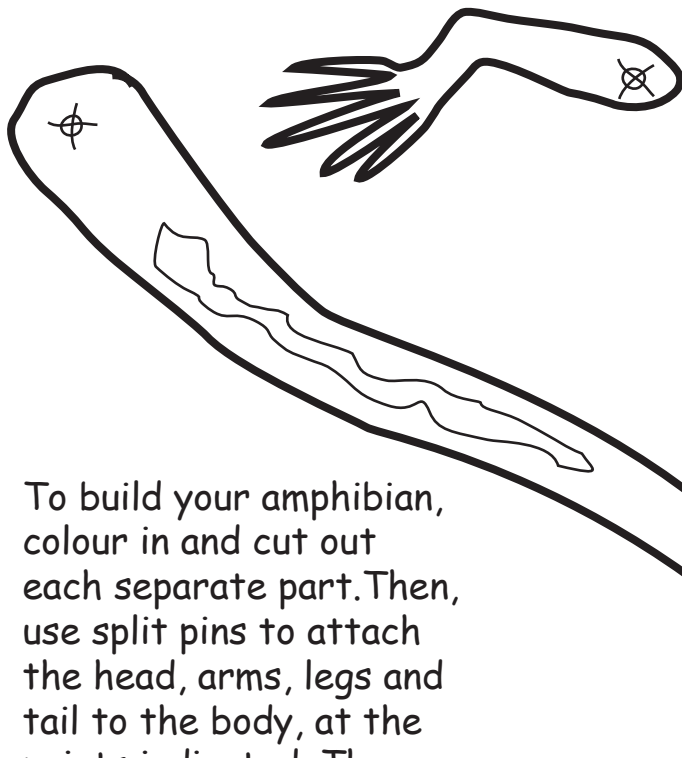


Build an Amphibian!

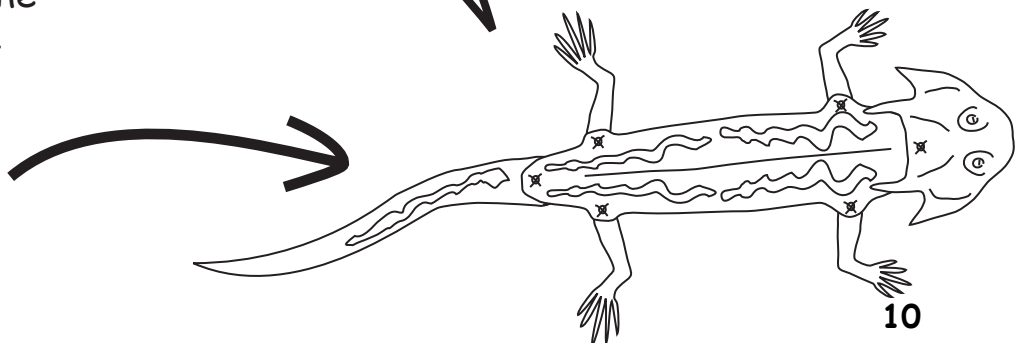
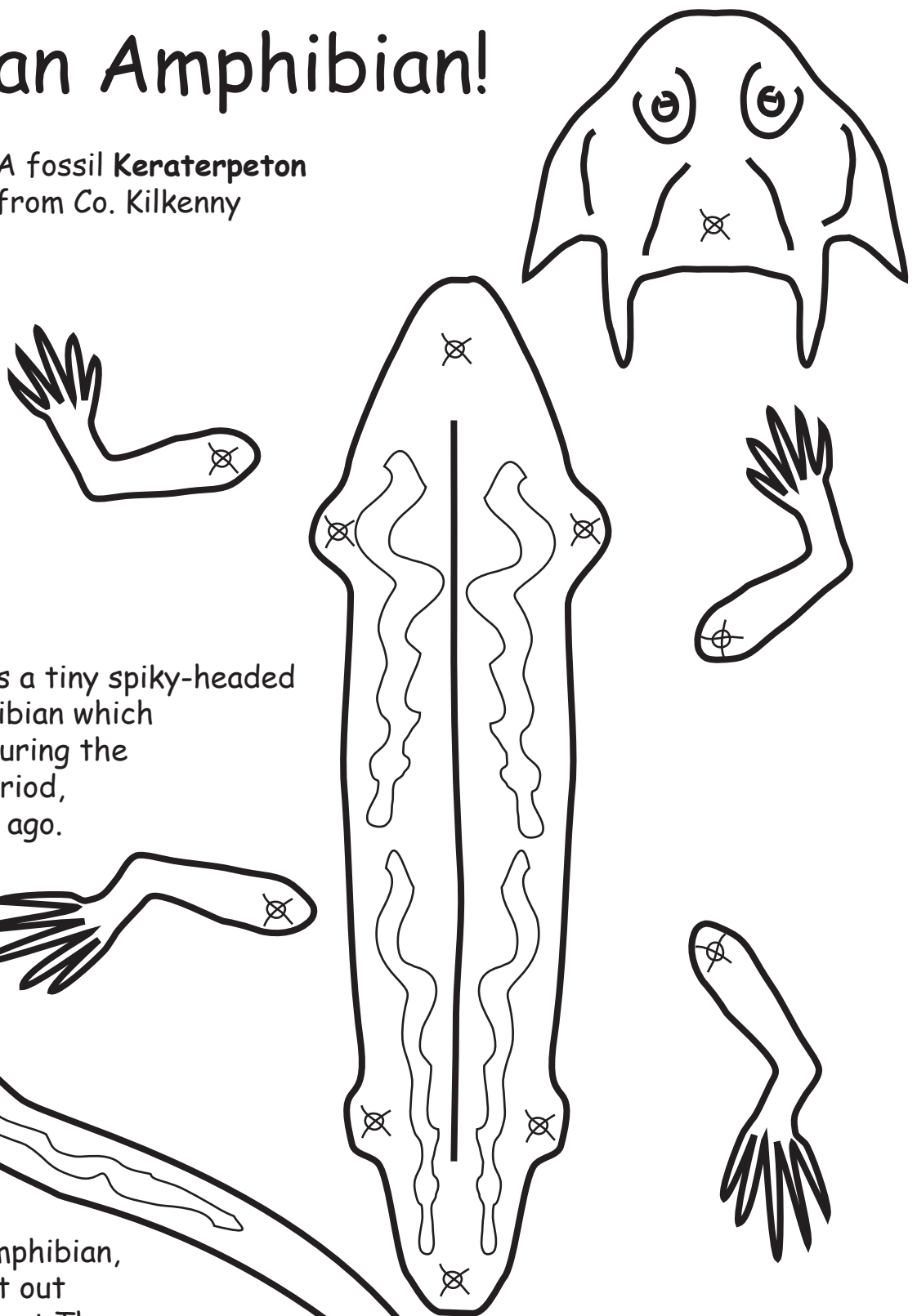


