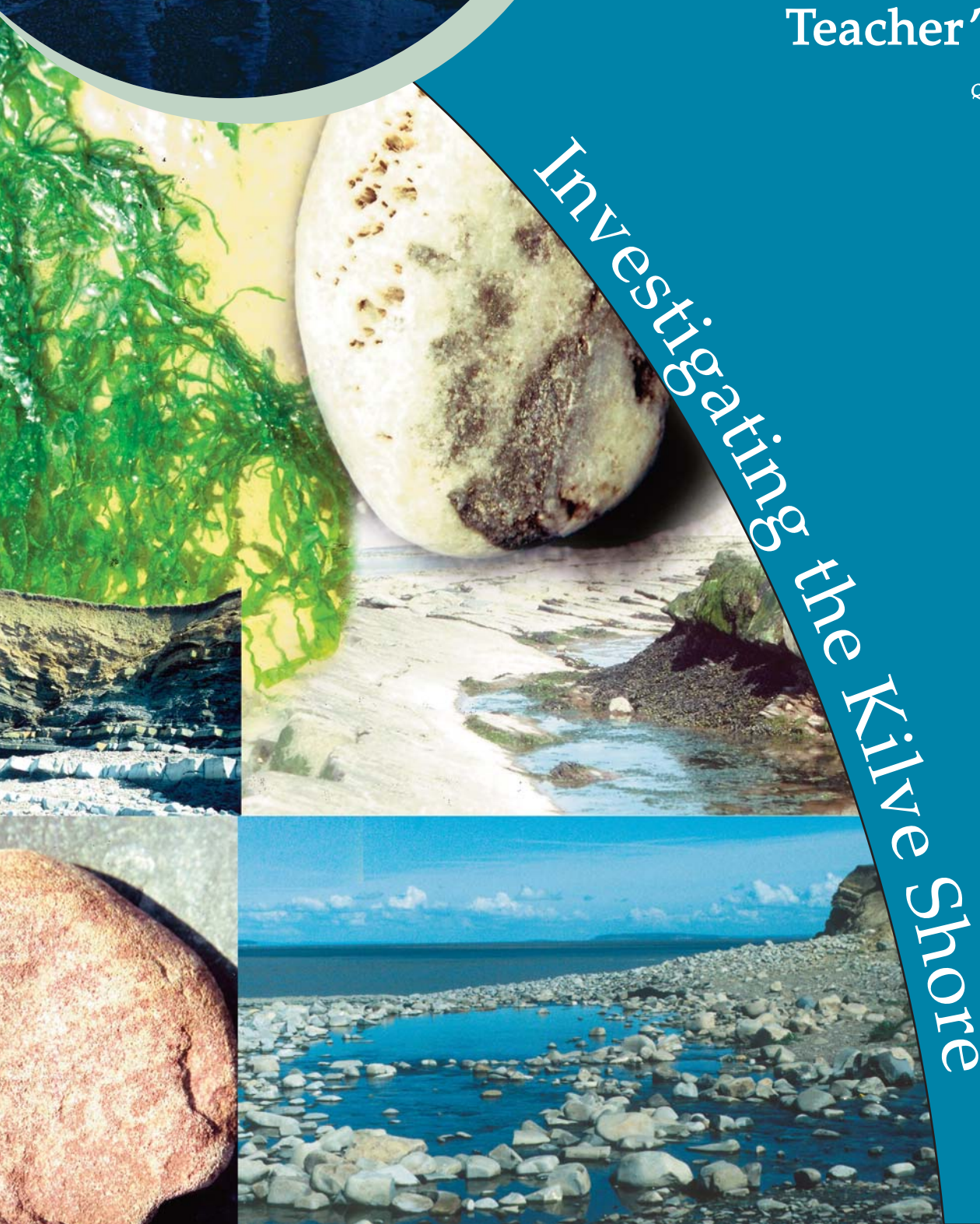




Teacher's Pack

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Investigating the Kilve Shore

Over many years teachers have visited and asked for information about the fascinating Kilve coast. Now provoked by the Quantock Hills AONB service, and under the aegis of its QEd project, this resource pack has been produced to try to meet these requests.

Exploring a seaside location is a very popular, interesting and worthwhile pastime enjoyed by all ages. Doing it 'for real' can be immensely exciting but because it is an unfamiliar environment it can be frustratingly difficult to answer questions knowledgeably.

The notes in this Resource Pack are written to help to answer many of the questions about the rocks, fossils and natural history asked by visitors to this coastline. They are based on much practical teaching experience. The information has been arranged to help easy location of particular aspects required.

Details are not exhaustive but concentrate on helping identification and some understanding. It is hoped that this will provide enough background to:

- Help teachers to answer pupils (and colleagues) questions.
- Encourage pupils' involvement beyond observation and collection and into the beginnings of understanding their significance.
- Put observations and finds into a context which makes some coherent sense of the whole location and its origins.

An important element of this Guide is the inclusion of a range of curriculum related ideas and investigations which are intended to:

- Lead pupils into active exploration, discovery and a sense of wonder, whatever their age.
- Encourage thoughtful observation and recording in a variety of media.
- Be followed by discussion to aid understanding of relationships and evaluation of their reactions to and possible effects on the area.

These activities are listed in an approximately progressive sequence depending on the age and starting level of the users. Though based on the seashore work they all extend into further work in the classroom.

The appendix information has been specially prepared to support the 'Exploring Kilve Shore' Pack. It is a distillation of Derek's deep knowledge and appreciation of the unique geology and environment of the Kilve Coast and his years of sharing that understanding with others.

It is strongly advised that teachers make a pre-visit to ensure that they choose the most relevant activities for their children. Please feel free to modify any of the ideas. Bear in mind that there is too much material for all children to cover in one visit, but please try to keep it 'informative fun'

ACKNOWLEDGEMENTS:

The content of the pack has been much enriched by three teachers who gave of their time and practical experience to contribute many good ideas with appropriate activities. Suzanne Harris and Jan Yardley of Kingsmoor School, along with Lesley Watson, Head at Kingston St Mary, kept my feet firmly on the ground at both S1 and KS2 level. I am very grateful for their patience and realism.

Thanks are also due to Iain Porter, Quantock Hills AONB Development Officer, for his steady encouragement and to Rachel Shaw, Heritage Education consultant, who has spent many hours interpreting my scripts to produce a sensible and sleeker final document.

We have devised materials founded on our own practical fieldwork with Primary pupils, teachers and other adults. We hope that they will ease and encourage your planning of a successful unit of coastal work based on a local accessible site. We strongly believe that it will be greatly enriched by the excitement of a real hands-on experience. Enjoy!

Derek Briggs

For the Quantock Hills AONB Service 2007

Except where otherwise indicated, the material in this pack can be copied for school use only.

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VISITING KILVE SHORE

HOW TO GET THERE?

Directions

From the East: Follow the A39 from Bridgwater to Kilve. In the centre of the village is a small turning on the right that takes you down to Kilve Beach (opposite the entrance to Kilve Court). After approximately 1.5 miles you will reach the car park (pay & display).

From the West: From Williton follow the A39 through West Quantoxhead to Kilve. In the centre of the village is a small turning on the left that takes you down to Kilve Beach (opposite the entrance to Kilve Court). After approximately 1.5 miles you will reach the car park (pay & display).

It is not recommended to take coaches down to the beach car park as the lane from Kilve village is narrow and winding and there are sensitive archaeological sites next to the road which suffer from damage by vibration (Kilve Chantry). We recommend you to travel by minibus if possible. Coaches can drop off at a lay-by on the A39 in Kilve village. It is a 20 minute walk to Kilve beach.

FACILITIES:

There are toilet facilities at Kilve Beach (near the car park). There is a tea room at the Chantry and shops at Kilve Village itself.



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SITE HEALTH & SAFETY REVIEW

Leaders Name:	
Activity:	Exploring Kilve Shore
Date & Time:	

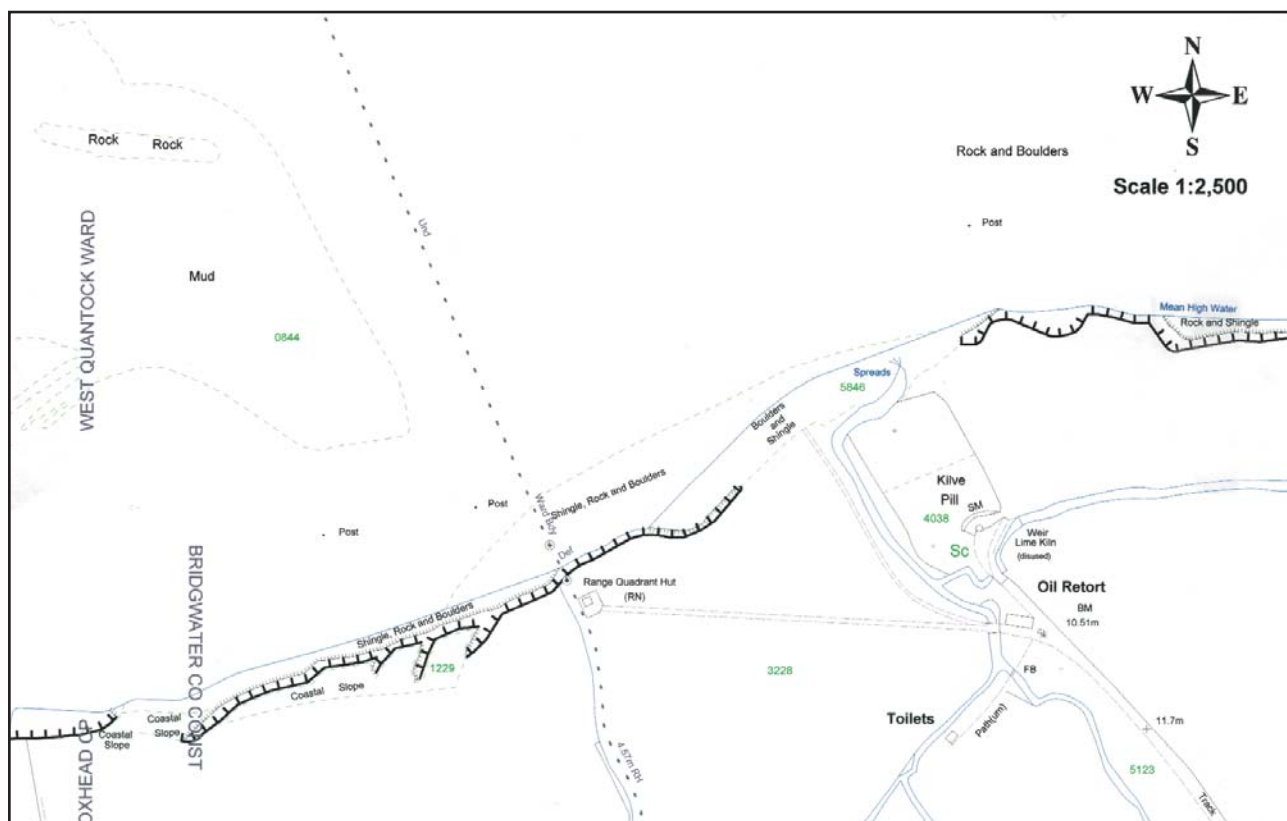
First Aid Provision:		
Lone Working Procedures:		
Emergency Procedures:	Report back to vehicle at car park.	
Incident reporting Procedures:		
Identified Hazards	Who is at risk?	Risks from hazards (high, medium, low) (Include how they will be managed)
Taking children on an off-site visit	Students & Leaders	Refer to school's generic risk assessment for off site visits. Code:
Travel to and from Kilve Beach	Students & Leaders	Refer to school's generic risk assessment for off site visits. Code:
Vehicles in car park at Kilve	Students & Leaders	Low. Remind children when still in vehicles of possible dangers in a car park. Staff to supervise children within the car park. Move onto grass area near the beach as quickly as possible.
Route surface from car park to beach.	Students & Leaders	Low. Path to be checked by staff prior to activity. Recommend suitable footwear on information letter to parents prior to the trip. Route survey carried out twice a year by AONB Service staff. Report any problems to AONB office as soon as possible.
Walking / Working on Kilve Beach	Students & Leaders	Low. Recommend suitable footwear on information letter to parents prior to the trip. Agree rules with pupils concerning walking and not running, not pushing, no throwing of pebbles etc. Use cones to mark areas where pupils can work and any boundaries that need to be set. Wear high visibility vests. Use of a whistle to carry an instruction to pupils (1 whistle - look / listen, 2 whistles - return to base, 3 whistles - accident). Pupils to walk down to the sea only when accompanied by an adult. Allocate an adult per group. Have one adult not assigned to a group to be able to deal with any accidents / incidents. Gloves and bags are recommended as there is often litter on the beach. Full toilet facilities are available. Recommend wet wipes are used.
Tide	Students & Leaders	Medium: Leader to have checked tide times. Suggested website www.bbc.co.uk/weather/marine/tides

SITE VISIT TO KILVE

Identified Hazards	Who is at risk?	Risks from hazards (high, medium, low) (Include how they will be managed)
Weather	Students & Leaders	<p>Low. Leader to have checked weather forecast on evening before visit and on the morning of the visit.</p> <p>Hot weather - ensure pupils have hats, access to sun screen and extra water - there is no shade on the beach.</p> <p>Wet weather - beach will be very slippery - ensure good grip on footwear, limit areas of beach for working in. Extra water in rock pools and other pools on the beach - waterproof footwear, adult supervision needed when working around rock pools. If weather causes too great a risk, cancel visit.</p>
Stream at Kilve Pill	Students & Leaders	<p>Low. Leader to be aware of location of stream (see attached map). Stream to be coned off. Pupils to be supervised by adults if the stream is being studied.</p>
Cliff edge	Students & Leaders	<p>Medium. If walking along cliff edge, leader to be aware of cliff edge (see attached map). Follow the footpath. Pupils to be supervised by adults when walking along the cliff edge.</p>
Bottom of Cliff	Students & Leaders	<p>Medium. Adults to tell pupils not to work directly beneath the cliffs. Adults to keep pupils away from bottom of cliffs.</p>

Conditions:

1. This form is for visits that fall outside the CDM Regulations.
2. The leader is aware and agrees to comply with all Health & Safety Legislation.
3. All accidents should be reported to the event leader within 24 hours.



