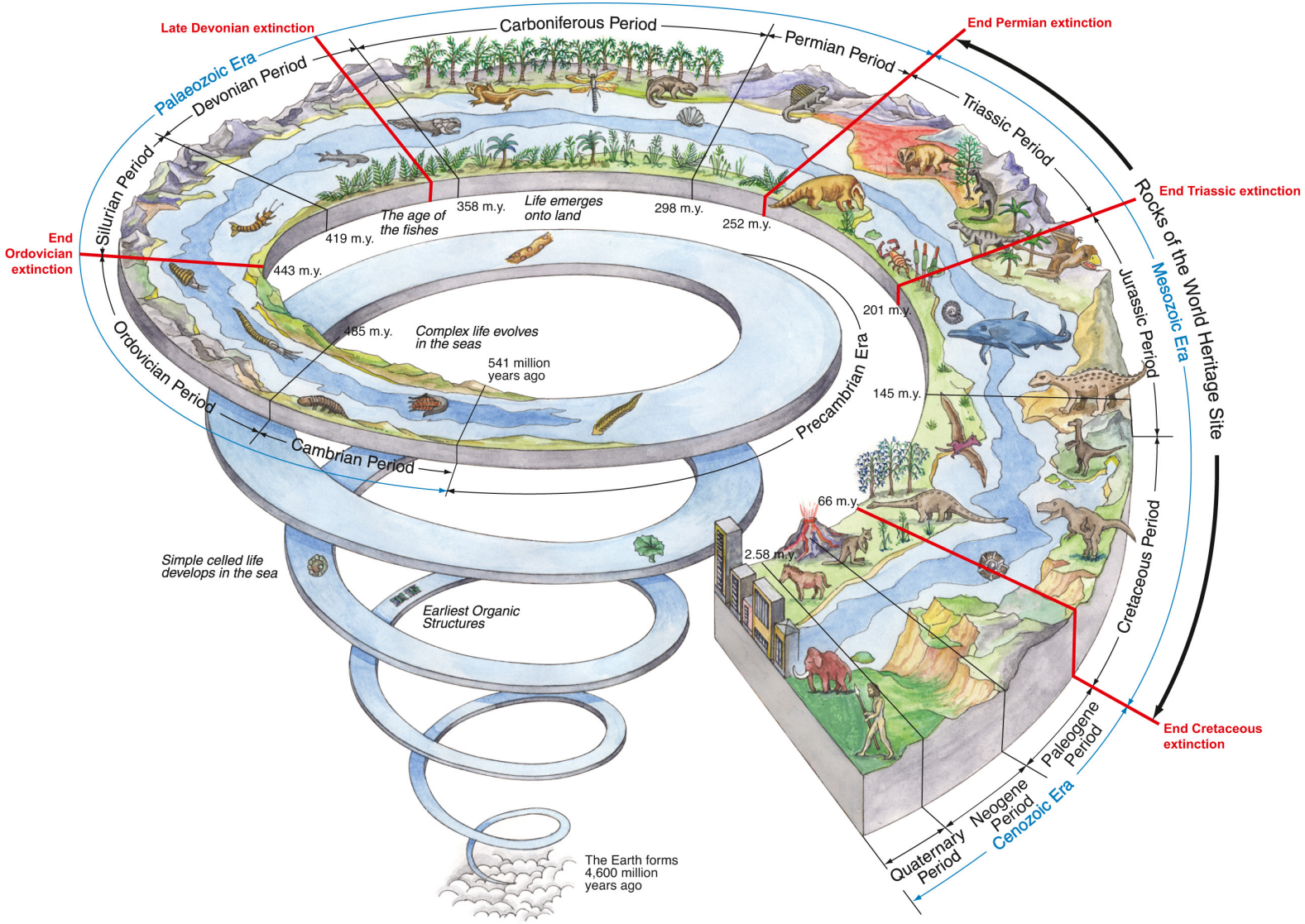
THE BIG JURASSIC CLASSROOM

JURASSIC COAST TRUST

why & how?
PRIMARY SCIENCE TEACHING TRUST

Resource Pack

TIME SPIRAL TO SHOW THE HISTORY OF THE EARTH




TRIASSIC
250 - 200 Million Years Ago
FACT
Small reptiles which were the early ancestors of dinosaurs lived in the desert.
During the Triassic Period, Dorset and East Devon was part of an enormous desert. Animals and plants lived where rivers and streams flowed across the harsh landscape.
FACT
Rhynchosaurs were very strange reptiles that are extinct today.

JURASSIC

200 - 140 Million Years Ago

At the start of the Jurassic Period, sea levels rose and flooded England. Rocks were now forming at the bottom of the sea instead of in a hot desert. Lots of fossils of sea creatures are preserved in our Jurassic rocks.

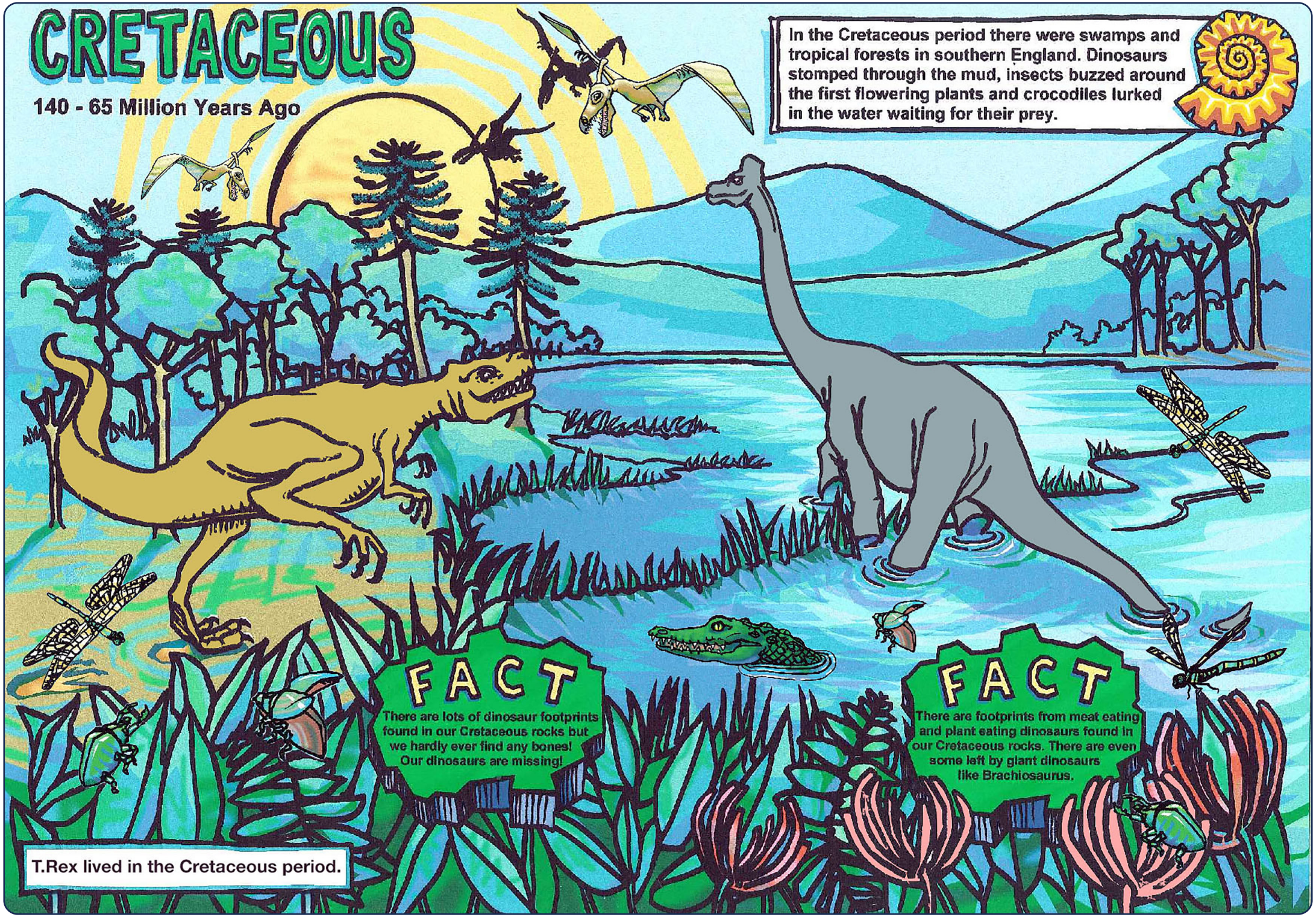
Pliosaurs were the biggest predator ever to exist. Even bigger than T-Rex!

FACT

Ichthyosaurs, Plesiosaurs and Pliosaurs are not dinosaurs. We call them marine reptiles.

Lobsters searched the mud for food leaving their burrows behind.

Sea shells and sea lilies or Crinoids, lived on the sea bed.


CRETACEOUS
140 - 65 Million Years Ago
In the Cretaceous period there were swamps and tropical forests in southern England. Dinosaurs stomped through the mud, insects buzzed around the first flowering plants and crocodiles lurked in the water waiting for their prey.
FACT
There are lots of dinosaur footprints found in our Cretaceous rocks but we hardly ever find any bones! Our dinosaurs are missing!
FACT
There are footprints from meat eating and plant eating dinosaurs found in our Cretaceous rocks. There are even some left by giant dinosaurs like Brachiosaurus.
T.Rex lived in the Cretaceous period.


© R.Bizley

ROCK IDENTITY CARD

GRANITE

1. What colours can I see in my rock?			
2. Is my rock shiny or dull? Are there any sparkly bits?			
3. What layers or patterns does my rock have?			
4. How does my rock feel? Is it rough or smooth? Light or heavy?			
5. How hard is my rock? What will make a scratch in my rock?	Soft	Medium	hard
6. Is my rock permeable? Does it absorb water?			
7. Does my rock fizz when it touches vinegar (an acid)?			
8. My other questions about my rock...			

ROCK IDENTITY CARD

MARBLE

1. What colours can I see in my rock?			
2. Is my rock shiny or dull? Are there any sparkly bits?			
3. What layers or patterns does my rock have?			
4. How does my rock feel? Is it rough or smooth? Light or heavy?			
5. How hard is my rock? What will make a scratch in my rock?	Soft	Medium	hard
6. Is my rock permeable? Does it absorb water?			
7. Does my rock fizz when it touches vinegar (an acid)?			
8. My other questions about my rock...			