A fossil **Keraterpeton**
from Co. Kilkenny

Keraterpeton was a tiny spiky-headed prehistoric amphibian which lived in Ireland during the Carboniferous Period, 300 million years ago.



To build your amphibian, colour in and cut out each separate part. Then, use split pins to attach the head, arms, legs and tail to the body, at the points indicated. The finished articulated creature should look something like this:



Geological Time & Ireland's Past History

Colour in the different geological periods to produce your own geological time chart

Era	Geological Period	
Cainozoic	QUATERNARY	Man arrives in Ireland Giant Irish Deer becomes extinct 10,000 years ago
	TERTIARY	Ireland covered by ice during Ice Age Atlantic Ocean opens Giant's Causeway forms from volcanic eruptions
Mesozoic	CRETACEOUS	Dinosaurs become extinct Chalk deposited
	JURASSIC	Marine reptiles dominate the seas
	TRIASSIC	Desert conditions in Ireland
Palaeozoic	PERMIAN	Ireland becoming drier
	CARBONIFEROUS	Shallow warm tropical seas with reefs cover Ireland
	DEVONIAN	Ireland covered by deserts and sand dunes
	SILURIAN	Leinster granite injected into the crust Iapetus Ocean (early sea) closes
	ORDOVICIAN	Small volcanic islands erupt near Waterford Ireland under sea
	CAMBRIAN	<i>Oldhamia</i> , a trace fossil forms in rocks now at Bray
Archean	PRECAMBRIAN	Early rocks altered and metamorphosed Oldest rocks in Ireland 3,300 million years old Earth forms at the 'Big Bang'

Origin of the Earth: 4,567 MA

Giant's Causeway Game

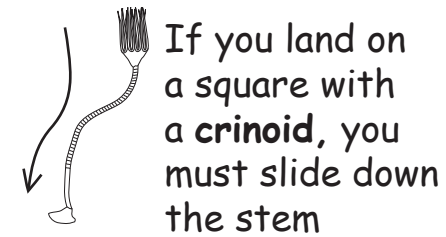
A game for 2-6 players - navigate across the basalt pillars of Giants Causeway!

What you need...

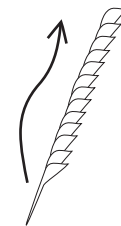
1. Each player needs a suitable piece for the game - a coin or a chess piece would be ideal. Make sure each one is different!
2. A six sided die.

The rules

1. All players place their piece on the 'start square'. To begin, each player throws the die and the highest scorer starts the game.
2. The starting player throws the die and moves their piece forward that number of squares.
3. Moving clockwise, each players takes turns to throw the die and move.
4. However, there are obstacles you will encounter on your journey:



If you land on a square with a **crinoid**, you must slide down the stem

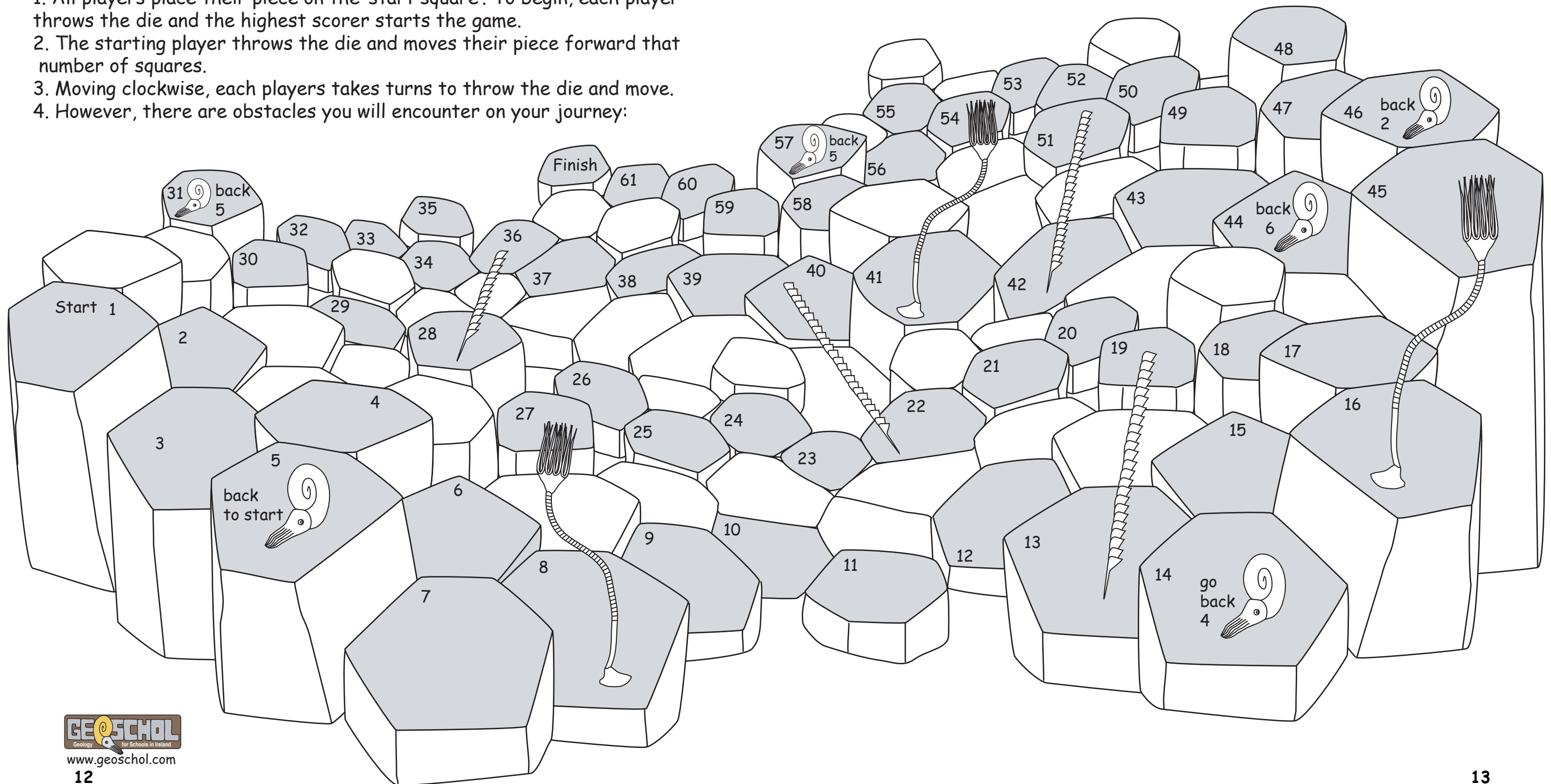


If you land on a square with a **graptolite**, you can climb up it.



If you land on a square with an **ammonite**, you have to go back the number of places indicated.

5. The first player to reach the 'finish' square wins!



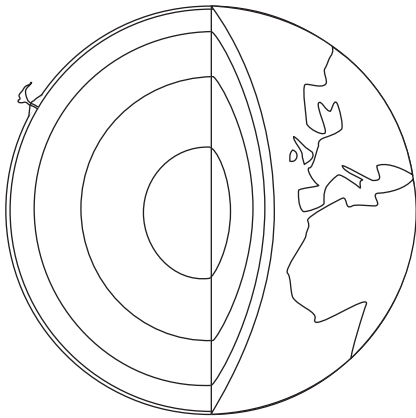
Missing Words

Complete the sentences by identifying the missing words in the box below and filling in the gaps.

Coal is a type of _ _ _ _ _ fuel.

The surface of the Earth is called the _ _ _ _ _.

_ _ _ _ _ is a rock used for roof tiles.

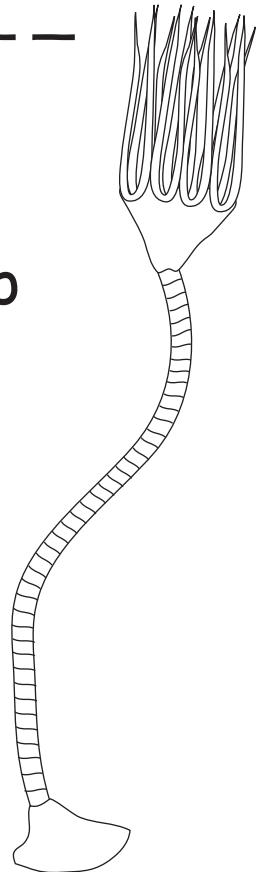


Volcanoes produce _ _ _ _ and smoke.

Planet Earth is made up of several _ _ _ _ _.

Iron ores contain metallic _ _ _ _.

Fossils are the _ _ _ _ _ of dead plants and animals.



crust

Slate

layers

remains

iron

lava

fossil

Rock Word Search 2

Circle the names of **twelve** different rocks

P	G	R	A	N	I	T	E	E	F	W	H	P	L	J	C
F	L	I	A	H	S	U	Y	L	P	K	O	G	J	S	O
G	Z	E	N	O	T	S	D	U	M	K	B	N	K	H	N
L	G	X	M	S	K	E	D	W	S	O	G	S	T	A	G
I	T	R	I	D	T	C	C	M	G	C	O	C	V	L	L
M	S	H	T	F	S	C	K	H	A	O	W	H	I	E	O
E	C	T	B	D	T	H	R	M	K	R	Q	I	V	P	M
S	S	X	U	T	L	A	S	L	T	S	B	V	T	T	E
T	D	O	S	C	A	L	Q	A	Q	C	V	L	W	L	R
O	S	M	S	B	S	K	L	M	N	S	O	T	E	L	A
N	A	U	T	S	A	U	G	T	Q	D	L	L	W	R	T
E	O	F	D	S	B	W	S	I	L	T	S	T	O	N	E
X	B	X	L	X	M	E	T	L	G	T	D	T	P	M	L
B	D	A	S	E	M	T	V	O	A	H	M	K	O	I	K
W	H	C	H	E	W	D	O	T	Q	T	H	W	J	N	O
X	C	S	L	V	S	O	I	W	D	Q	E	M	D	N	E

IGNEOUS:

BASALT - a black volcanic rock with tiny crystals

SEDIMENTARY:

GRANITE - pale rock containing quartz, mica and feldspar

CHALK - a pure white limestone used in school

CONGLOMERATE - made up of pebbles cemented together

LIMESTONE - often contains fossil shells

MUDSTONE - cemented mud

SANDSTONE - made of sand cemented together

SHALE - a black fine-grained rock

SILTSTONE - made up of silt cemented together

METAMORPHIC:

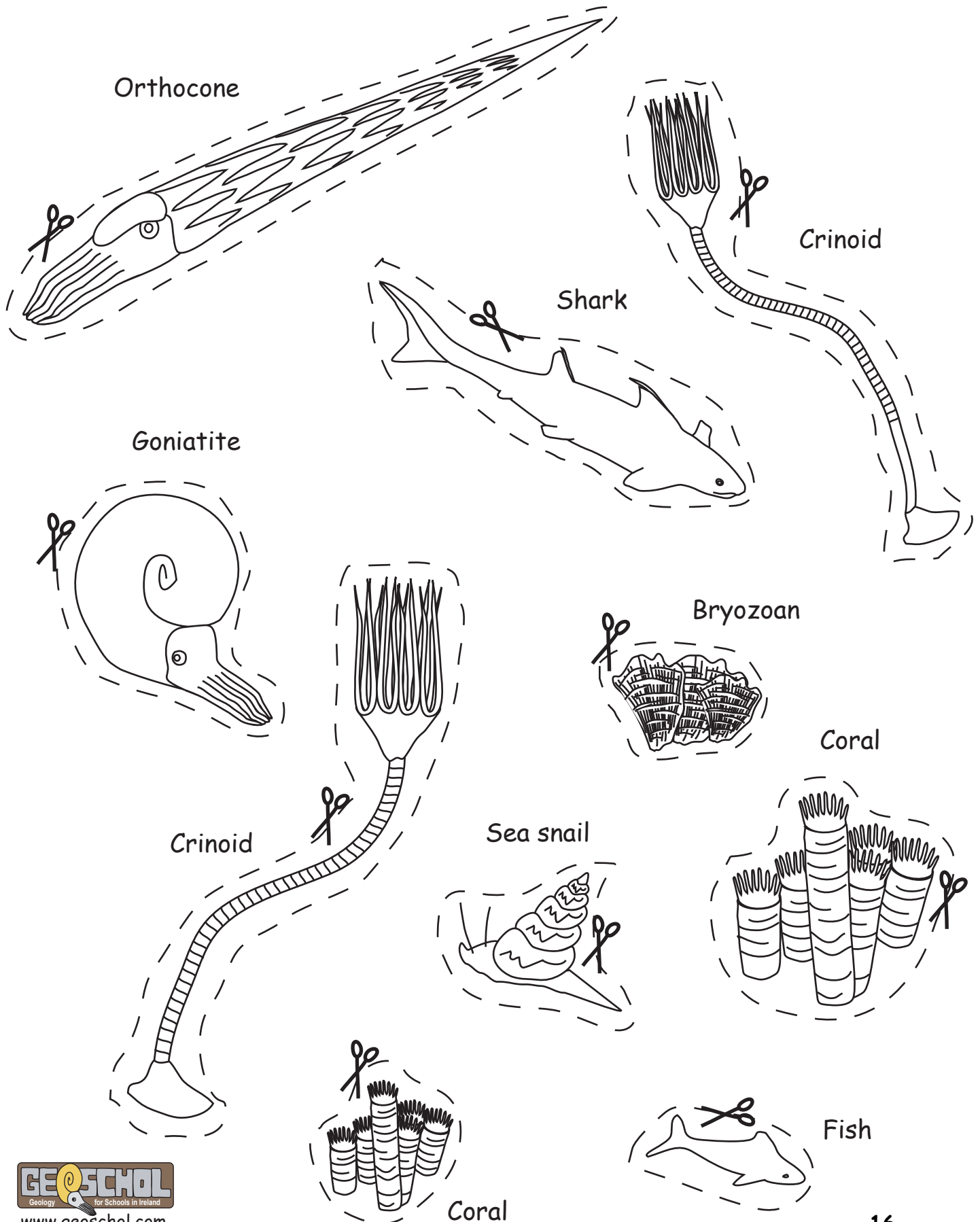
MARBLE - altered limestone used for statues and fireplaces