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Signed and agreed as an accurate statement of Health & Safety matters

Signed on behalf of

(School)

Dated

ABOUT THE UNIT

INVESTIGATING THE KILVE SHORE

Geography/science
Key Stage 1 and 2

ABOUT THE UNIT

This unit has been constructed around a visit to the Kilve Shore. All the activities are specific to the Kilve Shore but could be adapted to other coastal locations. It takes a cross curricular approach, with a focus on Science and Geography, linking with English and Art. There are opportunities for ICT and PHSE. The activities could be developed in the classroom in a variety of directions.

The basic Kilve Shore Unit contains many optional activities and activity sheets, most of which have easier and harder version. The teachers can therefore create a Kilve Shore Unit to suit their own needs. It can work as a one-off activity day for a mixed age range. Alternatively a long unit in Science and/or Geography can be built around the material.

Two Teaching Plans are given, to show how the Shore Visit fits into classroom work before and afterwards and how the activities and activity sheets can be differentiated. The Key Stage One Unit was conceived as a cross curricular experience: it includes activities to develop Art, English and Music, and shows how these can be integrated into the planning.

The Key Stage Two Unit focuses on Science and Geography. Ideas for using the visit to support English are given separately.

A step-by-step activity outline is given for all the investigations, showing how the supporting material is used and how the investigation follows a logical progression.

It is strongly advised that teachers make a pre-visit to ensure that they choose the most relevant activities for their children.

Where this Unit could fit in

GEOGRAPHY		SCIENCE	
KS1	<ul style="list-style-type: none"> ● enquiry and a wide variety of skills. ● places: locate, describe, compare. Changes. Local and wider links. ● themes: patterns and processes. Physical and human environmental changes. 		<ul style="list-style-type: none"> ● practical enquiry skills and obtaining, presenting, evaluating evidence. ● life processes and living things (seashore environment, animals, plants, - care, variety, life, links). ● materials and their properties (variety, sorting, grouping).
	<ul style="list-style-type: none"> ● enquiry and wide variety of skills. ● places: locate, describe, compare. Changes. Local and wider links. ● themes: patterns and processes; explain physical and environmental changes; Environmental issue. ● variety of coastal locations. Coastal features, erosion, deposition. <p>Local alternatives to parts of QCA Units 1C, 2B, 2C, 3C, 3D, 4B, 6A.</p>		<ul style="list-style-type: none"> ● practical enquiry skills and evidence (obtaining, testing, sorting, presenting, evaluating). ● life processes and living things (seashore animals and plants – sorting, their environment, adaptation, reproduction, feeding links). ● Materials and their properties (rocks and soils – variety, sorting grouping).

Vocabulary - in this unit children are likely to use:

KS1: seaside, seashore, beach, cliff, rocks, pebbles, sand, mud, soil, fossil, rockpool, seaweed, sea creatures, field sketch, route.

KS2: coast, shore, weathering, erosion, transport, deposition, waves, tide, beach, angular, ledge, zones, fault, oblique.

Also words connected with past industries, rocks and soil, land use.

KS1: as geography with some names of animals and plants and words related to their habitats.

KS2: specific animal, plant and fossil names; words related to their lifestyles and habitats.

Continued

GEOGRAPHY - Key Stage 1

During this unit most children will:

- recall much information about the physical features of this local seaside site and be able to use it to contrast with other localities they know.
- explain why people like to go there and express their own views about it.
- use some variety of resources to find out information and ways of recording observations.

Some children will not have made so much progress but will:

- recall some features of the coastal site which will help them to compare it with other places.
- have used a number of enquiry skills to find out about the location.

Some children will have progressed further and will also:

- be able to give a variety of reasons for the popularity of seaside places worldwide.
- understand that the Kilve coast has changed and is changing.

SCIENCE - Key Stage 1

During this unit most children will:

- have followed simple instructions safely to explore an outdoor environment.
- have collected evidence to answer questions involving the use of several senses and making comparisons.
- recognise a variety of seashore animals and plants and some of their special features and life needs.
- be able to sort and name some seashore materials on the basis of their basic properties.
- use their experience to compare animals and plants of the seashore and of their local area.
- know that fossils are traces of ancient life.

Some children will not have made so much progress but will:

- have used their senses to recognise and name a variety of seashore animals, plants and materials.
- use their experience to sort some of these by simple features and to name some seashore habitats.

Some children will have progressed further and will also:

- identify some similarities and differences between organisms and rocks of the seashore and of their local area.
- and understand that fossil traces were made of creatures which were once alive.

GEOGRAPHY - Key Stage 2

During this unit most children will use a wide range of geographical enquiry skills:

- describe the main features of a coastal environment and be able to compare them with another coastal site.
- begin to recognise the processes and some features of coastal erosion and to understand how they lead to change.
- realise that human use of the locality has changed and could do so in the future.

Some children will not have made so much progress but will:

- know some features of an eroding coast.
- begin to understand how some of these features have been caused and be able to respond to appropriate geographical questions posed by their teachers.

Some children will have progressed further and will also:

- be able to suggest why other seaside locations have different physical and human features
- make good use of I.C.T. in their presentations.
- use and create maps for a variety of purposes.

SCIENCE - Key Stage 2

During this unit most children will:

- use their senses and systematically collect evidence to answer questions.
- use their observations to identify some seashore creatures by their features and to record their behaviour and locations.
- explain some contrasting seashore habitats, how some of their creatures are adapted to them and be aware of some feeding relationships.
- name and give the characteristics of several rocks, of seashore materials derived from them and know how soil forms from them.
- know that fossils are the remains of ancient life forms and name at least one.

Some children will not have made so much progress but will :

- use their senses to answer simple questions about the features and locations of some seashore creatures and about their needs.
- name some seashore creatures and plants and recognise at least one fossil trace.
- be able to sort and name a few rocks, know that rock breaks down into fragments and that soil is formed from them.

Some children will have progressed further and will also:

- identify and understand how many organisms are suited to their habitat.
- describe a food chain and some features of a local fossil creature.
- explain the purpose and results of tests carried out on rocks and soil.
- suggest further investigations which could be made.

KS2. Also maps at various scales, Venn and Carroll diagrams, rock and angularity keys, camera, clipboards, tally charts, record sheets, seaweed keys, field sketch.

Resources Used
KS1. Atlas, O.S. map, 1:25000 maps, brochures, local guides, postcards, photographs (including aerial), clipboards, recording sheets, camera, tape measure.

SUGGESTED TEACHING PLAN - RECEPTION/KEY STAGE 1

A. FIELDWORK AT KILVE SHORE - BEFORE THE VISIT			
Learning objectives	Suggested activities	Learning objectives	Suggested activities
GEOGRAPHY		SCIENCE	
1. To compare seaside places and their characteristics	<ul style="list-style-type: none"> Who has been to the seaside? (surveys – database). Why do people go to the seaside? (surveys – database). Where are these places? (map/atlas work). What were they like? (pictures, sort, display, like/dislike). 	1. How to start collecting first hand information about the living and non-living things of a less familiar environment. This will involve the safe use of their senses to answer questions.	<ul style="list-style-type: none"> Talk about their present experience of the sea-side (who, where, when) What natural things do you expect to find there? <ul style="list-style-type: none"> - living things (animals and plants). - materials (e.g. rock, pebbles, sand, water). How to recognise them? (using senses). Agree some questions to answer on the visit, and record them for future reference. These would work well, and are included as Activity sheets: <ul style="list-style-type: none"> -What can you see/hear on the seashore? -What animals can you find in a rock pool? -What plants can you find on the seashore? -What pebbles can you find on the seashore? -What pebble colours can you find? -Where may you find seashore animals or plants living?
2. To locate the Somerset coast and Kilve shore.	<ul style="list-style-type: none"> Where is it? (mapwork + other Somerset resorts). How far is it and how long might it take to get there? (nearest?). Route? (identify places/features that will be passed). What do they expect it to be like? (information sources). Activity Sheets 1 My Route to the Kilve Coast & 2 Kilve Coast from the Air could be used at this point		<ul style="list-style-type: none"> Discuss how to observe and record what you find. If using activity sheets from the pack practise these at school. Discuss safety
3. The planning needed for a visit.	<ul style="list-style-type: none"> When? (term/season, weather, clothing, tides, timing). How? (transport, times – letters). Why? (activities, equipment, records). If you plan to use activity sheets from the pack Practise these first Health and safety aspects? 		

SUGGESTED TEACHING PLAN - RECEPTION/KEY STAGE 1 CONTINUED

B. FIELDWORK AT KILVE SHORE

Learning objectives	Possible activities/ activity sheets to use at Kilve Shore (Some of the KS2 sheets may also be appropriate)	Learning objectives
GEOGRAPHY		SCIENCE
<p>4. Discover what the Kilve coast is actually like.</p> <ul style="list-style-type: none"> ● Recognition of geographical features and use of geographical vocabulary. ● Exploring the shore and cliffline (pebbles, rocks, pools and organisms). ● Recording observations in several ways. ● Changes in physical features and human use of the locality. 	<ul style="list-style-type: none"> ● My route to the Kilve Coast. Activity sheet 1. ● Look for answers to the prepared questions <ul style="list-style-type: none"> ● What can you see/hear on the seashore ? ● What animals can you find in a rock pool ? ● What plants can you find on the seashore ? ● What pebbles can you find on the seashore ? ● What pebble colours can you find ? ● What solid rocks can you find ? ● Can you find some soil ? ● Where may you find seashore animals or plants living? ● I Spy: Give out photos of parts of the Kilve scene – can children identify these? ● Problem solving: e.g where has the stream come from? Where could a boat land? ● Quality Survey Activity sheet 21. Likes/Dislikes ● Collect describing words, adult to scribe. ● Follow My leader: pathways ● Collect beach debris, photos, sounds ● Rubbings of pebble surfaces, layered effects of rocks, fossils. ● Pebble Survey Find as many different types of pebbles as possible, sorting by colour, shape, texture. Choose a favourite one to take back to school. ● Field Sketches (Activity sheet 2a) ● Other sheets in the pack may be appropriate: <ul style="list-style-type: none"> ● Pebble & Seaweed words (Activity sheet 10) ● Poetry Words (Activity sheet 3a) ● Seaweed pictures (Info sheet 2) ● Fossil Fact Boxes (Info sheet 8) ● Pebble Shape Chart (Info sheet 4) ● Rock Pool Creatures (Info sheet 1) 	<p>2. Raise awareness of the variety of living and non-living things on a seashore.</p> <ul style="list-style-type: none"> ● experience the variety of seashore materials and simple ways of grouping them by comparing some of their properties. ● experience some sea shore animals and plants, what needs they have and where they live to meet their needs.
ENGLISH		ART
<ul style="list-style-type: none"> ● Use writing to explore experience and to organise information. ● Collect descriptive vocabulary 		<ul style="list-style-type: none"> ● Collect images/materials ● Record from first hand experience and observation

SUGGESTED TEACHING PLAN - RECEPTION/KEY STAGE 1 CONTINUED

C. SUGGESTIONS FOR CLASSROOM FOLLOW-UP ACTIVITIES

Learning objectives

Discussion, Summary, Presentation Creative Response, Display

Possible activities/ activity sheets to use at Kilve Beach

(Some of the KS2 sheets may also be appropriate)

1. A graph of rock pool creatures found.
 2. Class poems or individual verses from the question sheets
 3. Collage work with beach display.
 4. Smart copy of field sketch.
 5. Creative writing. Danger warning posters. Caves, Shipwrecks, rescues, day in the life of a fisherman.
- Read **'Fossil Legends' [Info Sheet 9]**
6. Role-play area. Boats of varying kinds e.g. pirate, rescue, sailing, ferry, fishing.
 7. Make a lotto game, use children's pictures, photographs, sounds.
 8. Make use of secondary resources for further research on creatures, rocks, shells etc.
 9. Artwork to recreate shapes found on beach, drawing spirals, 3D sculptures with natural materials
 10. Comparison chart / graph to compare quality of two places.
 11. From tape recording, use musical instruments to recreate sounds.
 12. Make a map using photos, showing locations of 'special finds, recollections or happenings'

SUGGESTED TEACHING PLAN - KEY STAGE 2

A CLASSROOM ACTIVITIES BEFORE THE VISIT

Learning objectives	Suggested activities	Learning objectives	Suggested activities
GEOGRAPHY		SCIENCE	
1. What is a coast and where is the nearest ?	<ul style="list-style-type: none"> ● Q and A session (i.e. zone where land and sea meet). ● Distinction between 'coast', 'shore' and 'beach' ● Locate on a Somerset map(s). ● What is it like ? (recollections, photos, map symbols). ● Introduce ideas of variety and change 	1. Planning a scientific investigation of a seashore by first-hand experience	<ul style="list-style-type: none"> ● location of and route to Kilve shore. General seashore characteristics. ● discuss and decide possible questions for investigation, about seashore plants, animals, rocks and pebbles. ● e.g. features, adaptation, feeding, properties and impact on environment and landscape
2. 'How and why are coastlines different?' <ul style="list-style-type: none"> ● Physical factors/changes ● human factors / changes 	<p>Introduce main concepts:</p> <ul style="list-style-type: none"> ● Cliffline and active erosions/ deposition (force of waves and gravity). ● Significance of rock type and hardness on beach materials, erosion and deposition. ● Effects of beach materials on seashore plants and animals, ● Weathering and soil formation. ● Uses of coastlines: work and /or recreation (in time or place). ● 'Development' possibilities (discussion). 		<p>(IF USING THE PACK RESOURCES for this, make sure you lead the pupils to the investigations covered by the activity sheets)</p> <ul style="list-style-type: none"> ● Agree methodology, resources and equipment. Think about fair testing. ● Decide how best to record and present results. Decide which activity sheets to use or design your own. PRACTISE using them. ● health and safety considerations.
3. Planning for a visit (to Kilve)	<ul style="list-style-type: none"> ● Decide questions for investigation and methodology. If using activity sheets from this pack (see below) familiarise pupils with them. ● How to get there (route, distance, time, transport) ● What to take and why (investigations and activity equipment). ● Health and safety (tides, weather, clothing, behaviour, food and drink). 		