ROCK IDENTITY CARD

SANDSTONE

1. What colours can I see in my rock?			
2. Is my rock shiny or dull? Are there any sparkly bits?			
3. What layers or patterns does my rock have?			
4. How does my rock feel? Is it rough or smooth? Light or heavy?			
5. How hard is my rock? What will make a scratch in my rock?	Soft	Medium	hard
6. Is my rock permeable? Does it absorb water?			
7. Does my rock fizz when it touches vinegar (an acid)?			
8. My other questions about my rock...			

ROCK IDENTITY CARD

LIMESTONE

1. What colours can I see in my rock?			
2. Is my rock shiny or dull? Are there any sparkly bits?			
3. What layers or patterns does my rock have?			
4. How does my rock feel? Is it rough or smooth? Light or heavy?			
5. How hard is my rock? What will make a scratch in my rock?	Soft	Medium	hard
6. Is my rock permeable? Does it absorb water?			
7. Does my rock fizz when it touches vinegar (an acid)?			
8. My other questions about my rock...			

ROCK IDENTITY CARD

CHALK

1. What colours can I see in my rock?			
2. Is my rock shiny or dull? Are there any sparkly bits?			
3. What layers or patterns does my rock have?			
4. How does my rock feel? Is it rough or smooth? Light or heavy?			
5. How hard is my rock? What will make a scratch in my rock?	Soft	Medium	hard
6. Is my rock permeable? Does it absorb water?			
7. Does my rock fizz when it touches vinegar (an acid)?			
8. My other questions about my rock...			

ROCK IDENTITY CARD

SLATE

1. What colours can I see in my rock?			
2. Is my rock shiny or dull? Are there any sparkly bits?			
3. What layers or patterns does my rock have?			
4. How does my rock feel? Is it rough or smooth? Light or heavy?			
5. How hard is my rock? What will make a scratch in my rock?	Soft	Medium	hard
6. Is my rock permeable? Does it absorb water?			
7. Does my rock fizz when it touches vinegar (an acid)?			
8. My other questions about my rock...			

ROCK IDENTITY CARD

Name of rock	Picture of rock

1. What colours can I see in my rock?	
2. Is my rock shiny or dull? Are there any sparkly bits?	
3. What layers or patterns does my rock have?	
4. How does my rock feel? Is it rough or smooth? Light or heavy?	

5. How hard is my rock? What will make a scratch in my rock?	Soft	Medium	hard

6. Is my rock permeable? Does it absorb water?	
7. Does my rock fizz when it touches vinegar (an acid)?	
8. My other questions about my rock...	

SORTING AND CLASSIFYING ROCKS

Does your rock have sparkly crystals?

YES

Are the crystals pink, white and black?

NO

Marble

YES

Granite

NO

Can you see layers?

NO

Does the rock leave a white powder on your fingers?

YES

Chalk

NO

Is the rock orange or brown in colour?

NO

Limestone

YES

Sandstone

YES

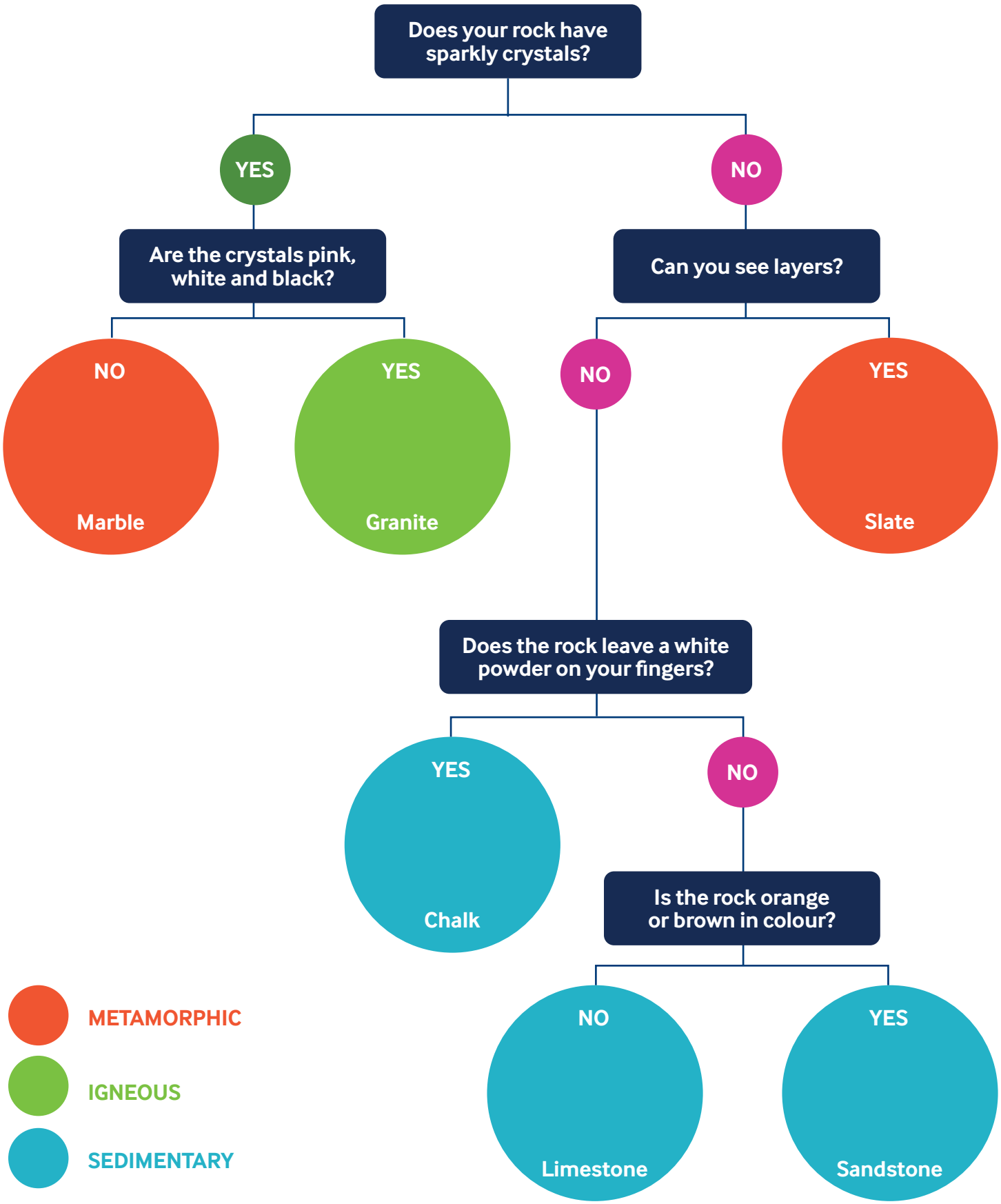
Slate

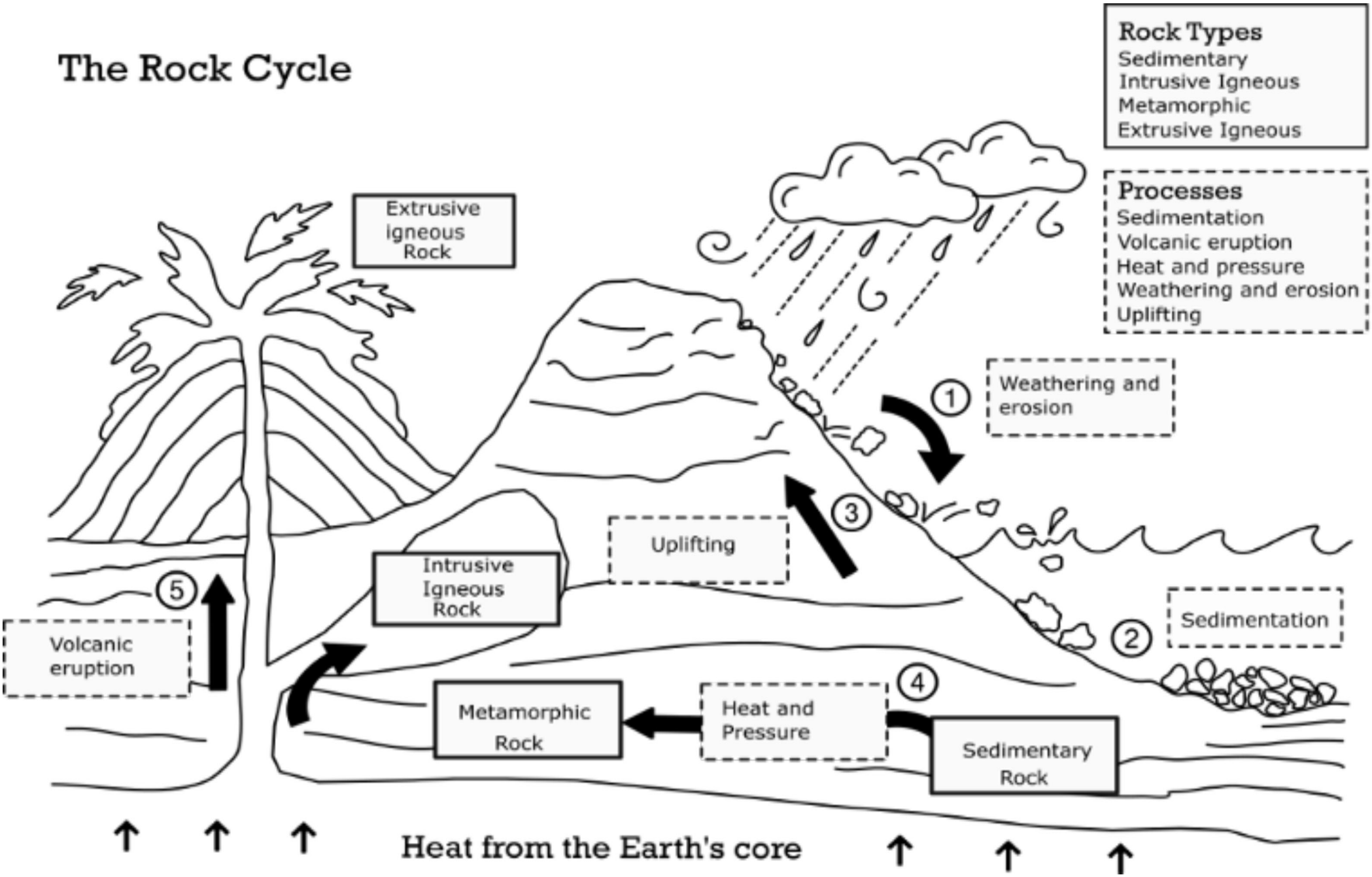
METAMORPHIC

IGNEOUS

SEDIMENTARY

SORTING AND CLASSIFYING ROCKS




The Rock Cycle
Rock Types
Sedimentary
Intrusive Igneous
Metamorphic
Extrusive Igneous
Processes
Sedimentation
Volcanic eruption
Heat and pressure
Weathering and erosion
Uplifting
Extrusive igneous Rock
Weathering and erosion
1
Uplifting
3
Intrusive Igneous Rock
5
Volcanic eruption
Sedimentation
2
4
Metamorphic Rock
Heat and Pressure
Sedimentary Rock
Heat from the Earth's core