SCHIST - an altered rock containing shiny mica

SLATE - a flattened rock used for roofs

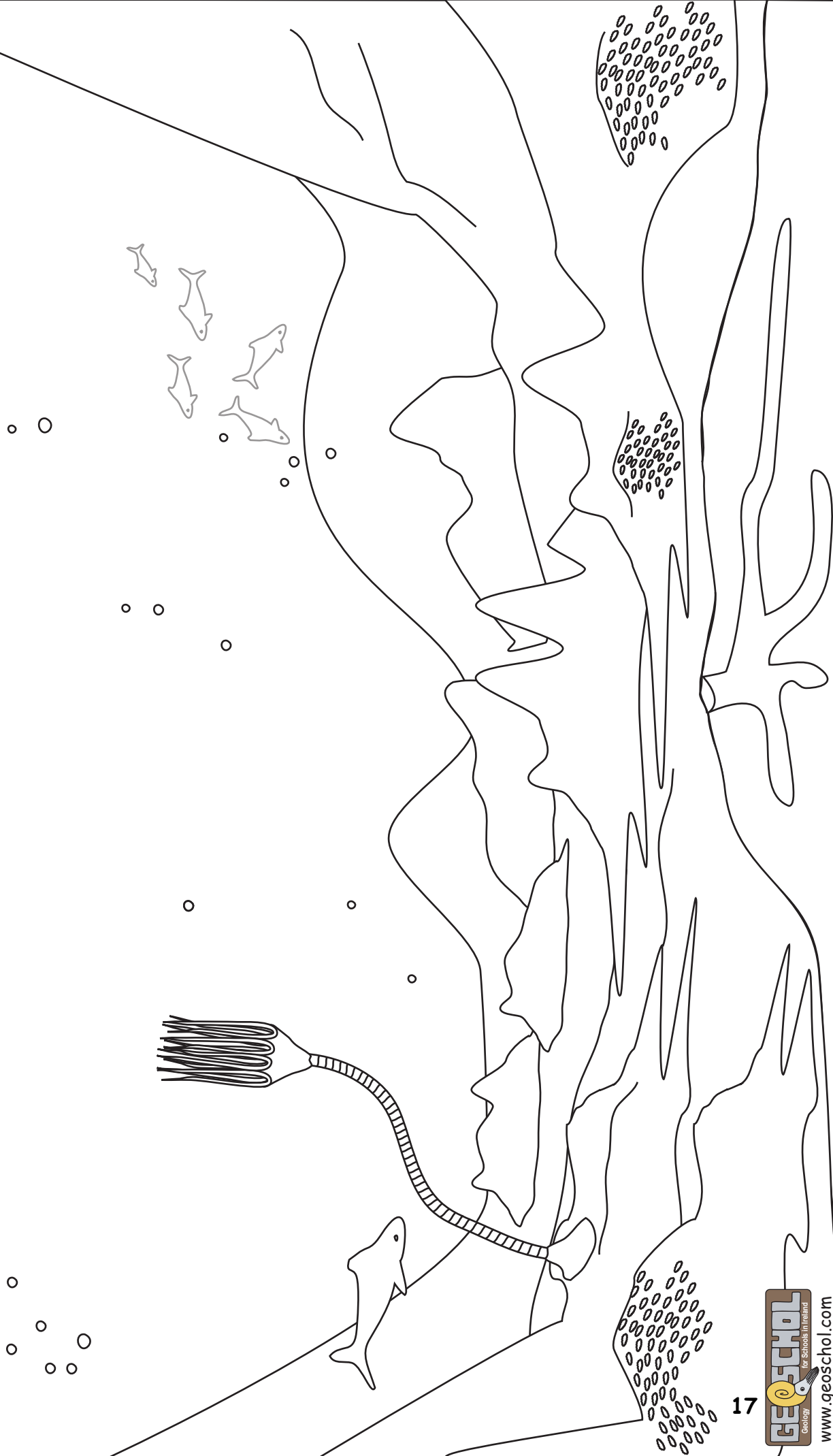
Carboniferous Life

Cut out and colour in these different Carboniferous-age creatures, then stick them into the coral reef on the opposite page to complete the scene.



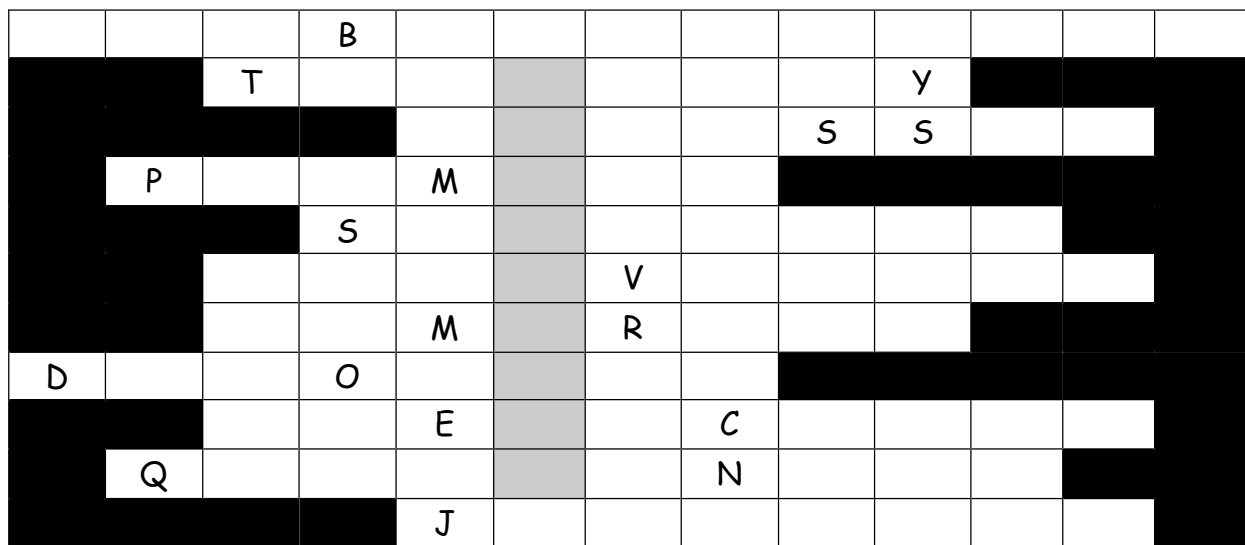
Carboniferous Sea

Carboniferous seas covered Ireland 300 million years ago, but they were full of life! Complete this coral reef scene by colouring it in and then cut out and glue in the organisms on the opposite page. Don't forget to colour them in too.



Which Missing Fossil is in the Geological Periods?

Fill in the names of the different geological periods and reveal the name of an extinct marine animal that lived between 500 and 300 million years ago.



Quaternary
Tertiary
Cretaceous
Jurassic
Triassic
Permian
Carboniferous
Devonian
Silurian
Ordovician
Cambrian



Draw a picture of the animal in the box

Dot-to-Dot

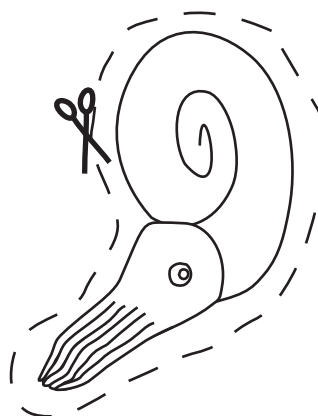
Finish the drawing and identify the famous Irish fossil mammal. When it's finished you can colour it in.