SUGGESTED TEACHING PLAN - KEY STAGE 2 CONTINUED

B FIELDWORK AT KILVE SHORE

Learning objectives	Suggested activities	Learning objectives	Suggested activities
GEOGRAPHY			
4. What is the Kilve Coast like?	Select from KS2 activities: 1 a-e 2 a,b 22 16. 17 a,b 18. 9 a,b 13 a,b 14. 3. 19. 20. 21 a,b	2. Identify and group a variety of seashore creatures, considering their adaptation to particular habitats and their feeding relationships . 3. Identify and group a variety of seaweed plants, considering their features, location and adaptation to the unusual environment.	Select from KS2 activities: ROCK POOL INVESTIGATION Rocks and Seashore Life Rock Pool Creatures Fact Boxes How many creatures can you find? Rock Pool Zones Finding Shells! Rock pool Life. Rock Pool Food Chains. SEAWEED INVESTIGATION Finding Seaweed! Seaweed Words. Brown Seaweed Tally Charts Green Seaweed Tally Charts Sorting Tree Seaweed Pictures
	My Route Map Kilve Beach from the Air Filled Sketch (and see page 24) When the Earth Shook Fossil Hunt Soil and Life Finding Seaweed Pebbles on the shore Rocks of the cliffs Rocks and seashore life The sea attacks Where are they now? (Change) Wish You were here. (Likes/dislikes)		PEBBLES + ROCKS INVESTIGATION Pebbles on the shore. Rocks of the cliffs. Rocks and seashore life. Pebbles words Pebbles Key
	Info 8 Info 4 Info 5	4. Identify and group a variety of pebbles and rocks by their properties and to consider some of their effects on the shore and its life.	13 a,b 14. 3. 15. Info 5 Info 4
C FOLLOW-UP ACTIVITIES			
5. Summarise characteristics of Kilve's coast, compare with other coasts/ places and discuss how it has/will change . Display work.		5. Some rocky wonders: Find evidence of geological changes in time and place .	16 17 a,b 18 Info 8 Fossil Fact Boxes
6. Discuss and evaluate findings , decide how to present and communicate conclusions .			

FOR TEACHERS FOR TEACHERS FOR TEACHERS FOR TEACHERS FOR TEACHERS

INVESTIGATING ROCK POOLS KS2

ACTIVITY OUTLINE

Range of Activities: OBSERVATION, IDENTIFICATION, DATA COLLECTION, SORTING AND THINKING.

1. OBSERVATION

- With the whole group briefly explore the Upper Shore (beach nearest cliffs) area to observe what can be found there. Let the children look further down the beach without moving and compare what they observe. Can the children think why there are differences between the Upper and Middle Shore Zones? (middle zone is usually covered and uncovered by all tides).
- Move group to Middle Shore, explaining that this covers a wide area.
- Work in small groups with adults to locate rock pools - make observations.

2. IDENTIFICATION

- Use Info Sheet 1: Rock Pool Creatures and Info Sheet 2: Seaweed Pictures to identify some of the plants and creatures found where there are rock pools.
- Game "What's my creature?" to familiarise children with creatures that might be seen. A volunteer describes accurately one of the creatures on the identification sheet without naming it and the others have to identify the correct one.

3. DATA COLLECTION AND SORTING

The activity sheets are designed to enable sorting to take place while the data is collected.

- Use Activity sheet 4: How many of these creatures can you find? to collect information about creatures found in or close to rock pools, Mark on the sheet each time one of the creatures is spotted. Collect information from different pools in each zone of the shore.
- Use Activity sheet 5: Rock Pool Zones to draw or write names of plants or creatures seen in different zones of the beach. Children might consider why the middle zone on the sheet has the largest area.

4. THINKING

- Use Activity Sheet 6: Finding Shells to think of differences between the shells and why there are differences.
- Use Activity Sheet 7: Rock Pool Life to begin thinking about the dangers faced by sea-shore life and how the creatures protect themselves.
- Use Activity Sheet 8: Rock Pool Food Chains.

INVESTIGATING SEAWEEDS KS2

ACTIVITY OUTLINE

The suggested order of these activities is deliberate. It enables children to follow a structured, step by step investigation. Children who have tried these activities out were successful at sorting the seaweed because they had spent time carefully observing and describing the seaweed first.

Stage 1. COLLECTING SEAWEED

- Children look for seaweeds of different colours (green, brown, red), of different textures (smooth, flat, bobbled), from different locations (rock pools, near shore line, middle zone of the beach).
 - Working in groups, collect one sample of each type of seaweed from around the beach (without setting criteria). These will be used later in the sorting activities.
- Limit the amount that can be collected and encourage collaborative collection to avoid too much picking of seaweed.

MATCHING

This activity links into the collecting activities but does not necessarily need to be included as part of the sequence above and may be more suitable for younger children.

- Give children small samples of seaweed from the beach, or use pictures cards cut out from Info Sheet 2: Seaweed Pictures
- Find seaweeds that match the picture/sample exactly, in different parts of the beach. Vary this by asking them to find seaweed that matches one attribute of the picture/sample eg colour or texture.

Stage 2. DESCRIBING

These activities need to be combined with careful observation of the seaweed.

- Describe the seaweed in as many ways as possible – using different senses.
- Children should be encouraged to use their own vocabulary initially but also to look for further words on the word banks as an understanding of these words will be beneficial in the sorting activities. Activity Sheets 10a, 10b. Pebble & Seaweed Words. These word banks become progressively more technical in their language.

Stage 3. SORTING

In order to be able to sort successfully children need a vocabulary to describe the seaweed and need to have had time to look for similarities and differences between the seaweeds. There are a number of different sorting activities that could be undertaken. The activities listed below become progressively harder. Some are better done at school.

- Sort into groups according to given criteria – colour, texture and position.
- Sort according to own criteria for another child to see if they can correctly identify the grouping criteria. (This could also be completed using a Carroll / Venn diagram with missing labels).
- Leave groups incomplete – can children find other seaweed that could be added to the group.
- Venn / Carroll diagrams using 2 criteria – children could choose the criteria to match any of their sorting activities or the criteria could be set by the teacher if a specific link is to be made – for example the link between green seaweed and rock pools.

Using a Carroll or Venn diagram is a useful follow up activity at school using small samples of seaweed or photographs of seaweed taken at the beach.

- Use a sorting tree (Info Sheet 3: Seaweed Sorting Tree)
- Design own sorting tree using children's own sorting questions This activity could be completed using Flexitree.

Designing a sorting tree is a useful follow up activity at school using small samples of seaweed or photographs of seaweed taken at the beach.

Stage 4. ANALYSING PATTERNS / COLLECTING DATA

This is the stage where children think about what they have found so far and refine their questions leading to the need for further, more focused, gathering of information about the seaweed.

- Ask whether they have noticed anything to suggest a connection between the colour, type or quantity of seaweed and where it was found on the beach. (upper, middle or lower zone)
Do they need more data to support/ disprove these ideas?
Activity Sheets 9a, 9b Finding Seaweed! contain questions to stimulate thinking at this stage, before collecting further data, or to help interpret data already collected. (These sheets could also be used as a follow-up activity at school)
- Organise the pupils into groups to use the tally charts for collect quantitative data on seaweed types.
Emphasise that they are now collecting information, not actual samples!
Select from Activity Sheets 11a, 11b, 12a, 12b: Seaweed Tally Charts
If using the tally sheets for upper, middle and lower zone, a time limit could be set for how long you will walk and tally seaweed seen. Or the children could walk down the beach to the shore edge in a long line – tallying the seaweed that they see in their path.
- A similar task could be repeated in different locations on the beach
- Share findings and discuss what they show. Back at school, plot results on bar charts and analyse to draw conclusion e.g. most common seaweed. Construct and compare bar charts from different locations.

Points to note

1. Collecting information from the upper beach (near cliff base) is best completed as a whole class with quick observations and teacher questions as there will not be much to see! “What can you see here?”
Look out across the rest of the beach. “What can’t you see here that you can see on the rest of the beach?”
2. If seaweed is found check that it is living (i.e. attached to a pebble, rock etc). Loose seaweed is not in its natural habitat, perhaps brought up the beach by parties of school children, dogs or the weather!
3. Green seaweed is the common seaweed found in rock pools. This is because the water in the rock pool is fresh water not salty. Although the rock pools are in the tidal zone of the beach, the sea water is constantly diluted by the fresh water on the beach.
4. The most common brown seaweed in the middle zone of the beach is flat wrack with some bladder wrack (quantities of this do vary depending on your location on the beach).
5. The most common seaweed in the lower zone is saw wrack with some egg wrack.

INVESTIGATING PEBBLES & ROCKS KS2

ACTIVITY OUTLINE

Stage 1. COLLECTING

- Find pebbles of different colours, of different textures, from different locations.
- Collect different types of pebbles from around the beach (without setting criteria) to be used in the sorting activities. It is useful to limit the size that can be collected (a piece that fits comfortably in the palm of the hand is recommended).

Stage 2. DESCRIBING

- Carefully observe and describe the pebbles in as many ways as possible – using different senses. Children should be encouraged to use their own vocabulary initially but also to look for further words on the word banks as an understanding of these words will be beneficial in the sorting activities. (Activity Sheets 10a, 10b Pebble & Seaweed Words)

Stage 3. SORTING

In order to be able to sort successfully children need a vocabulary to describe the pebbles (colour, texture, layers) and need to have had time to look for similarities and differences between the pebbles. There are a number of different sorting activities that could be undertaken. The activities listed below become progressively harder.

- Sort into groups according to given criteria – colour, texture, hardness.
- Sort according to one criterion for another child to see if they can correctly identify the grouping criterion. (This could also be completed using a Carroll / Venn diagram with missing labels).
- Leave groups incomplete – can children find other pebbles that could be added to the group.
- Use a sorting tree (see Info Sheet 3)
- Design own sorting tree using children's own sorting questions. This activity could be completed using Flexitree.
- Designing a sorting tree is a useful follow up activity at school using data collected at the beach, using small samples of pebbles or photographs of pebbles taken at the beach.

MATCHING

This activity links into the collecting activities but does not necessarily need to be included as part of the sequence above and may be more suitable for younger children. As collecting but to match in colour, texture. Could use pictures (see Info Sheet 4: Deciding Pebble Shape) or small samples from the beach.

DEVELOPMENT: GEOLOGY

These activities can lead naturally into a closer investigation of the unique geology of the beach, using activity sheets 16, 17, 18, and 19.

These activities aim to provoke thought about what fossils represent:

- they are the stony remains of an ancient animal or plant.
- they were once alive.
- they are clues to what the scenery was like millions of years ago.

Much will depend on what fossils are found, already available in school, can be borrowed (e.g. from the Quantock Hills AONB Office) or even bought Good plaster replicas are equally suitable.

Range of Activities: OBSERVING, COLLECTING / RECORDING, SORTING, COMPARING, THINKING, UNDERSTANDING, and INTERPRETING.

A. FINDING FOSSILS at Kilve Beach

A fossil hunt is always popular! The ones most likely to be seen are shown on Activity Sheet 17a, 17b: Fossil Hunt.

***CAUTIONARY NOTE: Pupils will need to know in advance that:**

- fossils are not common and can be hard to find;
- fossils are usually seen most easily on the flat surfaces of rocks (the old sea floor);
- fossils may be recognized by their shapes and patterns;
- fossils are often different, obviously and in detail (e.g. ammonite patterns);
- fossils are most likely to be found by a group walking side-by-side;
- fossils may have to be 'collected' by tick sheet, drawing, rubbing or photo. (hammering can be dangerous and destructive!)

DISCUSSION of what the fossils were like in life may be a suitable follow up.

B. INVESTIGATING FOSSILS IN THE CLASSROOM

1. MIX 'N' MATCH

- Prepare a mixed up selection of fossils and their modern counterparts

Fossil Sample	Modern Equivalent
ammonite. [Flat coiled tube. Radiating pattern. Thin shell.]	nautilus shell
gryphaea ('gry-fee-uh'). [Curved shell. Thick shell. Prominent concentric pattern]	oyster shell
fossil bivalve (e.g. Pecten or Chlamys). [Shape. Radiating pattern - two valves.].	scallop shell (complete)
fossil bivalve (e.g. Plagiostoma or Pleuromya). [Shape. Concentric pattern - two valves].	mussel shell (complete)
fossil wood [Shape. Grain/fibres. Cellular structure. Carbon].	split piece of wood
fossil bone [Shape. Cellular structure].	chicken limb bone

INVESTIGATING FOSSILS KS2

ACTIVITY OUTLINE - CONTINUED

- The pupils then have to **OBSERVE** carefully, **COMPARE** and **SORT** into matching pairs, for themselves.

The pupil's reasons for the pairing they make are important.