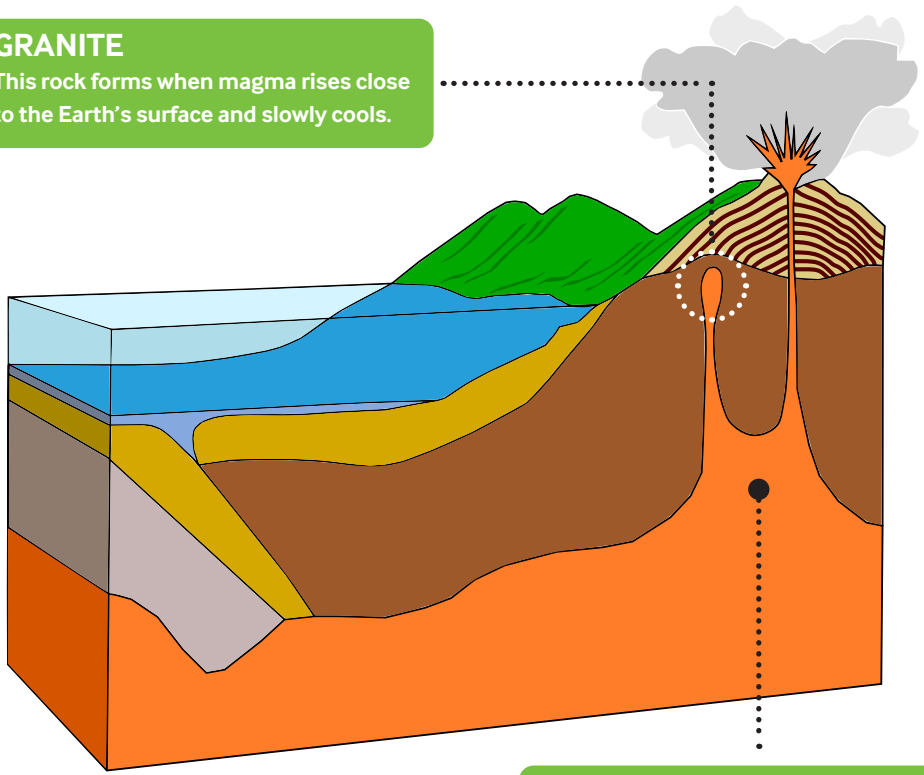
GRANITE

ROCK TYPE	IGNEOUS
COLOUR	PINK, GREY, BLACK, WHITE
HARDNESS	VERY HARD
TEXTURE	ROUGH, SHARP
APPEARANCE	SPARKLY, SHINY

JURASSIC COAST TRUST

why & how?
PRIMARY SCIENCE TEACHING TRUST

GRANITE
This rock forms when magma rises close to the Earth's surface and slowly cools.

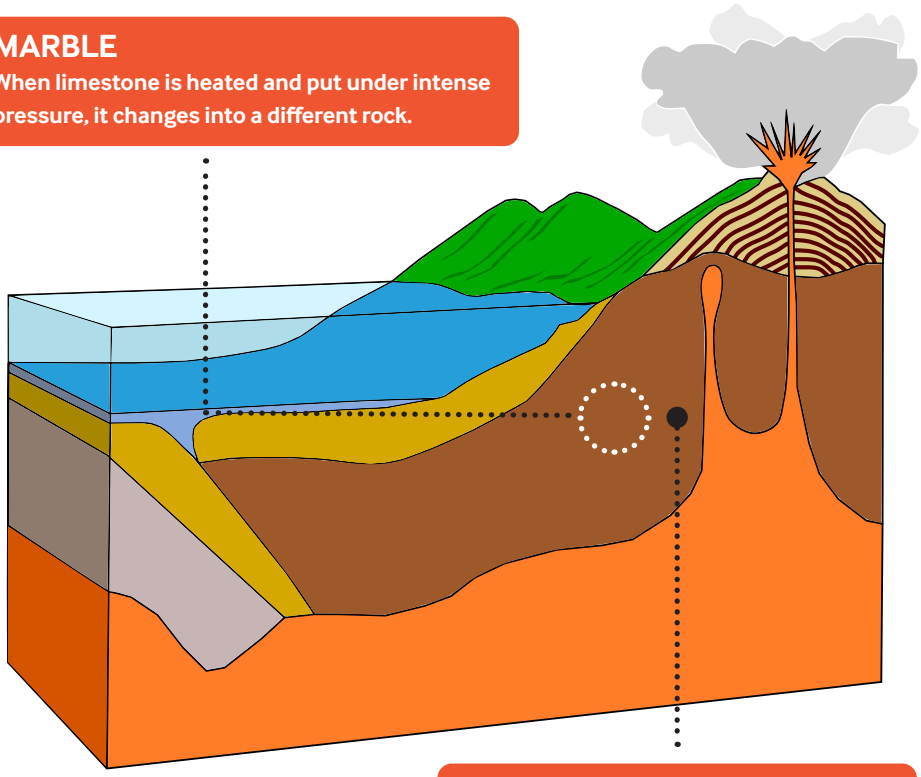


IGNEOUS ROCKS
This kind of rock is formed from magma (liquid rock) that has cooled and hardened.

MARBLE

ROCK TYPE	METAMORPHIC
COLOUR	WHITE
HARDNESS	VERY HARD
TEXTURE	ROUGH SMOOTH IF POLISHED
APPEARANCE	SPARKLY, SHINY

MARBLE
When limestone is heated and put under intense pressure, it changes into a different rock.



METAMORPHIC ROCKS
These rocks have been exposed to lots of high pressure and very hot temperatures.

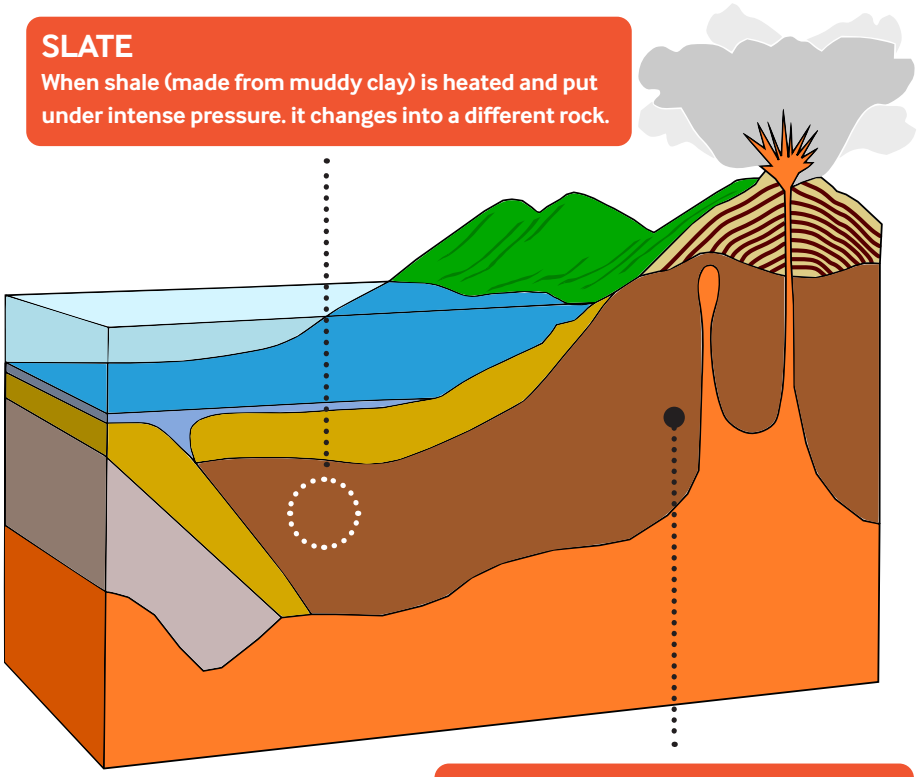
SLATE

ROCK TYPE	METAMORPHIC
COLOUR	GREY
HARDNESS	VERY HARD
TEXTURE	SMOOTH
APPEARANCE	MAY HAVE LAYERS

JURASSIC COAST TRUST

why & how? PRIMARY SCIENCE TEACHING TRUST

SLATE
When shale (made from muddy clay) is heated and put under intense pressure. it changes into a different rock.



METAMORPHIC ROCKS
These rocks have been exposed to lots of high pressure and very hot temperatures.

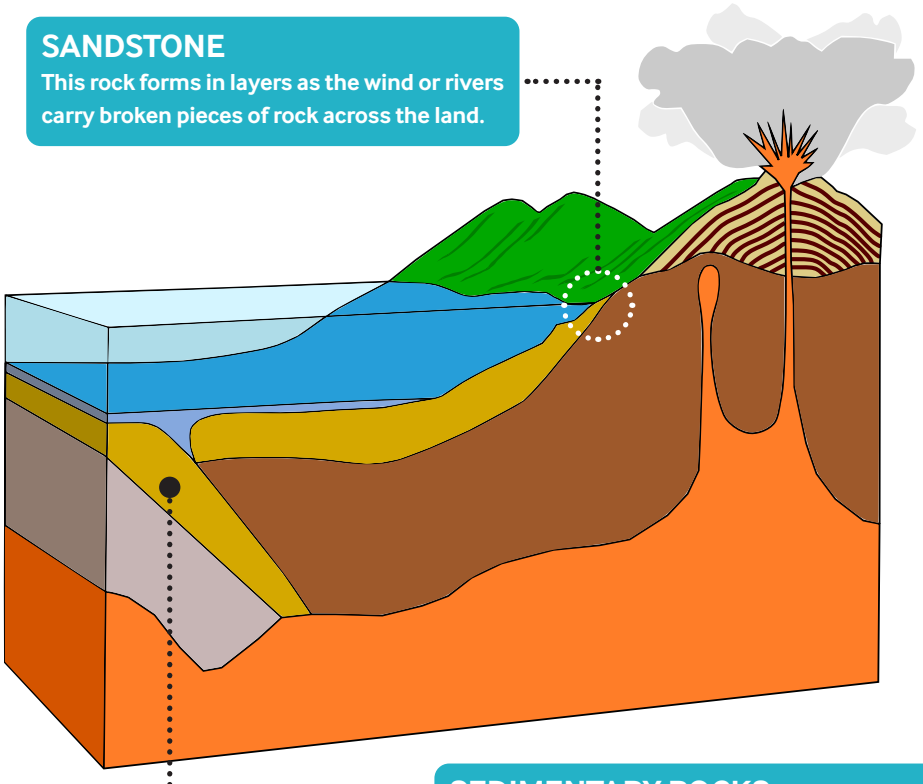
SANDSTONE

ROCK TYPE	SEDIMENTARY
COLOUR	ORANGE
HARDNESS	HARD
TEXTURE	ROUGH, GRAINY
APPEARANCE	MAY HAVE LAYERS

JURASSIC COAST TRUST

why & how? PRIMARY SCIENCE TEACHING TRUST

SANDSTONE
This rock forms in layers as the wind or rivers carry broken pieces of rock across the land.