Jurassic Life

Cut out and colour in these different Jurassic-age creatures, then stick them into the shallow Jurassic sea opposite to complete the scene.

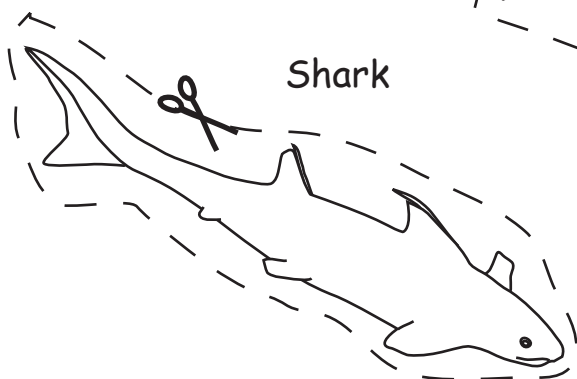
Ammonite



Fish



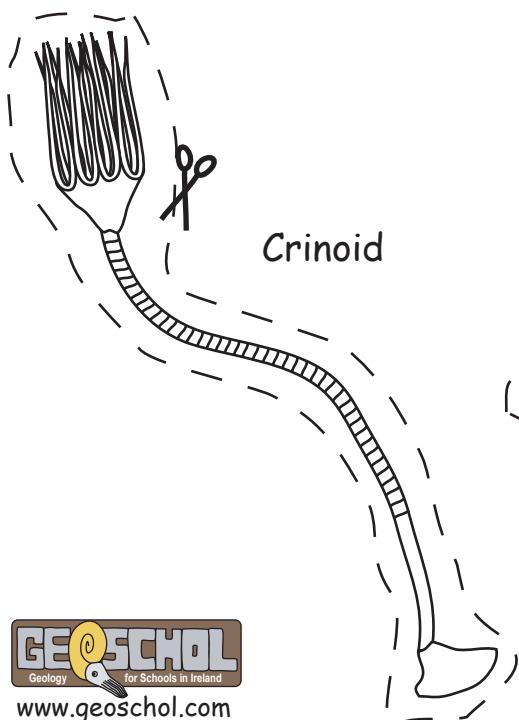
Shark



Plesiosaur



Crinoid



Belemnite



Ichthyosaur



Jurassic Sea

Jurassic seas filled with giant marine reptiles and ammonites, covered Ireland 180 million years ago. Complete this scene by colouring it in and then cut out the organisms on the opposite page. Finally, glue them into place.



Fossil Match & Colouring

Draw a line between the name of the extinct animal or plant and the correct picture. Then colour in the pictures.

AMMONITE

Related to octopus and squid.
Their shells were full of gas and this helped them float in the sea.

DINOSAUR

Reptiles that lived 200 to 65 million years ago. Some were tiny but others became huge.

FERN

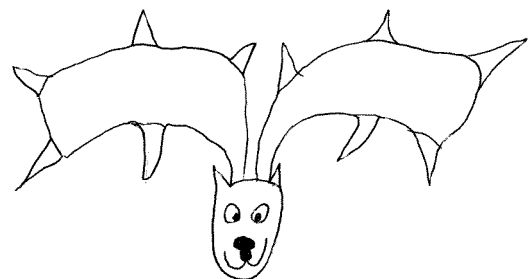
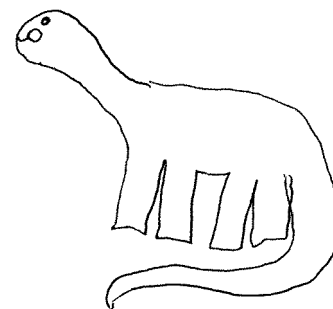
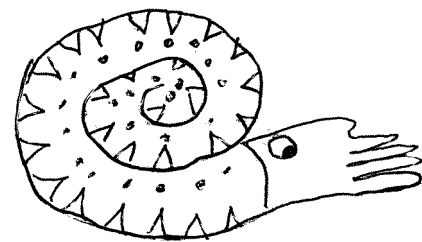
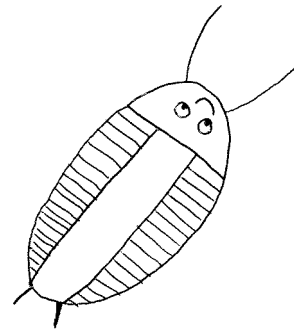
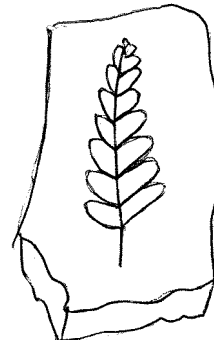
A plant found growing in swampy ground. Many were preserved in coal 300 million years old.

GIANT IRISH DEER

Died out only 10,000 years ago.
Male animals had large antlers 6 feet wide that they grew every year.

TRILOBITE

Lived in the sea 590 to 250 million years ago. They were divided into segments and had large eyes.



Fossil Word Search

Circle the names of **8** different types of fossil.

These can be forwards, backwards, down, or at an angle.

F	G	C	S	N	I	M	D	E	D
E	E	I	H	P	M	C	E	L	E
R	T	R	I	L	O	B	I	T	E
T	G	X	N	R	L	N	R	W	R
L	T	B	A	D	T	L	G	M	D
T	L	L	T	F	S	A	K	E	S
D	O	P	A	R	T	E	T	C	T
X	I	T	E	S	C	Q	N	E	I
T	D	O	S	C	Y	C	A	D	N
G	A	S	T	R	O	P	O	D	Y

CORAL - an animal with tentacles that lived in warm oceans.

CYCAD - a primitive plant with cones.

DEER - a mammal whose males grew large antlers every year .

FERN - a plant that produces spores and no flowers.