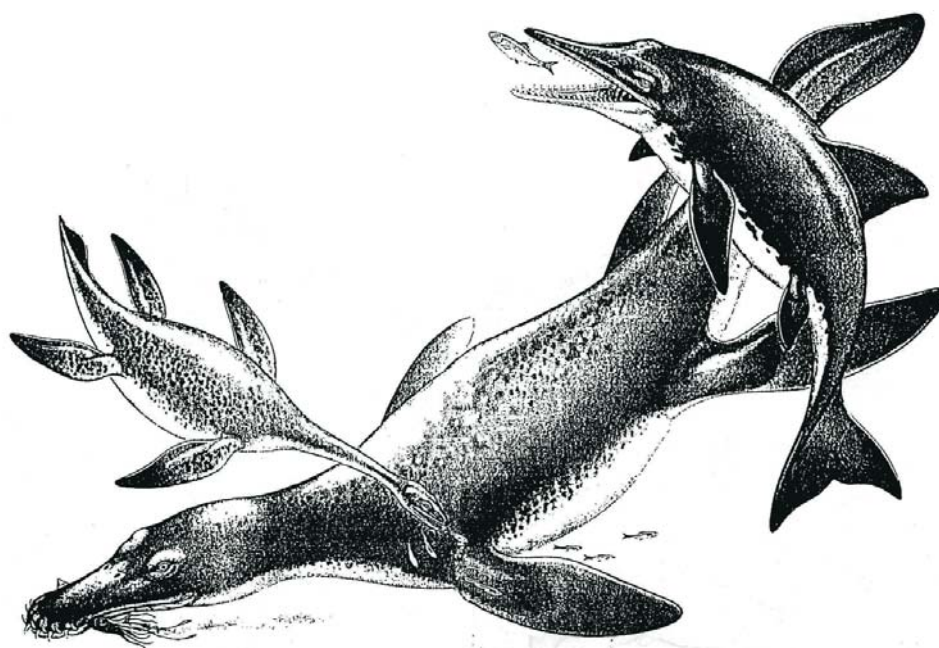
The living appearance of each pairing and their place of living can fascinate i.e. sea creatures and drift-wood (must be because found with sea fossils and rock)!

Thought of in this way the fossils are clearly clues to Somerset's very ancient, Jurassic, marine past (about 190 million years ago). There is much scope and, maybe, need for **DISCUSSION** to aid pupil's **UNDERSTANDING** and **INTERPRETATION** of this material.

3. SEA SERPENTS : Jurassic Marine Reptiles.

- Provide illustrations of these three Jurassic marine reptiles. [Fossil remains of (parts of) creatures 1 and 2 are occasionally found on the Somerset coast, as well as some inland quarries.]

1. Ichthyosaurus had a streamlined body with a big tail fin to help it to swim quickly. It also had a large triangular fin in the middle of its back. The front pair of paddles were twice as long as the back ones. The head had a long pointed snout with many sharp teeth.



2. Plesiosaurus was a slim, fast and agile swimmer with a long neck. It used its long, flexible, neck to reach for fish. The head was quite small but its tiny teeth were very sharp.

3. Pliosaur. Its short, thick, neck and massive head were the size of a small car. Its jaws had large teeth. It fed on ammonites and probably on small ichthyosaurs and plesiosaurs.

- Pupils match the illustrations to these descriptions. This activity and resulting **DISCUSSION** can add much to the pupil's grasp of the Jurassic seascape.

INVESTIGATING FOSSILS KS2

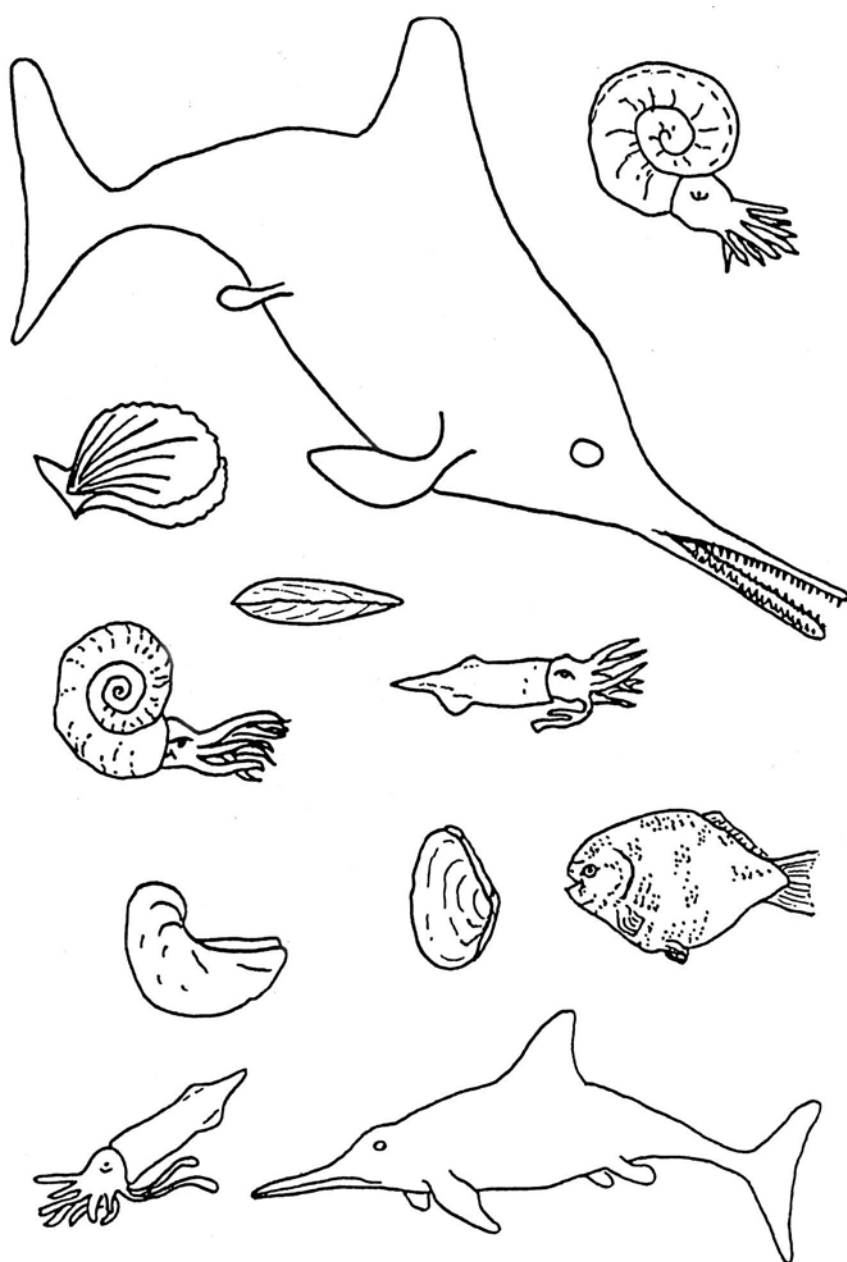
ACTIVITY OUTLINE - CONTINUED

4. VISUALISING A JURASSIC SEASCAPE

Clues to the past is the theme of this activity too. It implies **THOUGHT, UNDERSTANDING** and **APPLICATION** of knowledge.

Several alternatives are offered:

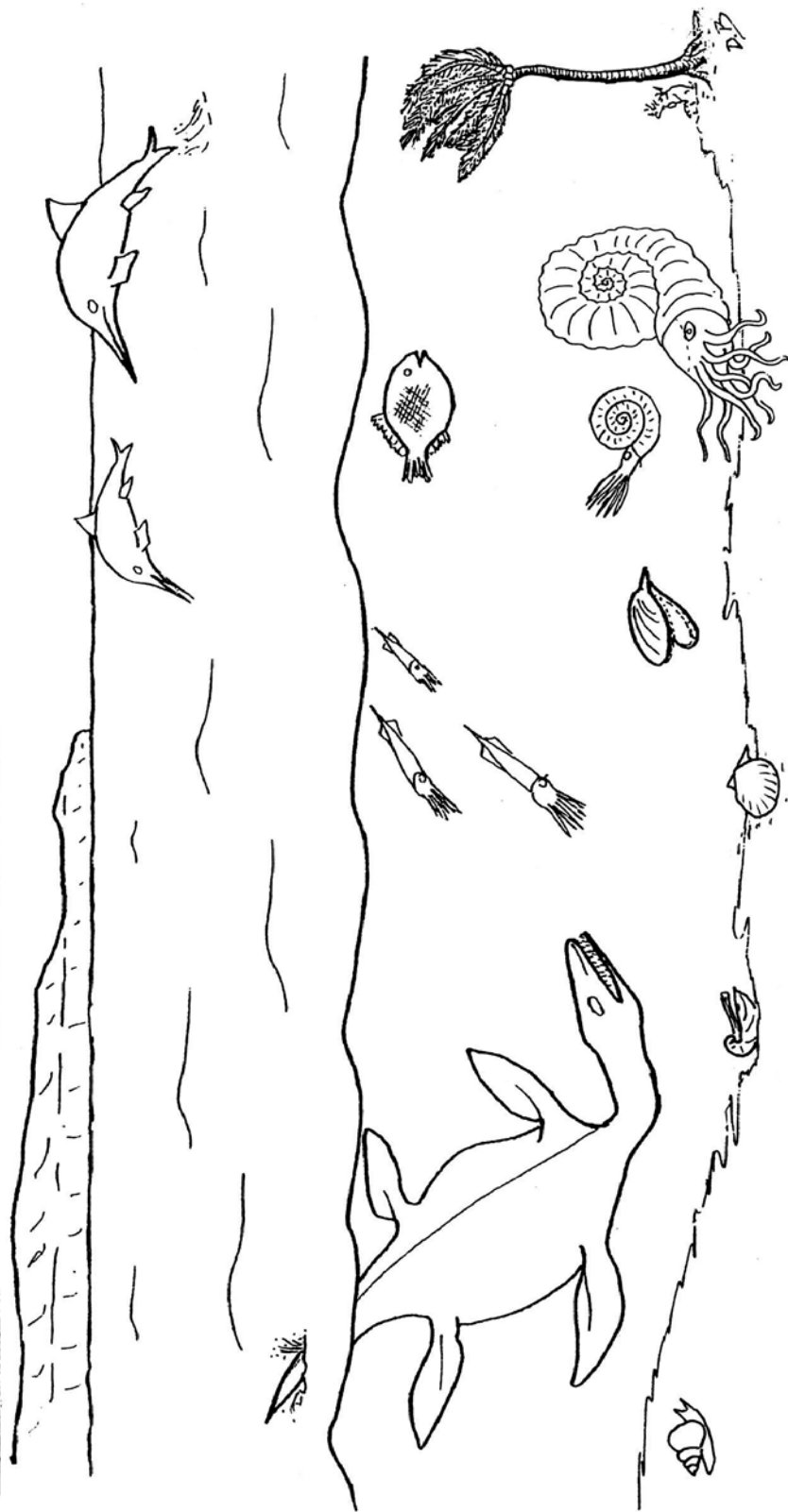
- relating the fossil 'clues' to the pictorial 'reconstruction' (bearing in mind that some fossil finds can be more complete than others, e.g. skeleton rather than odd bones).
- colouring the picture will bring it still more to life. N.B. The colour of the fossils when alive cannot be known for sure, but compare with modern equivalent (Activity 2).
- creation of the pupil's/class's own reconstruction of a 190 million year old Somerset Jurassic sea! This aids ownership as well as understanding and uses **IMAGINATIVE INTERPRETATION / APPLICATION** of knowledge.



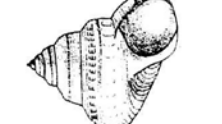


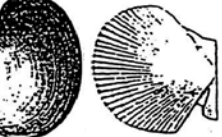





INVESTIGATING FOSSILS KS2

ACTIVITY OUTLINE - CONTINUED

A JURASSIC SEASCAPE: 200 million years ago.



Reconstruction

Gastropod	
Plesiosaur back bones	
Gryphaea ('Devil's toe nail')	
Bivalve shells	
Belemnites	
Ammonites	
Fish scales	
Ichthyosaur back bones	
Grinoid ('Sea lily')	

Clues

EXPLORING GEOGRAPHY AT KILVE COAST

TEACHING IDEAS

For many children the concept of 'the Seaside' is a construct of the artificial -promenade, hotels/caravans, cafes, souvenir shops and amusement arcades, maybe a marina, with cliffs, sea and beach as a sort of scenic backdrop. In contrast the Kilve Coast offers the comparison of a virtually natural seaside to be hands-on explored and marveled at.

Geography is about exploration; investigating what places are like, trying to understand how they got like it and considering what changes could/should happen. Visiting the Kilve seaside gives some good geographical opportunities:

1. Map Reading

This pack contains ideas for introducing and developing that skill for a range of age and ability. It uses the journey route to suggest activities to make and record observations in various ways and goes on to answering questions about what is seen. In all cases a prepared base-map is used for the recording, initially just a straight line record but developing into a traced outline of the route. A few children may be capable of following a proper road map!

2. Use of Aerial Photographs

These can compliment the map and actual visit by giving an overview which helps to relate the various features seen. Most useful is the 'oblique photo', i.e. taken from an angle rather than vertically, for it is easier to pick out the features. Graded activities exemplifying their use are given. Be aware that shadows cast by the sun can sharpen some items. e.g. field boundaries, but obscure details of others, e.g. the cliffs. Experience suggests that children have fewer 'hang-ups' over using maps and photos than do uncertain adults!

3. Consideration of Change, Natural and Human

Change is looked at through activities on coastal erosion (Activity Sheet 19: 'The Sea Attacks') and ruinous structures (Activity Sheets 20a,b). Some map work is used again.

4. Making an Environmental Appraisal

This allows the pupils to reflect on their experiences, to record their reactions to the site, and to consider how it will and could change, with and without human impact. (Activity Sheets 21a,b)

5. Creating Field Sketches

This is a very handy geographical skill to introduce and develop through school life, for a quick summarizing (part of) a visit either on the spot or back in school or as a class or personal revision tool for class work or test. Full details are given in Appendix I.

6. Increasing Vocabulary (see list below)

A different and stimulating situation can encourage pupils to use their existing and new vocabulary to express their findings, feelings and fantasies. Such practice of using words 'in context' is invaluable, whether they are expressing fundamental relationships, e.g. left, right, up, down, in front, on, under, or such concepts as erosion, habitat, food chain.