SEDIMENTARY ROCKS
These rocks form over a long time and are made from broken rocks, dead animals and plants.

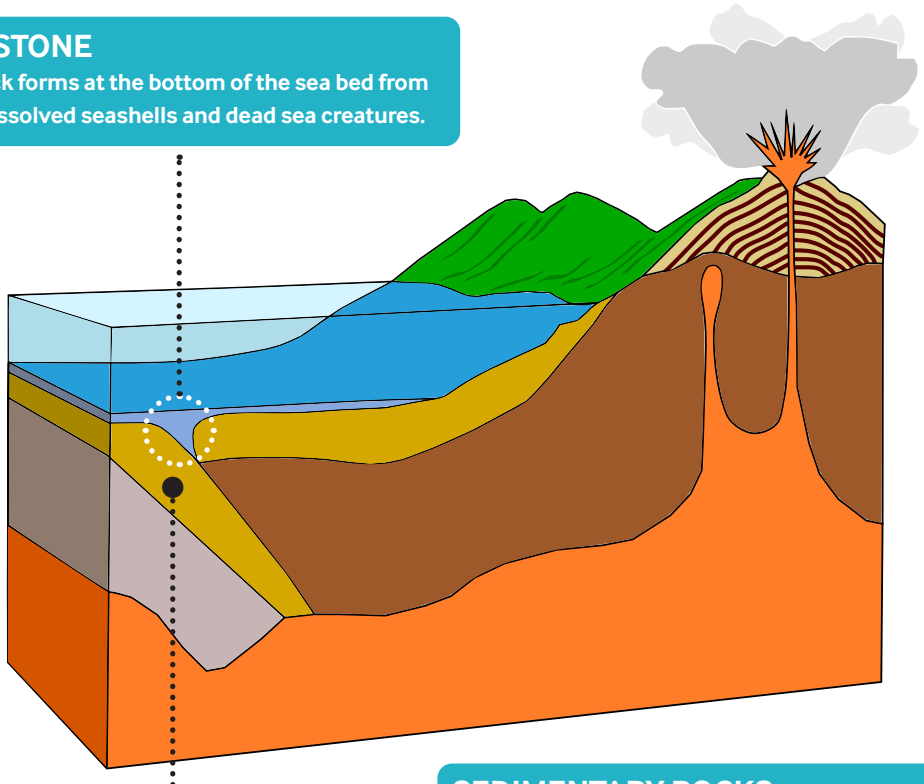
LIMESTONE

ROCK TYPE	SEDIMENTARY
COLOUR	GREY
HARDNESS	VERY HARD
TEXTURE	SMOOTH
APPEARANCE	MAY HAVE FOSSILS/ CRYSTALS

JURASSIC COAST TRUST

why & how? PRIMARY SCIENCE TEACHING TRUST

LIMESTONE
This rock forms at the bottom of the sea bed from mud, dissolved seashells and dead sea creatures.



SEDIMENTARY ROCKS
These rocks form over a long time and are made from broken rocks, dead animals and plants.

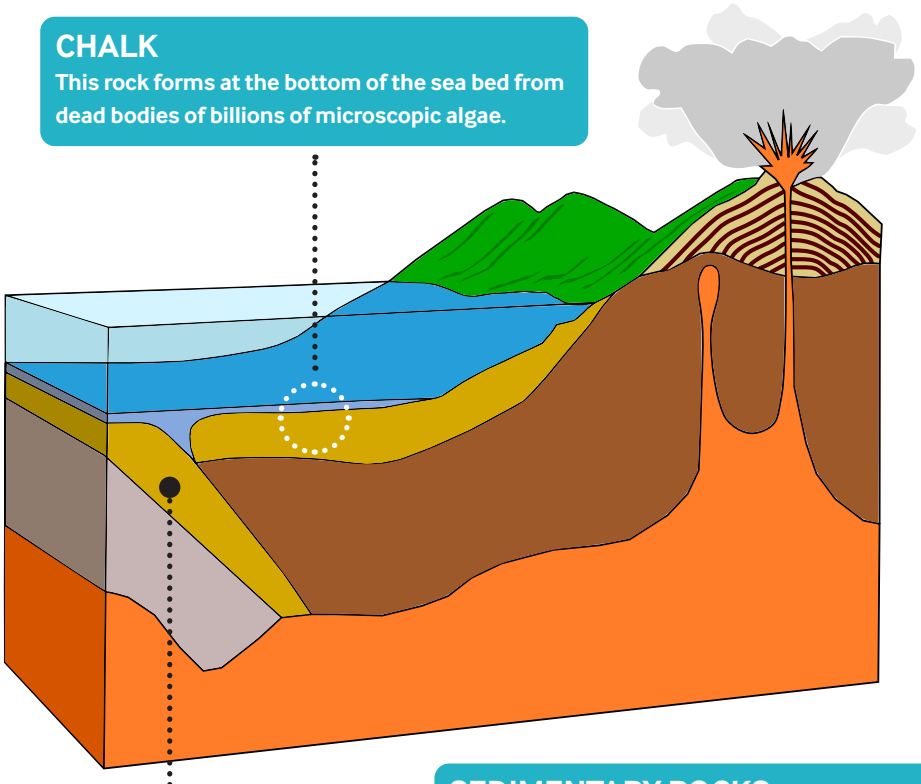
CHALK

ROCK TYPE	SEDIMENTARY
COLOUR	WHITE
HARDNESS	MEDIUM HARD
TEXTURE	POWDERY
APPEARANCE	NO LAYERS OR CRYSTALS

JURASSIC COAST TRUST

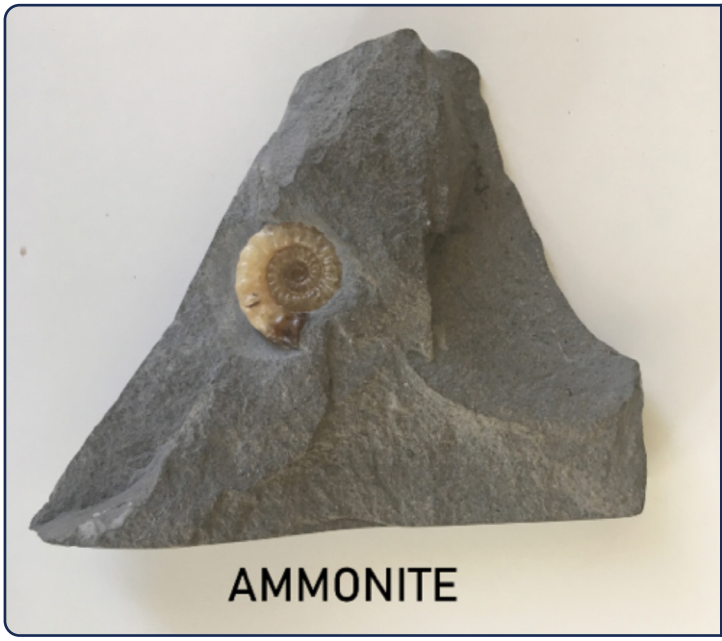
why & how? PRIMARY SCIENCE TEACHING TRUST

CHALK
This rock forms at the bottom of the sea bed from dead bodies of billions of microscopic algae.

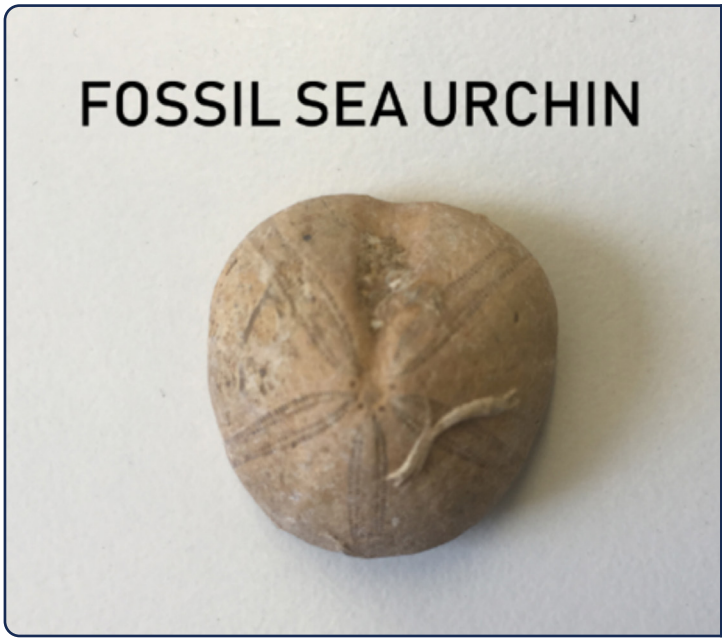


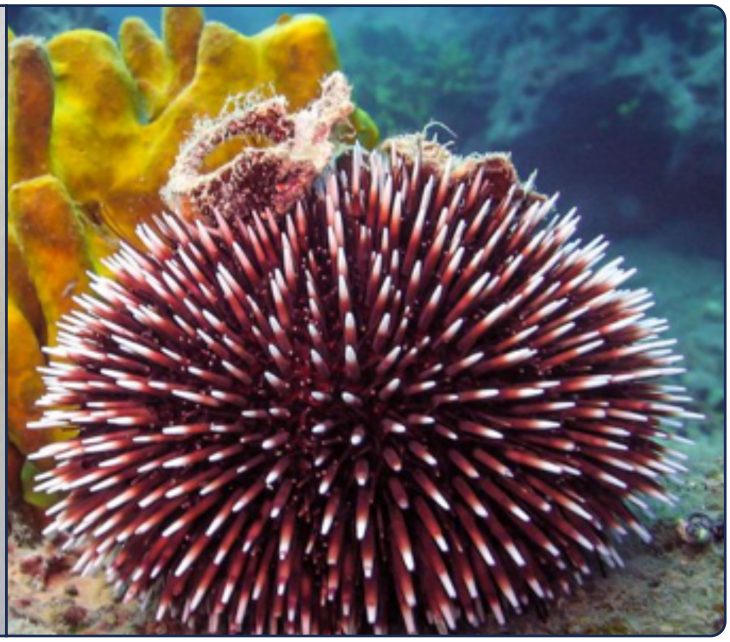
SEDIMENTARY ROCKS
These rocks form over a long time and are made from broken rocks, dead animals and plants.