GASTROPOD - a snail that lived in a spiral-shaped shell.

SPONGE - a soft animal that lives in the sea.

TETRAPOD - an early animal that walked on land on four legs.

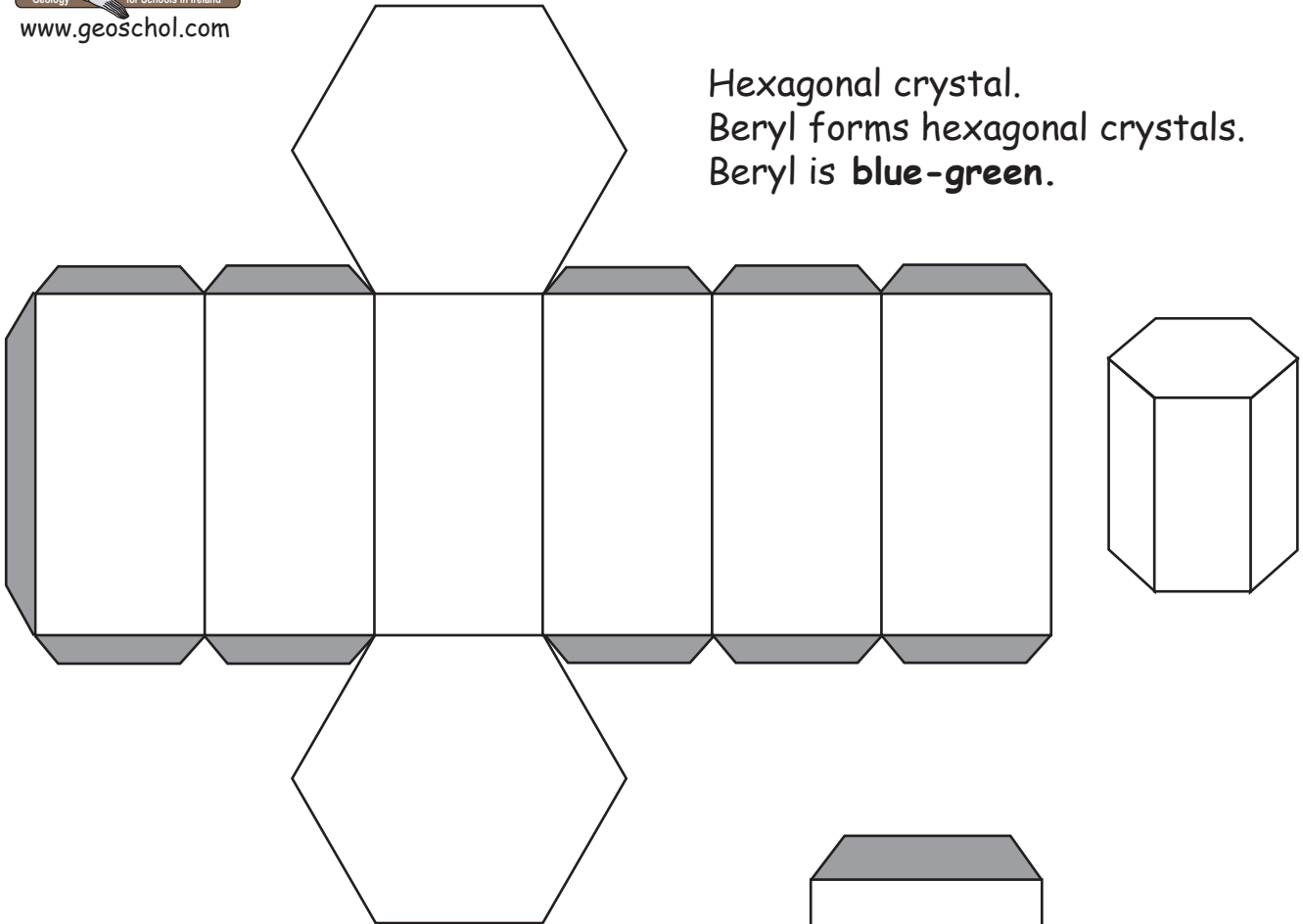
TRILOBITE - a sea animal with an outer shell divided into segments.

Crystal Shapes

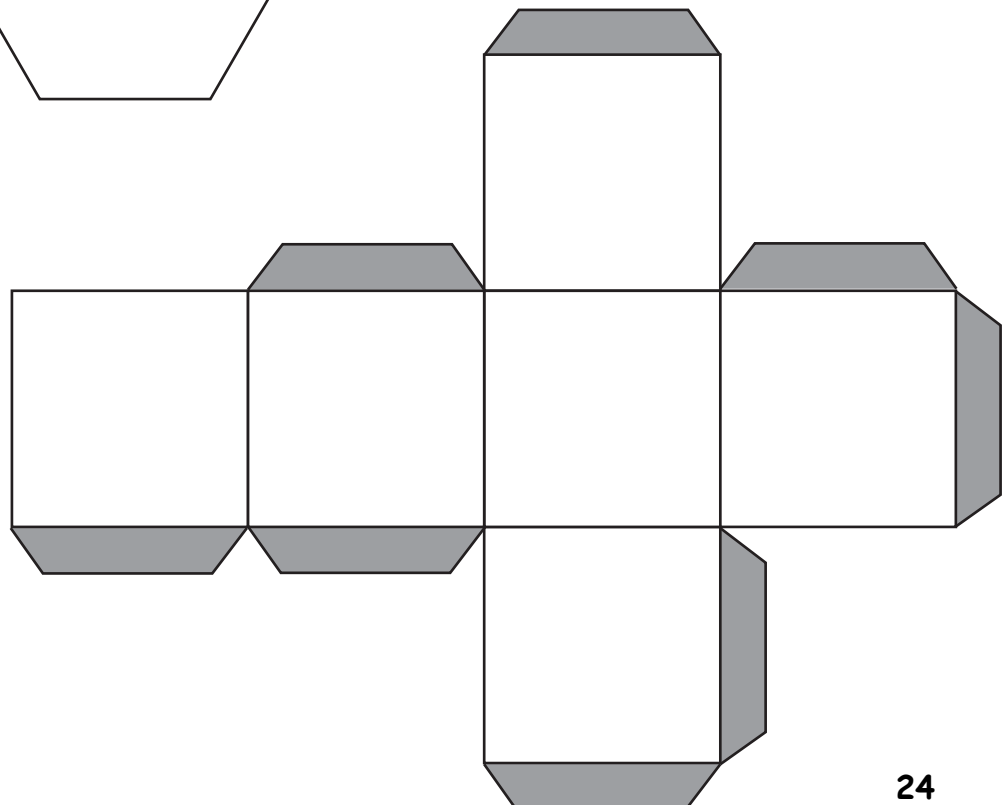
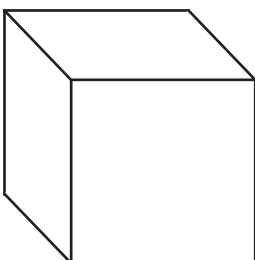
Different minerals have different crystal structures. Here are two examples of simple crystal shapes for you to make yourself. To build your crystals, first colour them in and cut around the outer edges. Fold along the lines so that they look like the pictures, then glue the grey tabs into place.