7. Links

Naturally there are links and areas of subject overlap between all the activities suggested – between the materials of the cliffs and their physical and chemical properties (Science), the ways they react to the sea, the weather and people (Geography), and the opportunities so given for colonization by plants and animals (Natural History).

landscape**Climate & Weather****Settlement****Transport****Economic Activity****Locational Words**

Hill	pond/pool	weather	settlement	bus	market	globe
Stream	steep	season	local	lorry	jobs	map
Slope	gentle	desert	house	van	work	plan
River	beach	wind	shop	road	shops	country
Lake	valley	rain	park	car	farm	area
Seas	mountain	cloud	village	pedestrian	factory	place
Waves	wood	frost	town	canal	services	position
Land	forest	ice	city	railway	quarry	north
Soil	cliff	storm	building	journey	mine	south
Rock		spring	supermarket	motorway	forest / wood	east
		Summer	office	bridge	field	west
		Autumn		tunnel		near / far
		Winter				left / right
						Up / down
						Behind / in front

Landscape	shore	climate	population	transport	pollution	fieldwork
Source	delta	temperature	urban / suburban	routes	industry	latitude
tributary	coast	rainfall	rural	barrier	manufacture	longitude
mouth	headland	mist	density	network	raw material	grid reference
weathering	bay	fog	port	system	labour	distribution
deposition	defence	dew	resort	traffic	fuel / power	region
environment	zone	drought	site	route	energy	vertical / oblique
moon	plain	flood	situation		renewable	aerial / satellite
tides	moor	evaporation	location		natural resources	field sketch
vegetation		condensation	conservation		tourism	key
feature		gauge	sustainability		interdependence	
volcano		thermometer	dormitory		issue	
earthquake			commuter			
wave cut platform						

Above the line = words included or implied in the KS1 Programme of Study

Below the line = further words included or implied in the KS2 Programme of Study

Some Overlap

KILVE SHORE: FICTION WRITING

1. POETRY

- Haiku, cinquain, couplets, kennings, shape/concrete poems, acrostic, riddles and free verse.
- Using all of the senses words and ideas can be collected while at the beach and then refined in school leading to a completed poem (see Activity SHEETS 3a-d and 10a,b)
- Shorter poetry forms such as haikus, cinquains, couplets and riddles on the different aspects of Kilve beach could be combined into a longer poem (possibly a class poem) using each haiku etc as a different verse.

2. MYTHS / LEGENDS

- Use 'Fossil Legends' [Info Sheet 6] as starting points for discussion before the beach visit. Whilst at the beach, pupils could look for evidence that supports the myths / legends.
- Story telling could be used to develop a myth / legend using different parts of the beach to continue the story. After beginning the story, the pupils could develop it / write the ending by using items found on the beach and features they see on the beach. These could be recorded in note form / pictures to be used to write the complete myth / legend in school.
- Suggestions for myth / legend ideas:
 - the watery spirit of Kilve which haunts the waters edge particularly on wild and stormy nights
 - the pebble man (in the style of the Iron Man) who once lived as part of the cliff and is often found on quiet days wandering the beach looking for different body parts!
 - the faces in the cliffs – ancient gods of Kilve looking out for fishermen, sailors and children in danger
 - how the beach became; how the fossils became.

3. STORY WRITING

Adventure:

- travel back in time to meet cavemen – teach them how to make fire
- shipwrecked and stranded on beach – use different beach features to make final escape
- children exploring beach whilst on holiday – trapped, find fossil, travel to prehistoric times.

Suspense:

- friendly fisherman turns nasty, watching, following, chasing.
- stormy night, friends camping on beach, for a dare other friends decide to trick them.

Mystery:

- the missing fossil
- the case of the disappearing fisherman
- the treasure of Kilve (find map, treasure buried under rocks)

Moral / Learning a Lesson:

- sharing, safety, team work, a rescue.

4. DIARY

Write a diary entry of:

- a shipwrecked sailor discovered years later
- a famous fossil hunter / scientist
- memories of a childhood
- a local fisherman

EXPLORING ENGLISH AT KILVE SHORE - TEACHING IDEAS - CONTINUED

KILVE SHORE: NON-FICTION WRITING

1. EXPLANATION

- Water cycle - using the sea as a starting point;
- How beaches are formed.

2. INFORMATION LEAFLET

- Things to be found on Kilve beach;
- Leisure leaflet - activities on Kilve beach.

3. ARGUMENT/DISCUSSION

- Persuasive leaflet - come to Kilve (could use different audiences; parents, children, schools).
- Newspaper debates: should facilities be improved, holiday homes built, dogs banned from the beach.

4. LETTERS

- Letters of complaint after an accident on the beach.
- Information letter to parents about the visit to Kilve.
- Letter requesting information about/identification of an item found on the beach.

KILVE SHORE: SPEAKING AND LISTENING

1. TALKING PARTNERS

Use to refine and develop creative writing ideas.

2. DRAMA

- Could be used as a way to generate ideas for stories: shipwreck, treasure hunt, travelling back in time.
- Create freeze frames using the beach e.g. a shipwreck scene, building a shelter.
- Taking on the role of a fisherman, a shipwrecked crew needing to find: shelter, water, warmth, food, help etc.

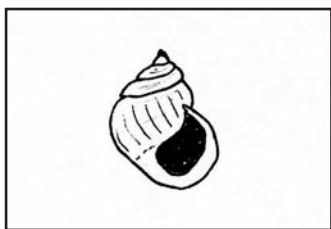
3. ORAL STORY TELLING

Use different objects on the beach and features of the beach to build up a story - the journey of a pebble from being part of the cliff, to a boulder, clump of pebbles, shingle etc, adventures of a limpet in different rock pools.

4. DEBATE

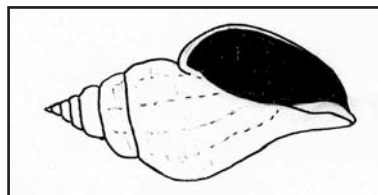
Use similar topics to those suggested in argument/discussion writing.

Periwinkles



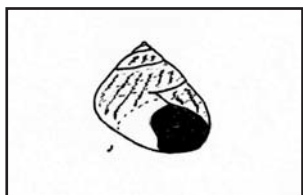
Periwinkles are plant-eating snails that graze on seaweed. They crawl many metres each tide cycle on their one fleshy "foot". Look for a thick patch of brown or black skin, attached to the foot, which seals the shell shut when the tide is out.

Dog Whelk



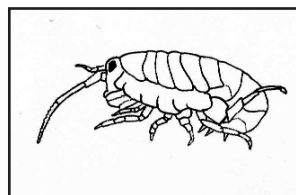
The Dog Whelk is a common shell found on rocky shores. It is often found from the middle zone down to shallow water. Its colour can vary but is usually a grey/cream with dark lines around it. Dog Whelks feed on barnacles.

Top Shells



Another type of sea snail, Top Shells are creatures that are usually found under stones, feeding in seaweeds. They are about 15 mm tall and have a silver-grey-green shell with purple bands.

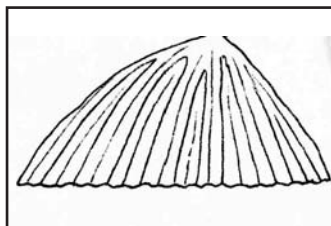
Sandhopper



Sandhoppers are small creatures with many legs. They forage on decaying seaweed. they are often found on the upper zone of the beach.

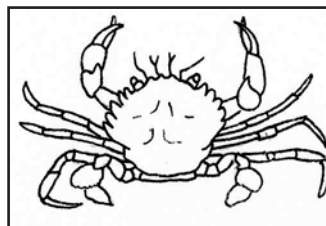
INFO SHEET 1 ROCK POOL CREATURES

Limpets



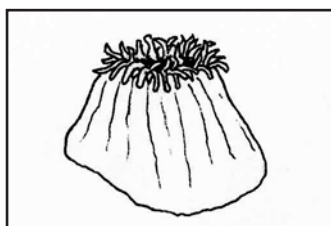
Limpets stick to the rocks using a suction pad in a huge muscley "foot". They are herbivores which move over the rock surface very slowly. They use their rasping tongue to scrape off the fine weed that they find there. That is their main food.

Crabs



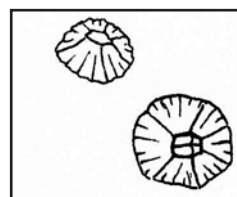
Crabs tend to live in gaps under stones and in crevices in the rock. They are scavengers, eating plants, small living animals and animal scraps. Their shells are shed as they grow and replaced by a new, larger 'suit of armour'.

Sea anemones



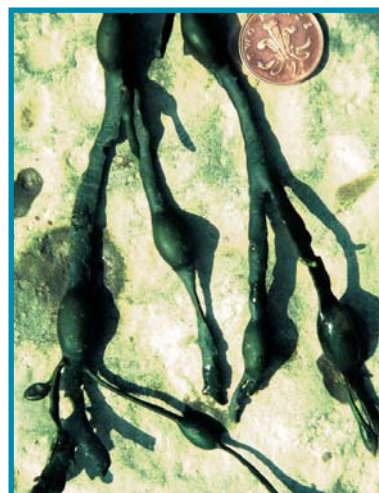
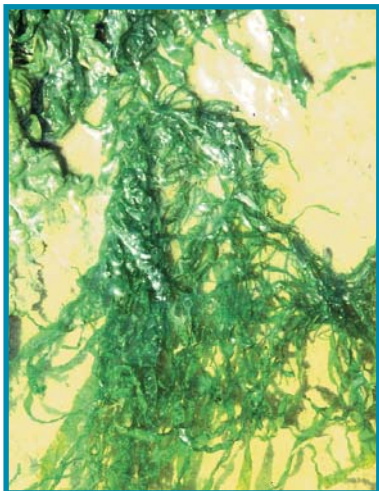
Sea anemones live on rocks and use their tentacles to attract and catch small prey such as shrimps, which are then ingested in the centre of the anemone. Their structure is quite delicate.

Barnacles

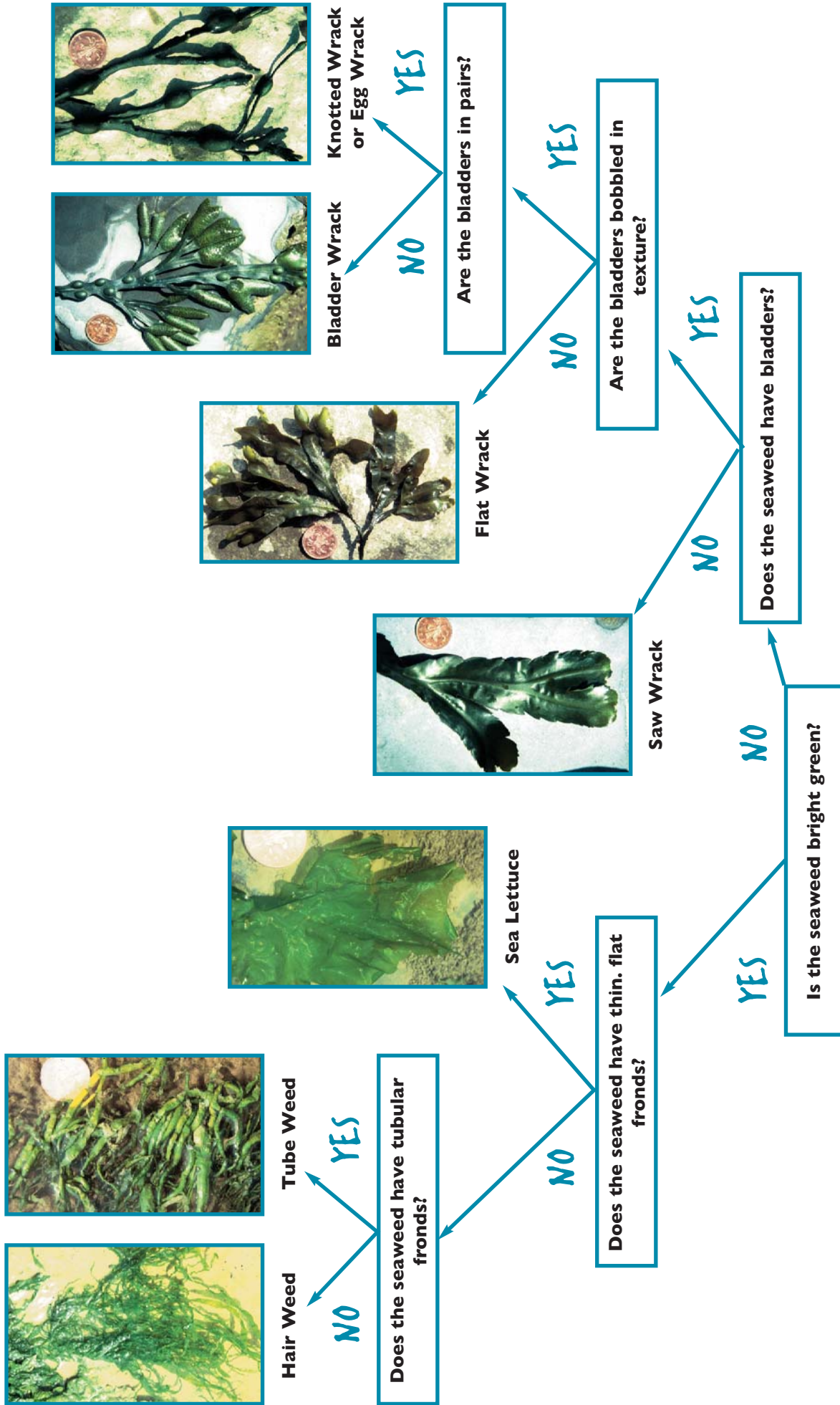


Barnacles are creatures with jointed legs and shells of overlapping plates. Instead of crawling after food, they glue themselves to rocks and wait for food to wash by. When they are under water, they reach out little feathery barbed legs to strain out plankton for food and to collect oxygen bubbles for breathing.