FACTS ABOUT FOSSILS



Ammonites are spiral shelled sea creatures lived in deep seas during the Jurassic and Cretaceous Period (about 240 and 65 million years ago). Although they became extinct at the same time as the dinosaurs, their modern day ancestors are squid and the Nautilus. The creamy white colour in the fossil comes from the mineral calcite which replaced part of the shell during fossilisation. In some fossils, iron pyrites has replaced the shell and the ammonite has a golden gleam! Ammonite fossils can be commonly found on the beaches around Lyme Regis and Charmouth on the Jurassic Coast.

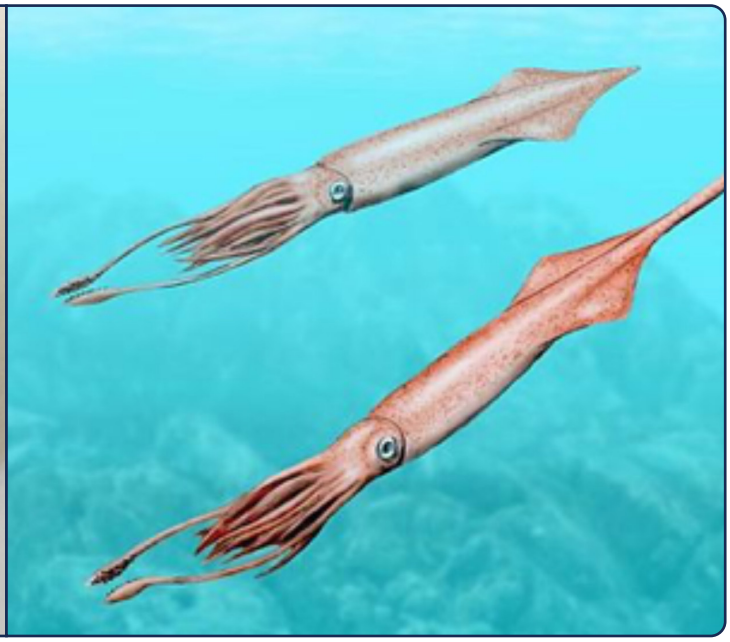




Sea urchins have been alive for about 450 million years and you can still seem them alive today. They have sharp spines which fall off when they die, leaving a ball or heart-shaped body behind. On the bottom of the body is a small hole which is the mouth. Sea urchins live at the bottom of the sea bed, and eat anything that can find. However, they have no other outlet for their waste (poo) and so it comes out of the only hole they have, their mouth! Sea urchin fossils are usually found in limestones or the chalk which form in tropical warm seas.

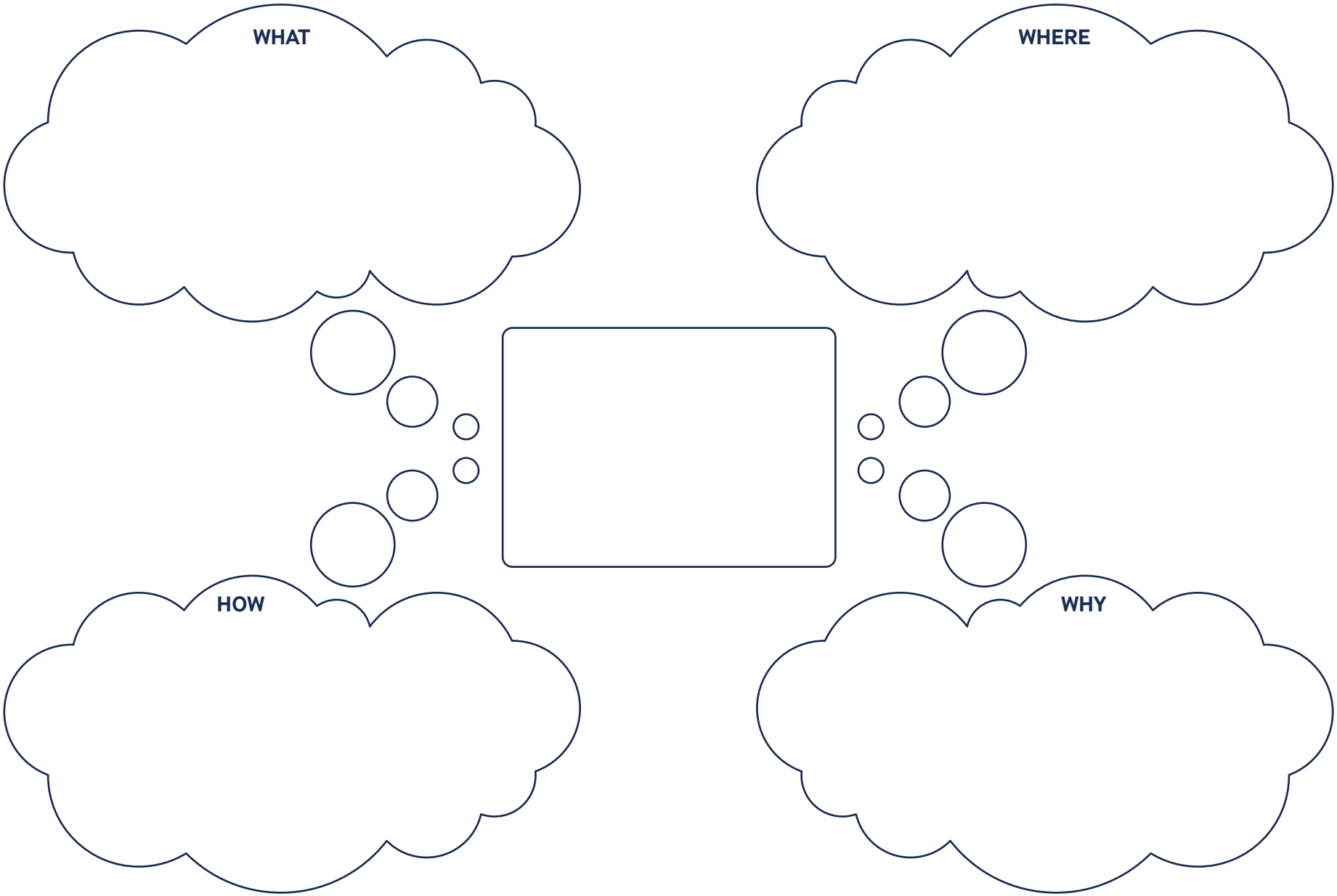
FACTS ABOUT FOSSILS

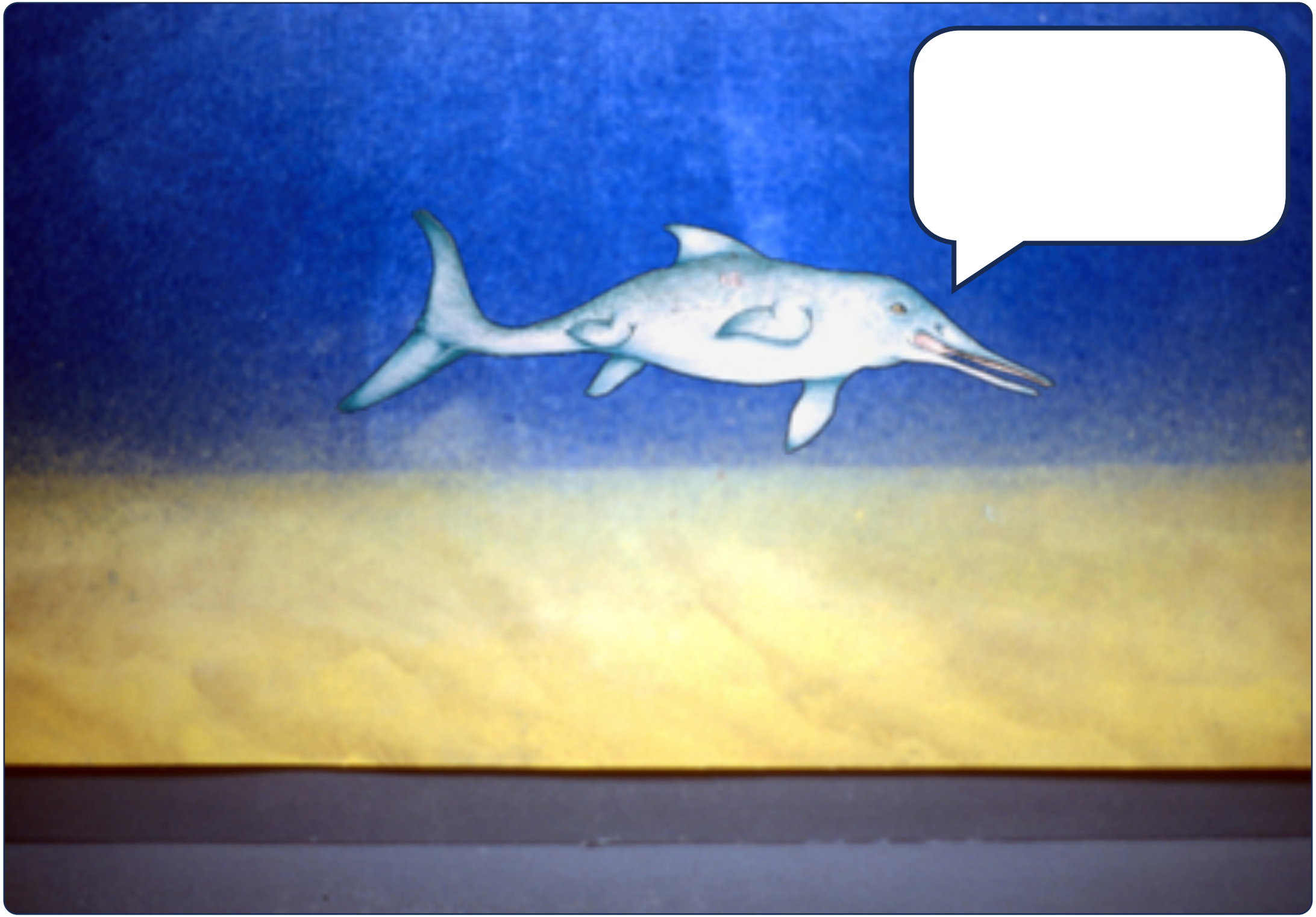
Creatures living in seashells evolved about 800 million years ago and are still around today! Fossil seashells can be found in the Jurassic and Cretaceous rocks along the Jurassic Coast. These examples shown range from about 160 – 80 million years old! The limestone rocks which contain seashell fossils were formed in warm, tropical turquoise seas very much like the Bahamas today.