Hexagonal crystal.
Beryl forms hexagonal crystals.
Beryl is **blue-green**.

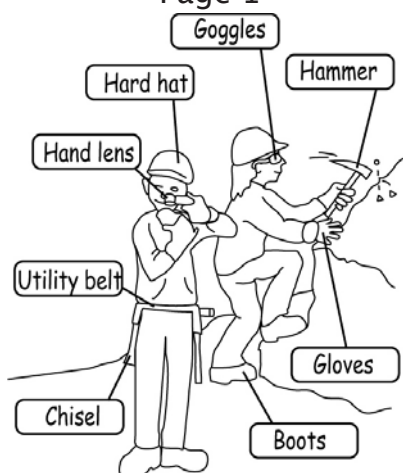


Isometric crystal.
In this type of crystal all of the sides are equal.
Pyrite or Fool's gold forms isometric crystals.
Fool's gold appears **gold** in colour.



Solutions

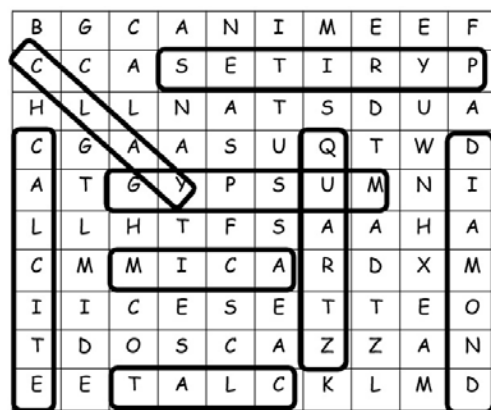
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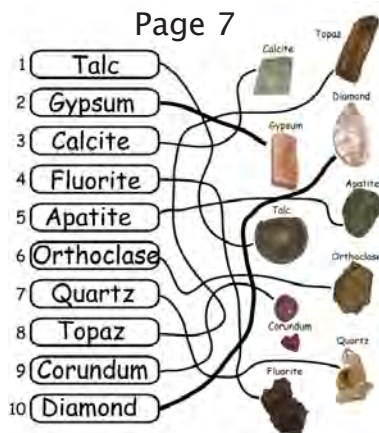
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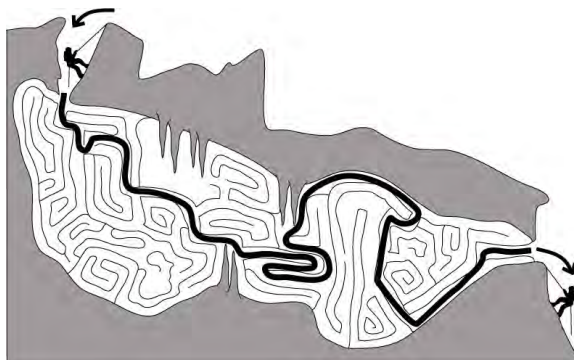
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Coal is a type of fossil fuel.

The surface of the Earth is called the crust.

Slate is a rock used for roofing.

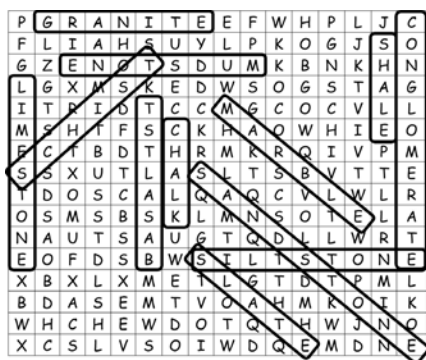
Volcanoes produce lava and smoke.

Planet Earth is made up of several layers.

Iron ores contain metallic iron.

Fossils are the remains of dead plants and animals.

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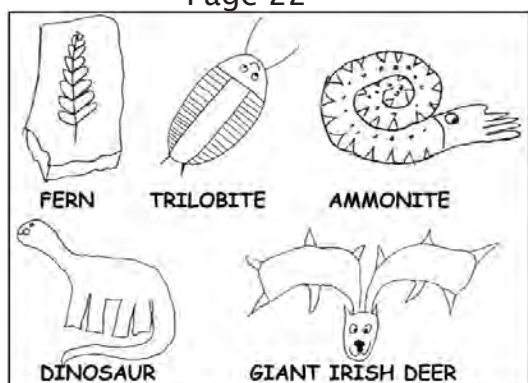
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