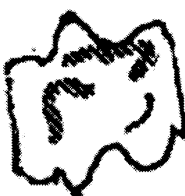
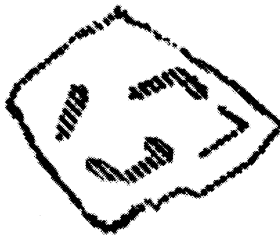

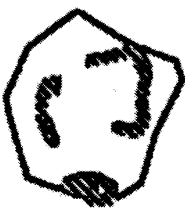


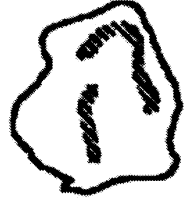
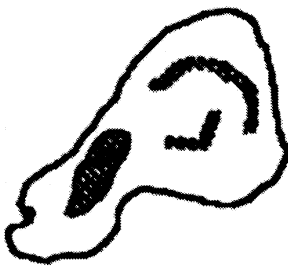

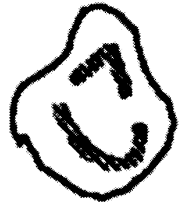
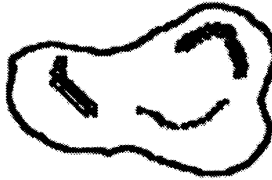


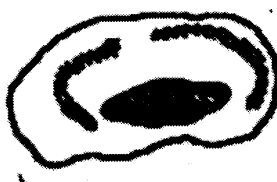

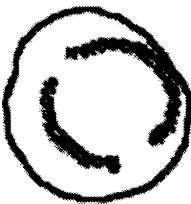

Can you find seaweeds at Kilve beach to match these photos?

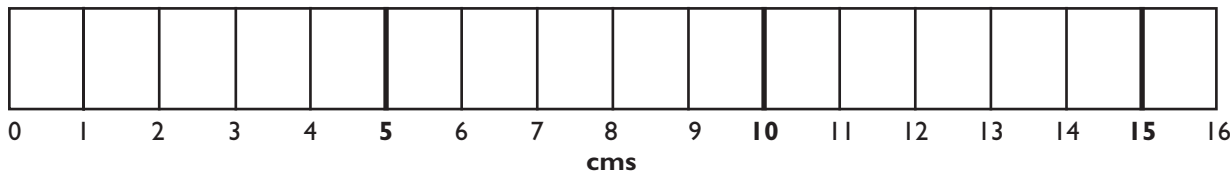


INFO 3 SEAWEED SORTING TREE



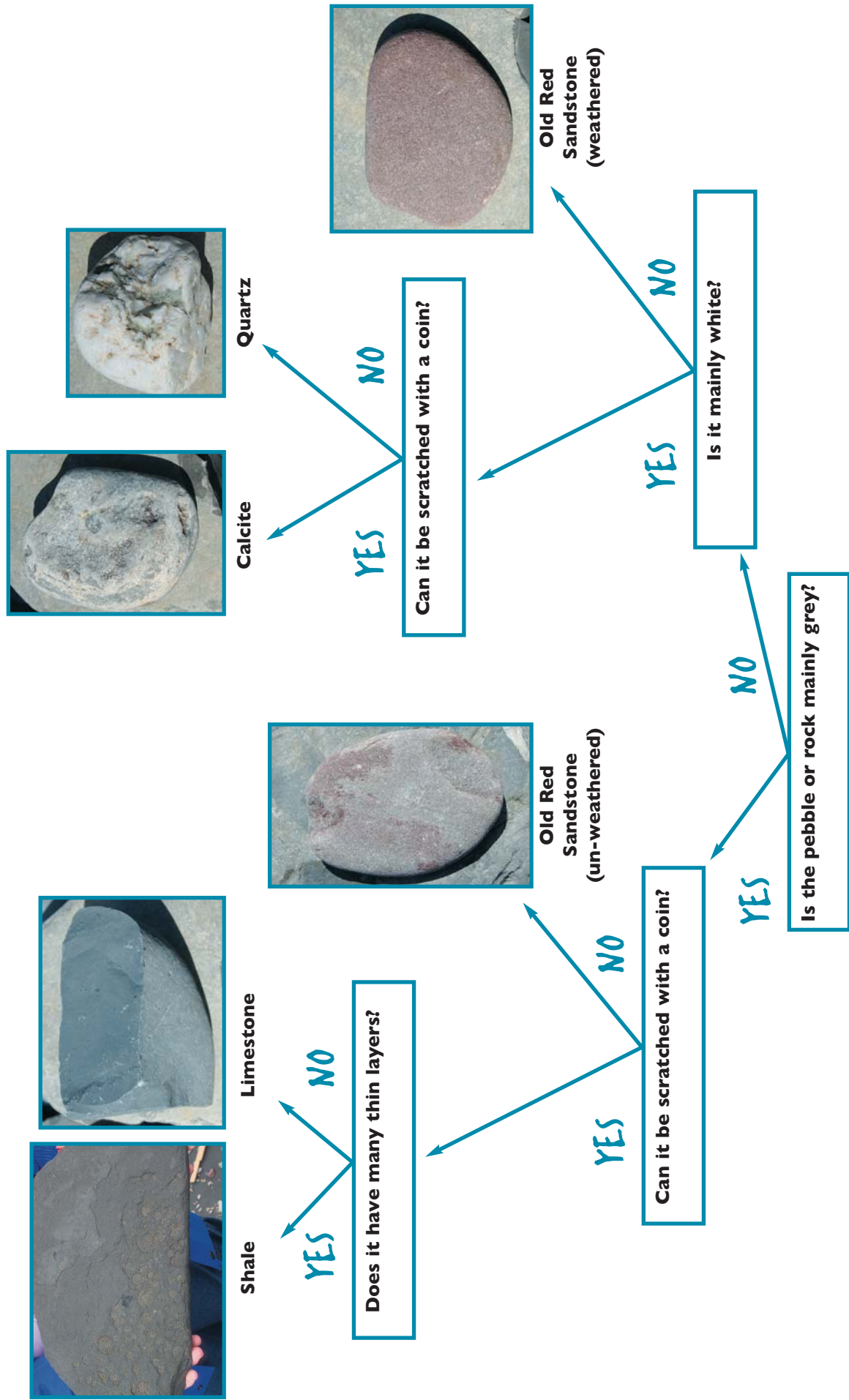
Pebble shape

1	Very angular				Every edge and every point is sharp. There are no smooth parts to the pebble.
2	Angular				One or two points and edges are smooth but most aspects of the pebble are sharp.
3	Sub- angular				The pebble is irregular in shape and has one or two sharp points or edges. The rest of the pebble is smooth.
4	Sub-rounded				There are no sharp points or edges on the pebble but it is irregular in shape.
5	Rounded				The pebble is almost Perfectly smooth but there are one or two irregularities.
6	Very rounded				The pebble is Perfectly smooth.



A Key for identifying pebbles and rocks on Kilve Shore

INFO 5 PEBBLES KEY



FOSSIL LEGEND: Saint Keyna's Serpents

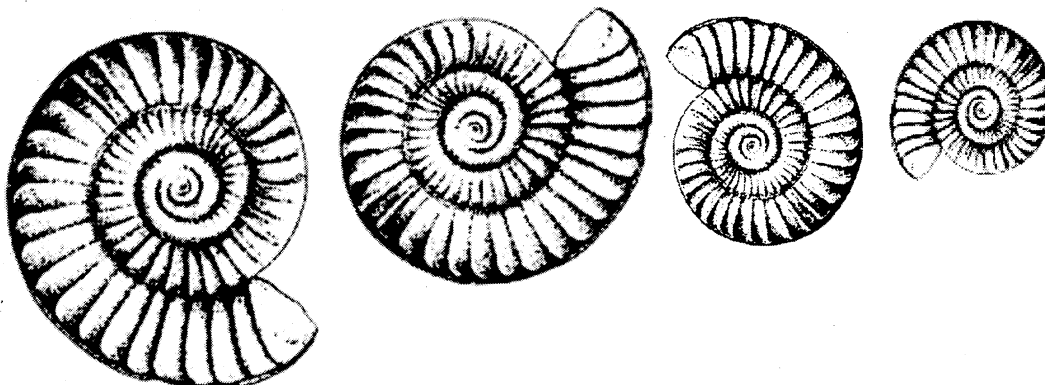


The Ammonite

Many years ago, around Bath, there was a plague of snakes. They got everywhere!

The people were so fed up with the snakes that they went to see Saint Keyna of Keynsham. They asked her to help them. She agreed and turned all the snakes into stone!

The snakes must have got as far as Kilve beach because you can find lots of ammonites there.



INFO 6 FOSSIL LEGENDS - CONTINUED

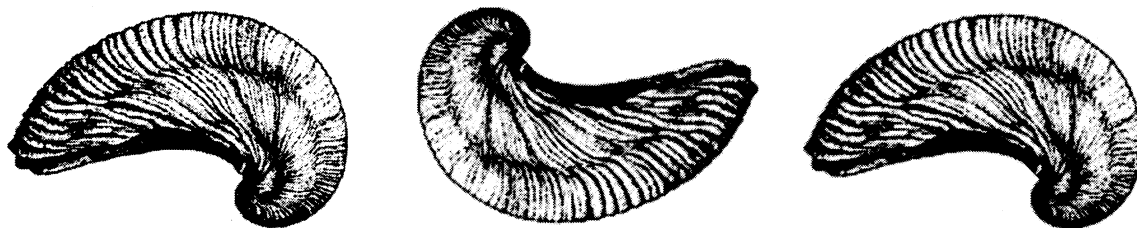
A FOSSIL LEGEND: The Devil's Toenails



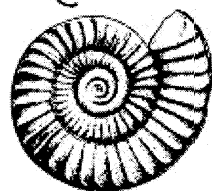
GRYPHAEA: THE CURVED OYSTER SHELL

At the same time that St. Keyna came to live in Somerset, the Devil visited the area. He was ugly. His toenails were like claws. The Devil did so many bad things that St. Keyna punished him. She made his toenails fall off!

St. Keyna must have punished him many times because there are lots of these Devil's Toenails about!

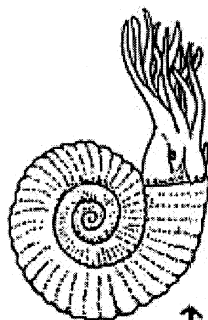


Some Fossil Fact Boxes



Ammonites

('St. Keyna's serpents')



when alive →

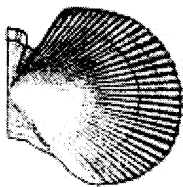
A fossil seashell, shaped like a round, flatly-coiled tube. An octopus-like creature lived in the outer, widest, part of the shell. The tentacles guided food to its mouth. The shell was fragile and often found cracked or crushed. When the animal died and rotted away, the empty shell filled with mud which is now solid rock.

Ammonites lived in the Jurassic seas while dinosaurs roamed the land.



Bivalves

(side views)



These fossil seashells are roughly oval, but vary in size and shape. The outsides often have a pattern of circular (growth) lines and/or of fan-shaped (strengthening) lines. In life the soft-bodied animal was protected inside 2 similar shells joined together side-by-side: --
Some lived on the sea floor.
Others burrowed into the mud.



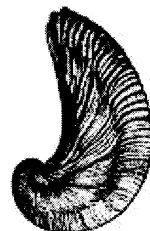
(top view)



A trace fossil (burrowing marks)

These trace fossils are the shapes of burrows made in the rock a very long time ago. At that time this rock was still a soft mud on the floor of an ancient sea. Creatures burrowed into it to find food or protection.

Afterwards the burrows were filled with more mud, often of a slightly different colour. It is rare to know exactly which Jurassic creatures made these burrows.



Gryphaea

('Devil's toenails')



Lid-like valve

main valve

Another bi-valved seashell; a fossil oyster. In this case one side of the shell became very curved. The other part of the shell fitted on top like a rounded lid. The soft-bodied animal lived inside the larger, curved, part. It could open the 'lid' and suck in very small sea plants and animals. The shell lay this way up on the sea floor. The lid-like part of the shell is rarely found as a fossil.

1. What can you See / Hear on the seashore?

What can you see on the seashore?

sea	pebbles	seaweed	kite
sand	wood	dog	people
rockpool	litter		

I can see _____

What can you hear on the seashore?

water	pebbles	birds	people
wind	waves		

I can hear _____

2. What animals can you find in a rock pool?

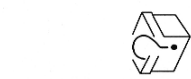






What animal can you find in a rockpool?

Has it got legs	eyes	fins	a shell?
Is it in the water?	swimming	crawling	out of the water?
Is it walking	still?		


What colour is it? _____








Draw a creature. I have found _____



3. What plant can you find on the seashore?












What plant can you find on the seashore?

What colour?  green or  brown?

Is it in water?  Out of water? 

Has it got  roots,  stem,  leaves,

 bobbles, an animal on it? 