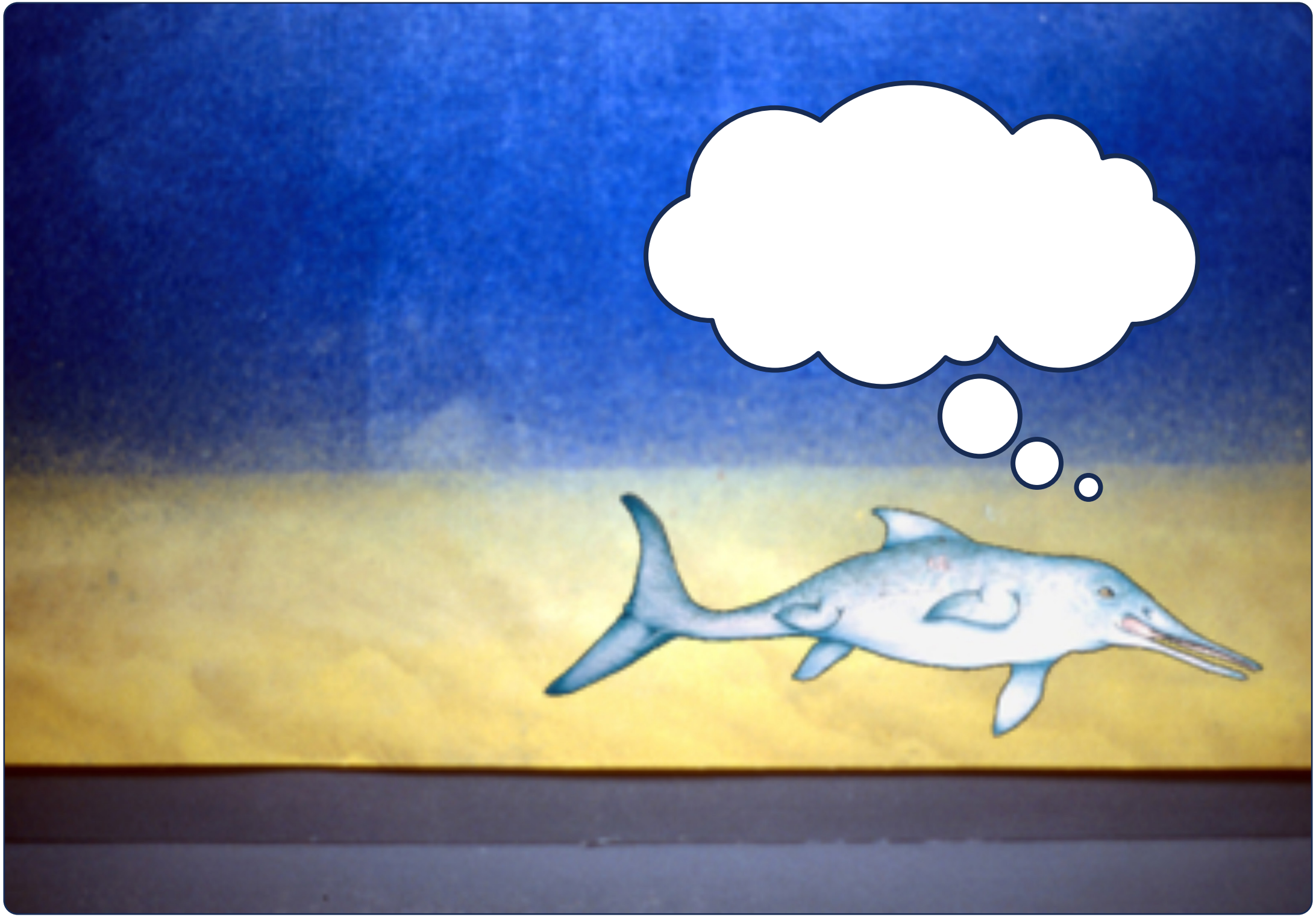


Belemnites are in the same family as ammonites and lived in deep Jurassic seas. They share many traits with their modern day ancestors, Squid, such as ink sacs, streamlined bodies and tentacles. The only part of their body that is fossilised, is their bullet shaped shells which can commonly be found on the beaches at Lyme Regis and Charmouth.