Draw your plant  I have found 

4. What pebbles can you find on the seashore?



















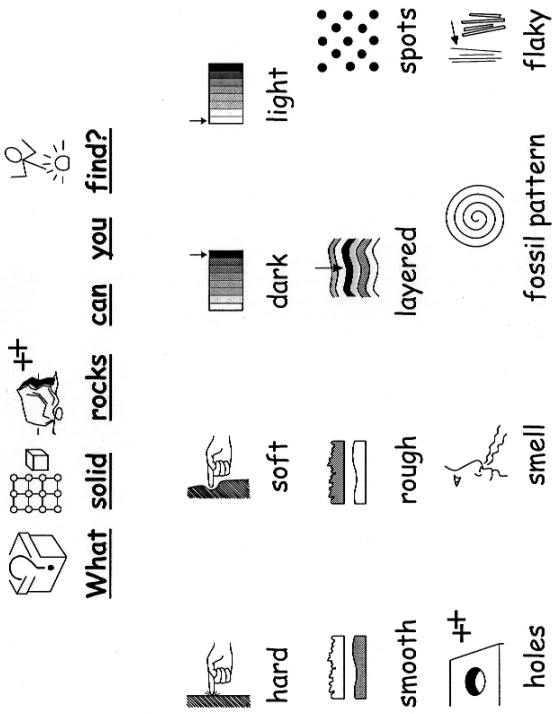


What pebble colours can you find?

 red  yellow  green  brown
  black  white  pink  orange
  grey  layers

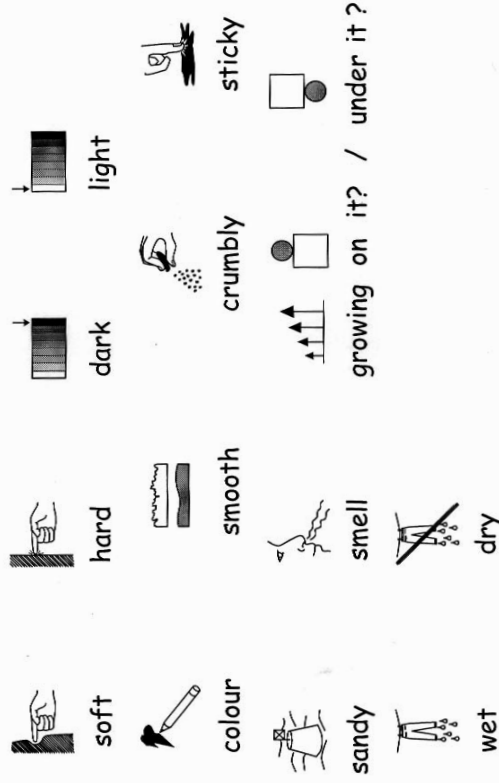
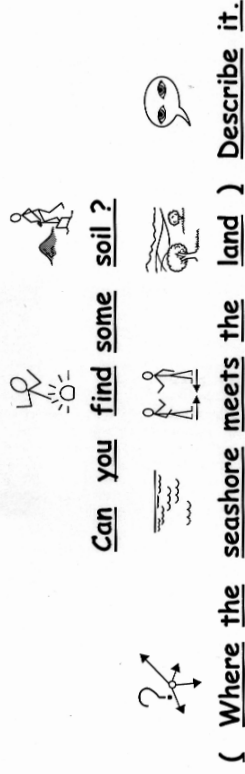
 Sort your pebbles. 

5. What solid rocks can you find?



I have found rocks like this

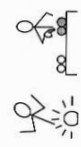
6. Can you find some soil?



I found soil like this

7. Where may you find seashore animals or plants living?

Where may you find these seashore animals and plants living?



a seasnail



a seagull perched



seaweed



a crab

8. Change ahead.



Change ahead?

(If you come again, many things will have changed: Some will be easy to see, some you will need to think about.)



Tick any of these which will have changed.



people



buildings



cars



litter



rockpools



pebbles



shells



birds



soil



fossils



cliffs

MY ROUTE TO THE KILVE COAST 1A

left
right

9

6

4

2

8

7


5

3

1

↑










road



School

START HERE

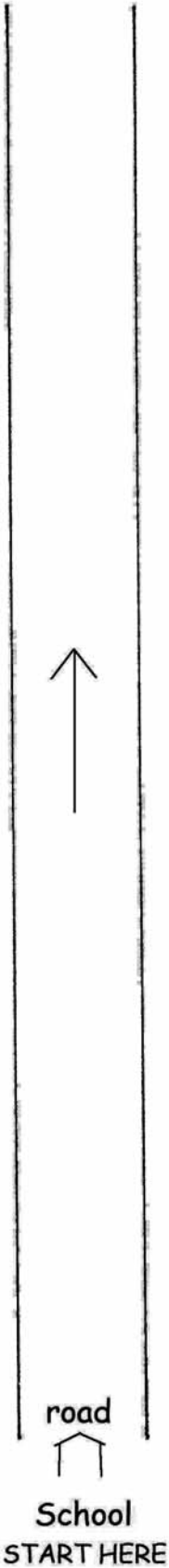
KEY

traffic lights		river	
castle		wood	
inn		caravan	
factory		valley	
church			

MY ROUTE TO THE KILVE COAST 1B

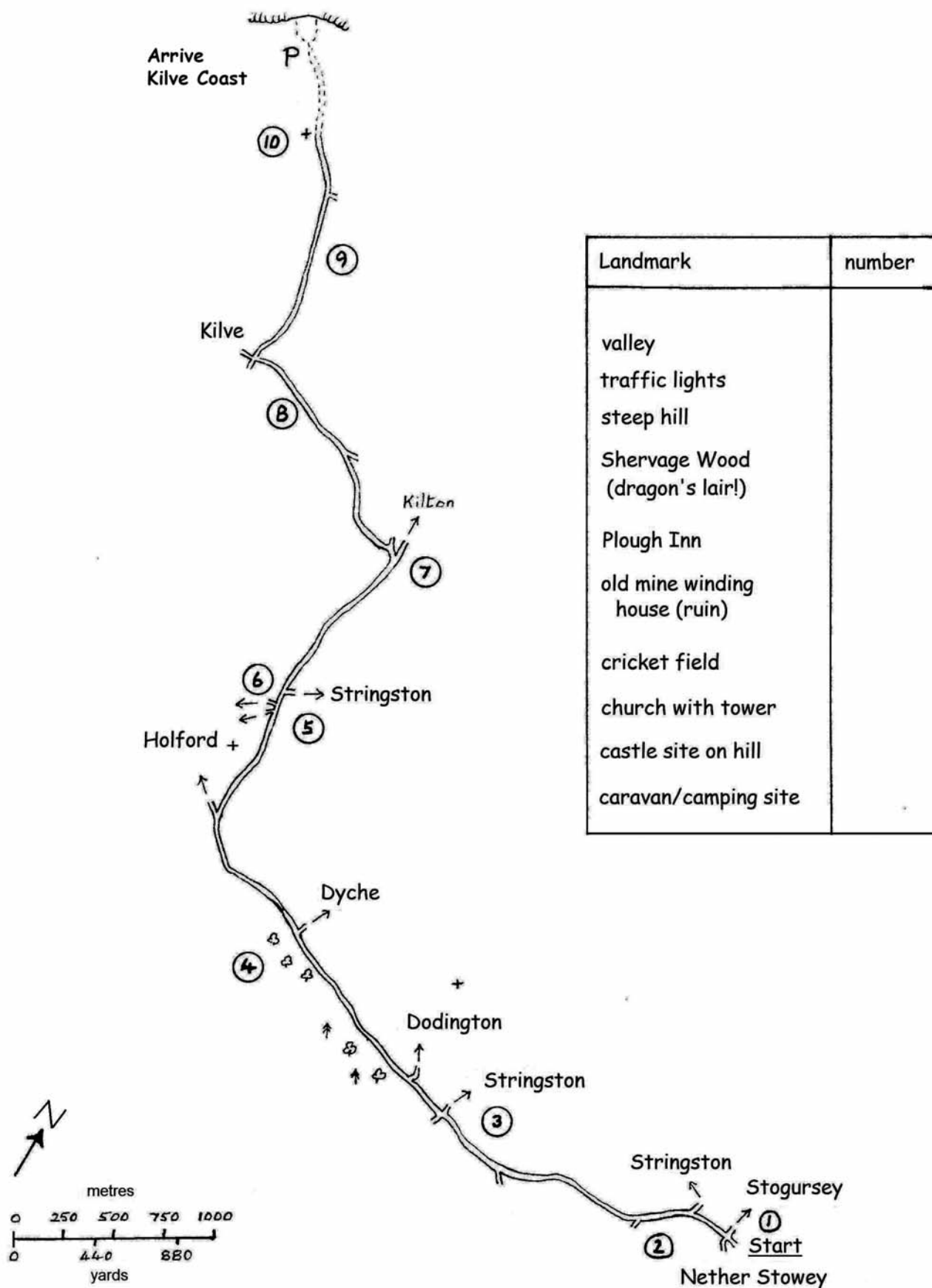
left

right

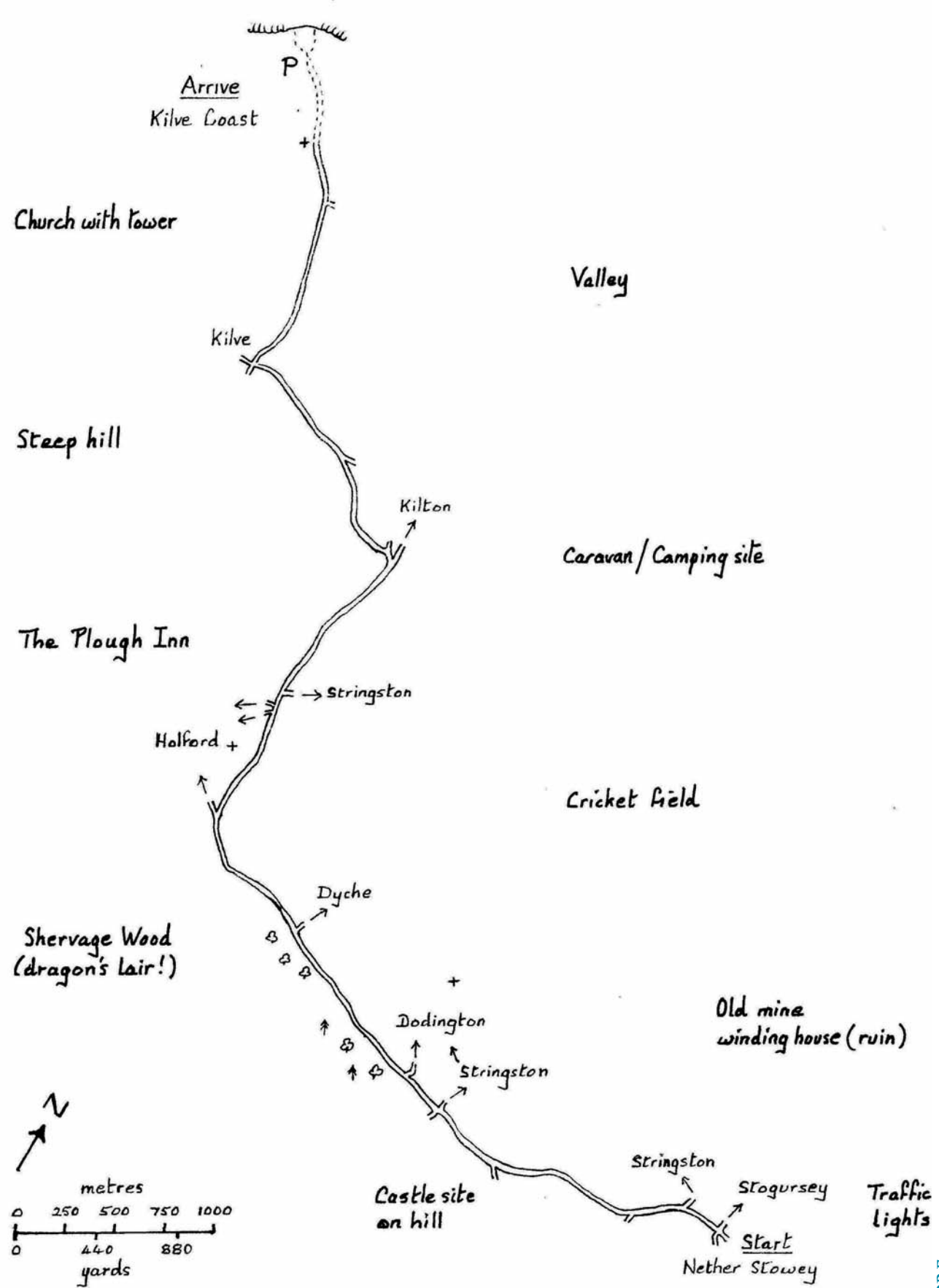


landmark	left	right
Kilve church ⑨		
valley ⑧		
cheese factory ⑦		
caravan site ⑥		
Crown Inn ⑤		
a wood ④		
castle ruin ③		
river ②		
traffic lights ①		