THINKING ABOUT FOSSILS

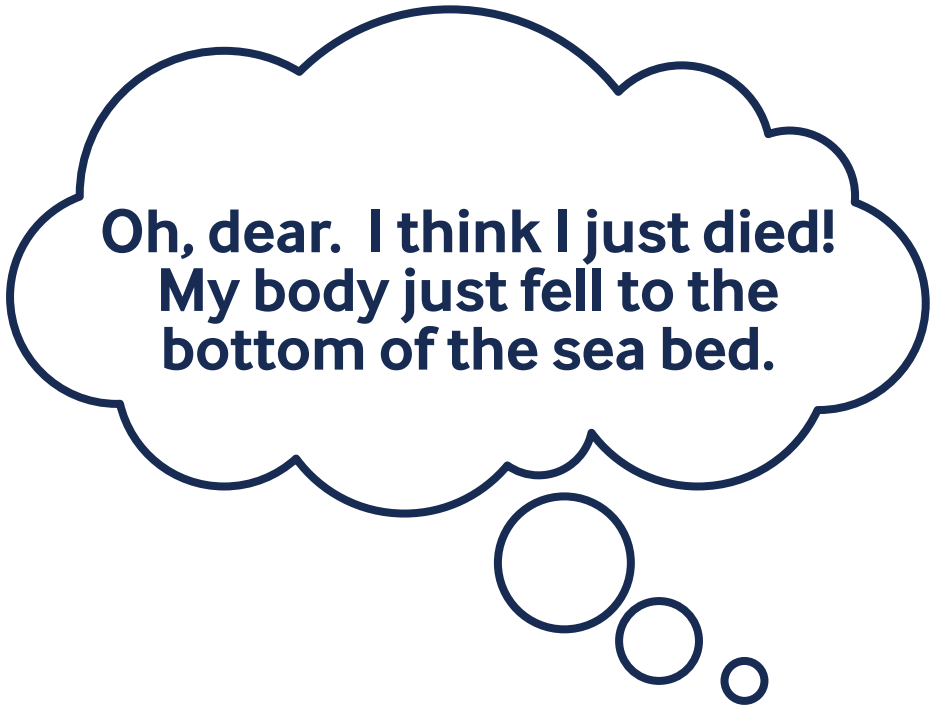


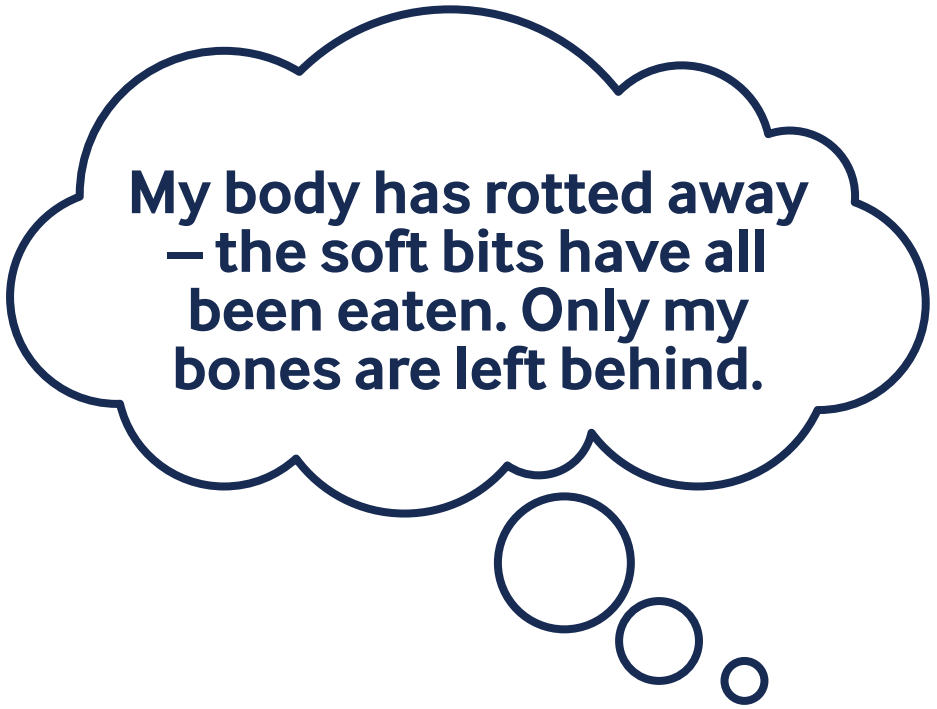


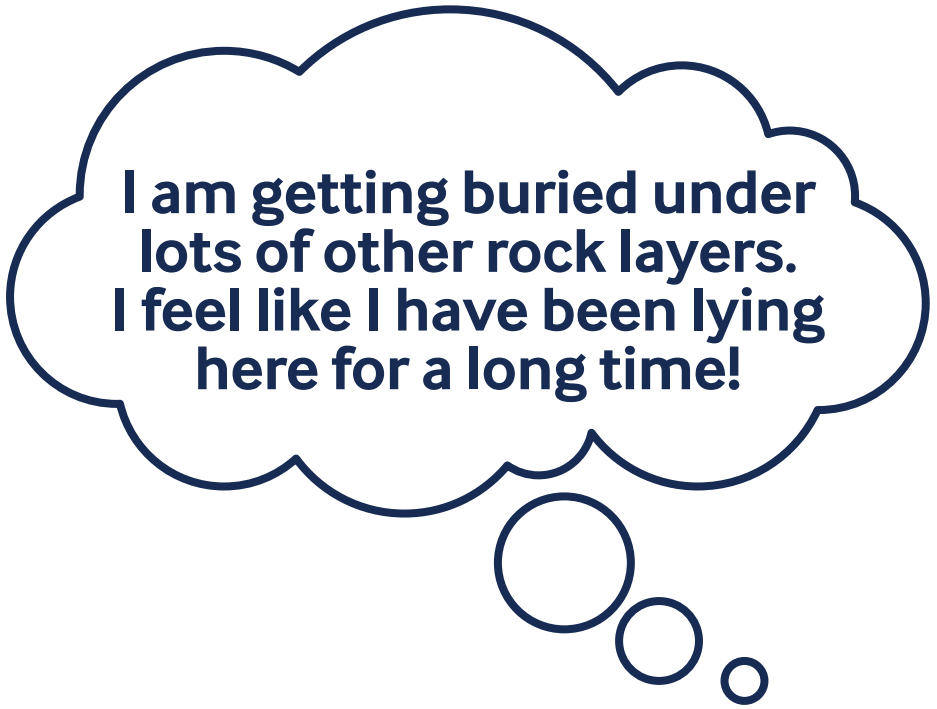


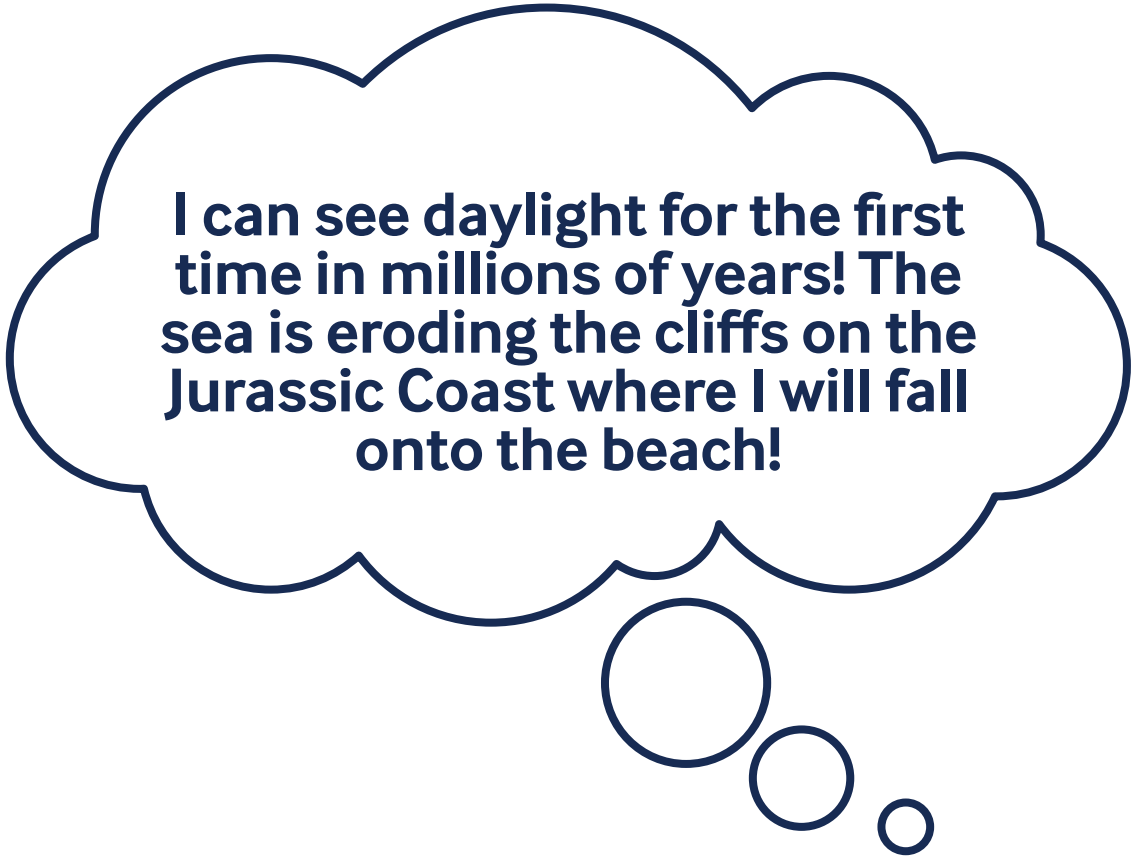
I am an ICHTHYOSAUR.
I like swimming in the sea
and eating other animals!

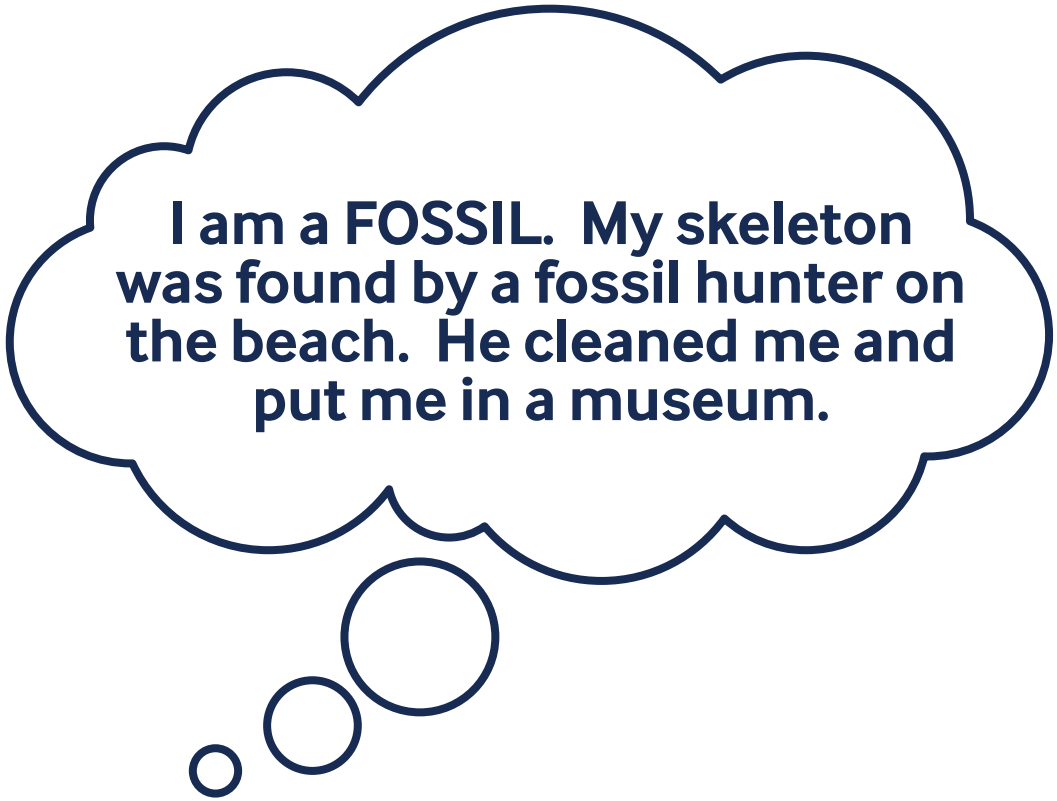
I don’t feel very well. Must be something I ate.


Oh, dear. I think I just died!
My body just fell to the
bottom of the sea bed.


My body has rotted away – the soft bits have all been eaten. Only my bones are left behind.


I am getting buried under lots of other rock layers. I feel like I have been lying here for a long time!

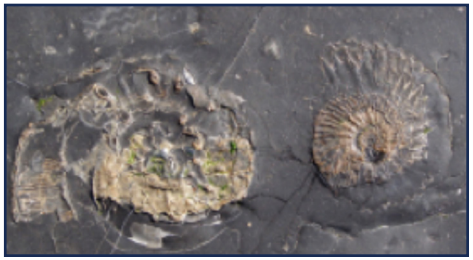

I can see daylight for the first time in millions of years! The sea is eroding the cliffs on the Jurassic Coast where I will fall onto the beach!


I am a FOSSIL. My skeleton was found by a fossil hunter on the beach. He cleaned me and put me in a museum.

	What does the rock look like?	What fossils are in the rock?	Where did this rock form?
 Limestone			
 Limestone			
 Sandstone			
 Clay			

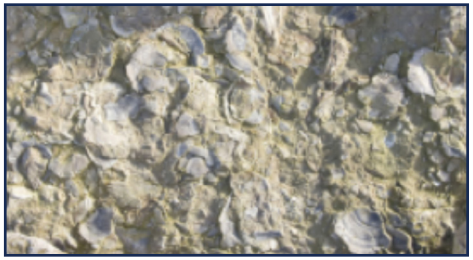
SPIRAL SHELLS

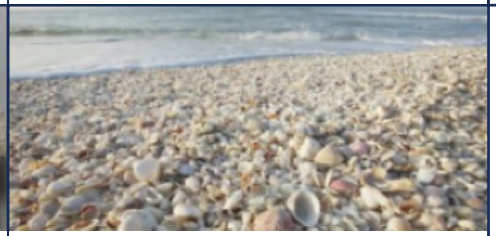
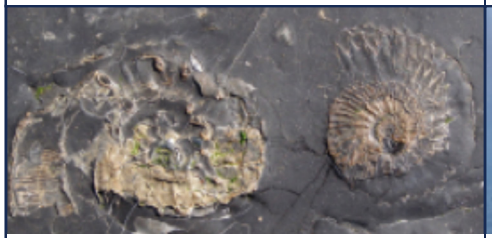
AMMONITES



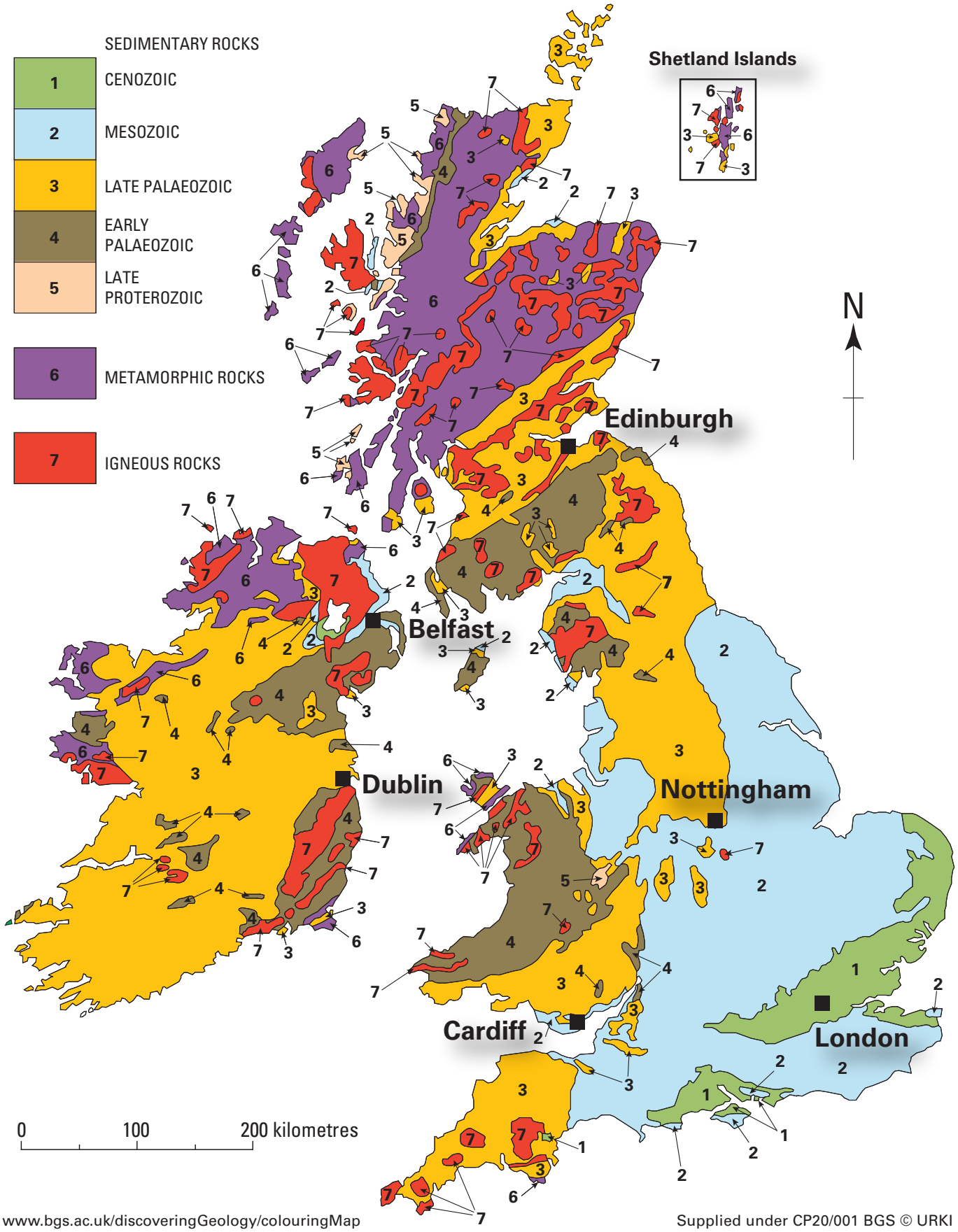
CLAM SHELLS

DINOSAUR FOOTPRINTS



What does the rock look like?	What fossils are in the rock?	Where did this rock form?
 Limestone	 Forest	DINOSUAR FOOTPRINTS
 Limestone (“roach”)	 Shelly Beach	SPIRAL SHAPED SHELLS
 Sandstone	 Shallow Water	CLAM SHELLS
 Clay	 Deep Water	AMMONITES

GEOLOGICAL SURVEY MAP OF THE UK AND IRELAND



www.bgs.ac.uk/discoveringGeology/colouringMap

Geological Society: Regional summaries can be found: **www.bgs.ac.uk/research/ukgeology/regionalgeology/home.html**

Region	Rock Summary
South West	**Very rich in different rocks** Devonian Red Sandstone – Buildings in Exeter Slates/Shales – Dalebole Slate Quarry Volcanic (Granite on Dartmoor) and metamorphic rocks Copper and Tin mines/quarries
Bristol and Gloucester Region Incl. Somerset and Bath	**One of the most geologically varied parts of the country, with almost every geological time period represented.** Limestone – Cheddar Gorge/Avon Gorge Mines-lead, zinc, coal, limestone Geo-thermal springs – Bath Cotswold Limestone (Oolitic) – honey coloured buildings
Hampshire Basin incl. Isle of Wight, Wiltshire, Dorset and West Sussex	**This low-lyng region forms the western part of a deep basin filled with sediments laid down in ancient seas. (muddy, lagoon environment)** Well known for Chalk – Isle of Wight/Salisbury Plain/Marlborough Downs • Many deep boreholes in Chalk – aquifers providing drinking water. Beneath Chalk are sedimentary rocks deposited 145 and 100 million years ago in shallow sea and lagoon environments (Lower Cretaceous sediments). The layers include limestones, mudstones – Vale of Pewsey, Devizes, Warminster Next layer comprising thick mudstones containing thin limestones and sandstones overlain by shelly and sandy limestones – west of Yeovil, Wincanton, Frome and Trowbridge to Chippenham. Dorset = Jurassic Coast story. Around Solent area = many clays, silts, peats, sands and gravels on surface– laid down 2-3 million yrs ago in Ice Age and Interglacial periods. Boreholes in mudstones – potential source of gas and oil.
Wealden District (Kent, East Sussex, Surrey	**Mainly formed of rocks laid down in warm, clear seas that covered the area. Relatively flat landscape – typical of areas underlain by sandstones, clays and limestones.** • Famous Chalk on E. Sussex coast and Dover Flint buildngs • Mineral wealth: Coal – Kent + Some oil and gas exploration • Gypsum in East Sussex – used to make fertiliser and plaster
London and Thames Valley (Incl. Hertfordshire and Bedfordshire and into Oxfordshire)	**Sedimentary rocks Jurassic origin laid down in seas** • Relatively flat landscape – typical of areas underlain by these sandstones, clays, mudstones and limestones/ chalk • Chalk downlands and Chiltern Hills • Chalk – porous – good source of groundwater • London Basin: mainly clay, gravels, sands soft and easily eroded most extensive are along the River Thames and its tributaries – commonly dug for sand and gravel.

Region	Rock Summary
East Anglia and adjoining areas	**Flat, rolling landscape** • Soft rocks, easily eroded • Sands, clays and peat (Fenlands and The Broads) laid down by former ice sheets in rivers, swamps and marshes and along margins of N. Sea • Central E. Anglia formed of Boulder Clays and sands – full of fossils.
Central England	**Varied scenery** • Many industrial areas based on underlying rocks – "The Black Country" • Coal Measures (Carboniferous period) – S. Staffs coalfield Iron ore • Jurassic Sedimentary rocks: Shales/sandstones/mudstones • Triassic red sandstones : formed 240 to 200 million years ago in a low-lyng desert and, at times, the sea encroached into this area – Periodic evaporation of the sea water led to the precipitation of layers of rock salt up to 50 m thick – extensively mined in Cheshire.
Welsh Borderlands	**Sedimentary Sandstones rich in pebbles – deposited in an ancient desert approximately 280 million years ago** • Coal Measures, around Telford, formed when vast quantities of sand and mud gradually built up to form large river deltas. When the tops of these deltas were exposed, massive swampy forests grew up and the vegetation from these forests was later buried and compressed to produce layers of coal. Also much older rocks: • Much Wenlock Limestone – about 425 million years old • Long Mynd rocks – 450 million yrs old include mudstones, sandstones, limestones and volcanic tuffs – a rock formed from the compaction of erupted volcanic ash – very hard and reason that Long Mynd forms such a prominent upland area.
Wales including island of Anglesey.	**Diverse landscape:** • Newer rocks: Gravelly clays and sand and gravel laid down during the last Ice Age, sand, silt and gravel deposited by rivers along valley floors over the last 10,000 years and peat bogs in upland areas. • Jurassic sedimentary rocks in S. Wales incl Coal measures Below are much older rocks: • Quite hard rocks which were deposited up to 415 million years ago • Strongly folded and faulted grey mudstones, siltstones and old red sandstones, volcanic rocks or formed from the solidification of molten rock deep below the surface (igneous intrusive rocks) metamorphic rocks in parts of Anglesey • N.West Wales + mts of Snowdonia – deeply eroded by glaciers
Eastern England (Tees to the Wash)	**Low-lying plains, steep ridges and upland areas:** • low-lying ground – laid down by former ice-sheets, lakes, rivers and along the coast (in last 2-3 million years) • Sedimentary rocks: mudstones, sandstones, limestones and ironstones – lots of fossils found on coast • Famous for Whitby Jet • N. YorksMoors – Jurassic – shallow sea • Lincs and Humberside – Cretaceous rocks – Chalk formed in shallow seas.

Region	Rock Summary
Pennines and adjacent areas	**Great Ice Sheets have sculpted the scenery** • Pennines – Carboniferous limestone + seams of coal – formed in swampy rain forest. (305-360million yrs old) • Derbyshire Peak District – Millstone Grit (lead, zinc and copper mineral deposits were mined) and hard carboniferous limestone • Yorks Dales – famous for its Limestone scenery. Limestone mined – used for cement and aggrates • Cheshire – Rock salt deposits (Northwich)
Northern England and Scottish Borders Incl. Lake District and Northumberland National Parks	**Outstanding scenery** • Very high mountains incl. Scafell(England's highest mt)/Helvellyn/Langdale Pikes • Volcanic formed from Very hard lavas and ashes – 500-450 million yrs old • Youngest rocks in area – red sandstones and mudstones, (250 million years old) form undulating lowlands to the west of the Lake District and south of Whitehaven • N. Pennines and Northumberland – Durham coal field: Coal Measures and Carboniferous Limestone , deposited in warm, clear seas.
Scotland	Scotland's complex story goes back to early history of the earth, oldest rocks formed 3 billion years ago. Series of Plate tectonic movements and volcanic eruptions have resulted in huge Geological diversity reflected in Scotland's scenery. Climate changed from tropical to glacial and everything in between! Eg. • Western Isles – Metamorphic (gneiss) buried under sandstones and limestones • Cairngorms – Highland metamorphic rocks and granite. • Central Lowlands – Granite Hill ranges (eg Dumbarton Rock, Arthur's Seat) – result of volcanic activity during Carboniferous Period and surrounded by Lowlands – sedimentary rocks and Coal measures. • Southern Scotland – more 'rounded' scenery – sedimentary rocks formed in deep sea – contain fossil remains of ancient sea creatures, that lived in the ocean over 400 million years ago.
Northern Ireland	**Varied landscape – much of it glacial and volcanic** • Glacial sediments, made of mixtures of clay, silt, sand and gravel that were laid down by the repeated growth and decay of former ice-sheets. during the last 2-3 million years • Antrim, Down and Armagh drumlins – glacial deposits shaped into ridges and swarms of whale-back hills • N. Ireland area affected by geological movement and uplift Sperrin mts are oldest rocks – 650 – 570 million yrs old (Metamorphic Schists) • Mourne mts – Granite • The Antrim Plateau – unique geological area of the UK. It contains an almost continuous sequence of flat-lying layers from 420 to 30 million years old. On the coast, north of the Antrim Plateau, stretches another area of great geological significance known as the Giant's Causeway. This consists of 6km of around 40,000 basalt columns that form stepping stones from the cliff foot into the sea.