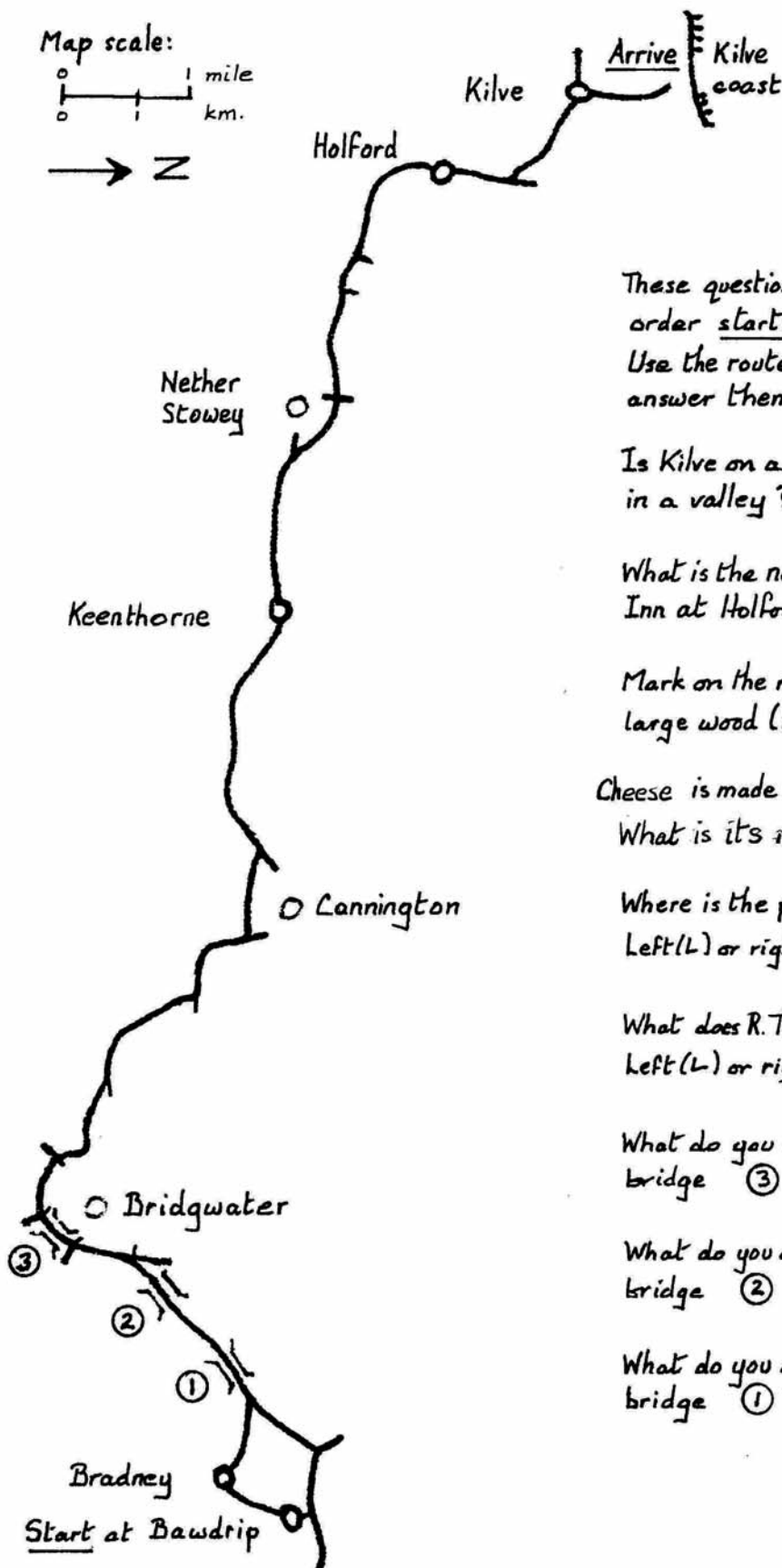
MY ROUTE TO THE KILVE COAST 1C



MY ROUTE TO THE KILVE COAST 1D



MY ROUTE TO THE KILVE COAST 1E



These questions are arranged in journey order starting from the bottom.

Use the route map to help you to answer them as you travel.

Is Kilve on a hill or in a valley?

What is the name of the Inn at Holford?

Mark on the map where you pass a large wood (left or right of road).

Cheese is made at Nether Stowey's farm shop.

What is its name? _____

Where is the petrol garage? _____

Left (L) or right (R) of the road? _____

What does R. Tincknell sell? _____

Left (L) or right (R) of the road? _____

What do you cross on bridge ③? _____

What do you cross on bridge ②? _____

What do you cross on bridge ①? _____

Match words to numbers to describe this view.

Kilve Coast: oblique aerial view looking South

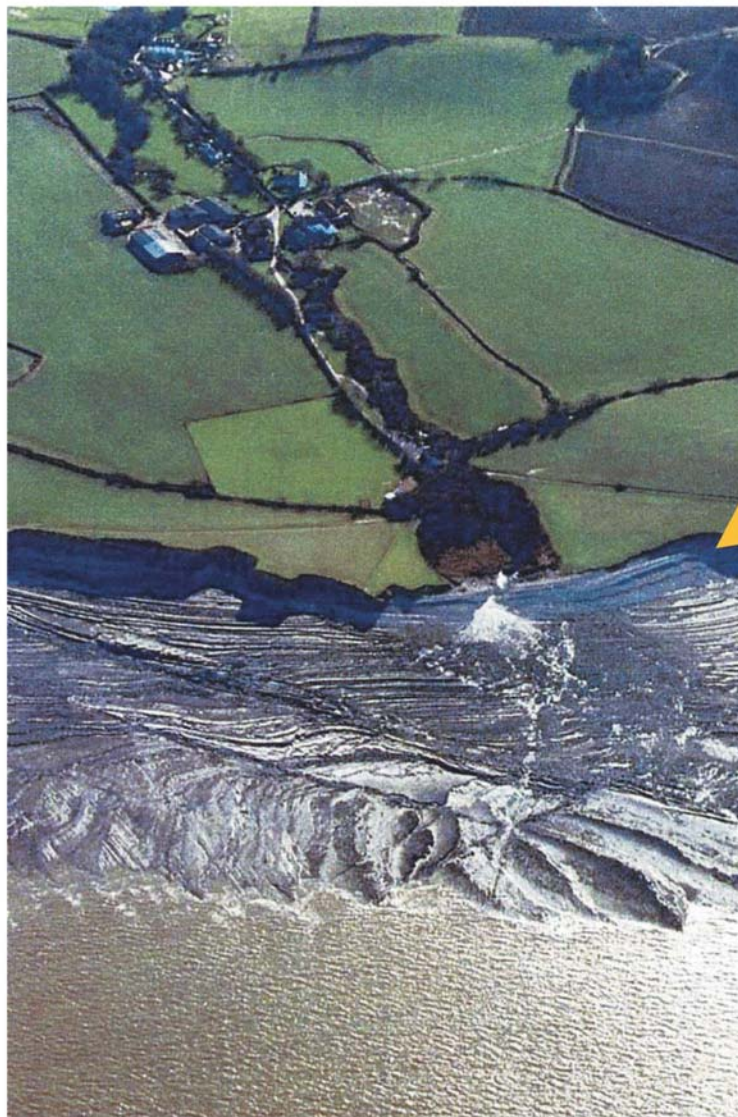


KEY	WORD	NUMBER	WORD	NUMBER
	car park		sea	
	cliff		seashore	
	farm		small wood	
	field		stream spreading across shore	
	pattern of rock steps			

KILVE COAST FROM THE AIR 2B

Annotate this aerial view by labelling features that you recognise.
The first is done for you

Kilve Coast: oblique aerial view looking South



cliff

Name:

different sizes

still rock pools

grey

Look, listen, touch! Sit a while on the beach. Notice everything.
Write all your ideas - whatever you think of them.

uneven
still
smooth
soft
curly fossils

crashing
large
TINY HOLES
shining
tall
slippery

green and brown

curved

cheeping

POETRY WORDS YEAR 3 - 3B

Name:

layered

flowing stream

sharp

Look, listen, touch! Sit a while on the beach. Notice everything.
Write all your ideas - whatever you think of them.

breaking waves

rough

peaceful

squelchy

slippery

still
glistening

whistling

smooth

ROLLING

soft

roaring

rushing

PATTERNED

Name:

shuffling

multicoloured

jumbled

sparkling

Look, listen, touch, smell, sniff! Sit a while on the beach.
Notice everything. Write all your ideas - whatever you think of them.

still
ROLLING

mysterious

whistling

soft

Rugged

Peaceful

Effortless

Slippery

Squelchy

trickling

gentle

PATTERNED

POETRY WORDS YEAR 5 - 3D

Name:

trickling

rumbling

hiding treasures

jigsaw

staircase

Look, listen, touch, smell, sniff! Sit a while on the beach.
Notice everything. Write all your ideas - whatever you think of them.

sky of sea

ploughed landscape

motionless

Journey's end

lifestory secrets

dusty

mirror

moist

soft as a pillow

crisscross

loneliness

silent

silent Sea soldiers

everlasting

abandoned

dream

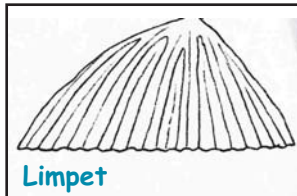
soothing, breathing

gentle grumbling

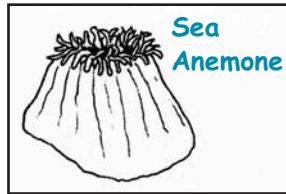
HOW MANY CREATURES CAN YOU FIND? - 4

Are they in the water? on a rock? or both?

Show with a tick where you see each one. Make a tick for each creature you see.



In the water	
On a rock	
Both	



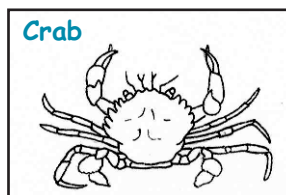
In the water	
On a rock	
Both	



In the water	
On a rock	
Both	



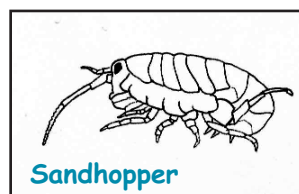
In the water	
On a rock	
Both	



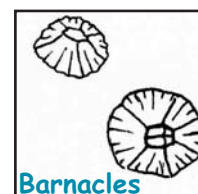
In the water	
On a rock	
Both	



In the water	
On a rock	
Both	



In the water	
On a rock	
Both	



In the water	
On a rock	
Both	

ROCK POOL ZONES - 5

Rock Pool Zones

The part of the shore nearest the sea is alled the **Lower Zone**. It is only uncovered by the lowest tides and for a short time.

The part of the shore nearest the land is called the **Upper Zone**. It is only covered by the highest tides and only for a short time.

The part inbetween the **Upper and Lower Zones** is called the Middle Zone and is usually covered and uncovered twice daily by all the tides.

on this diagram draw or list any plants or creatures you see in their correct zone:

Upper Zone	Middle Zone	Lower Zone

Which shells have you found most of?

Are any shells camouflaged?
Why do you think this is?

Where are most limpets found - in the water or on a rock?

Where are most periwinkles found - on open rock surfaces or amongst seaweed?

In which zone of the beach are most periwinkles found?

Barnacles are always found on a rock. Do they mostly face seawards or towards land?
Why do you think this is?

In which zone of the beach are most limpets found?

ROCK POOL LIFE - 7

Why are crabs found under stones?

Why do crabs have pinchers?

Most sandhoppers are found under stones or seaweed. What do you think they are sheltering from?

How does the sea anemone differ from the other creatures in the way it protects itself?

Why must stones and seaweed be put back carefully?

Which of the creatures do you think are herbivores?

Which of the plants or creatures that you have seen in a rock pool could you include in a food chain?

Periwinkles leave muddy trails behind them. What does this tell you about the way they find their food?

Which creatures have to wait for their food to come to them?

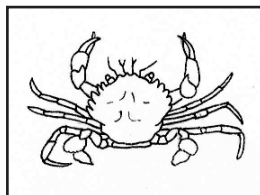
A food chain shows living things feeding on other living things. All food chains start with a plant (producer). Animals are consumers.



Seaweed



Periwinkle



Crab

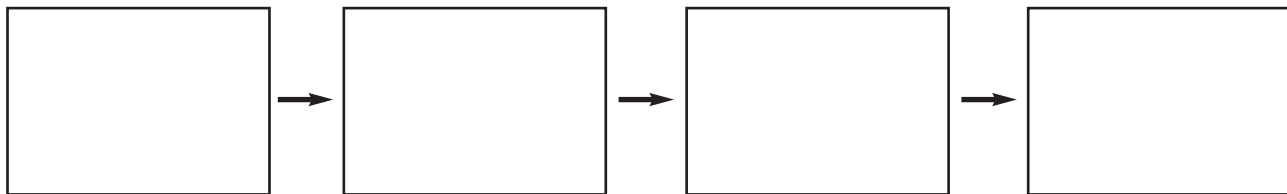
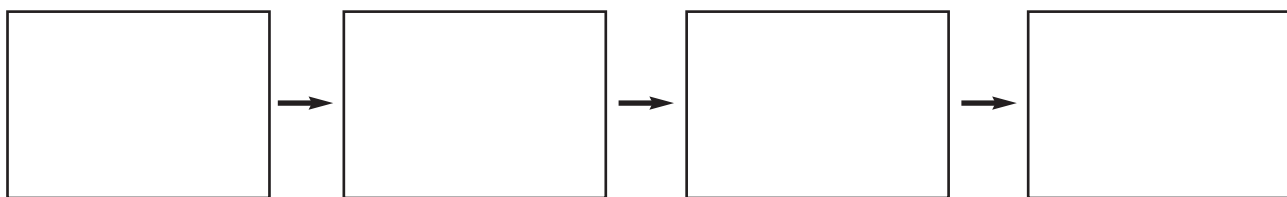
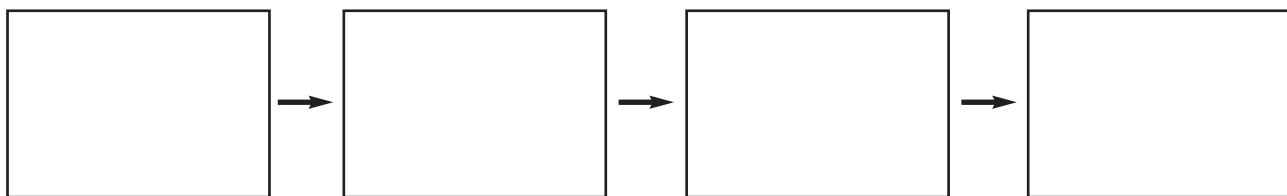


Gull

Each item in a food chain is linked by an arrow. This means "is food for". What does this diagram mean?

~~seaweeds~~ are food for....., which are food for....., which are food for..... .

Now make your own food chains, using information from the fact boxes to help you.



FINDING SEAWEED! - 9A

Which colour of seaweed is found most often?

Which seaweed is found most often: **smooth?** or **bobbled?**

Where is most of the green seaweed found?

Where is most of the brown seaweed found?

Look around the beach

Which colour of seaweed is most common?

Does this vary depending on where you are on the beach?

Which seaweed is most common: smooth or with air pockets?

Does this vary depending on where you are on the beach?

Where is most of the green seaweed found?

Where is most of the brown seaweed found?

Does the type of brown seaweed vary across the beach?

Try to explain your answer.

Are there areas on the beach where there is no seaweed?

Why do you think this is?

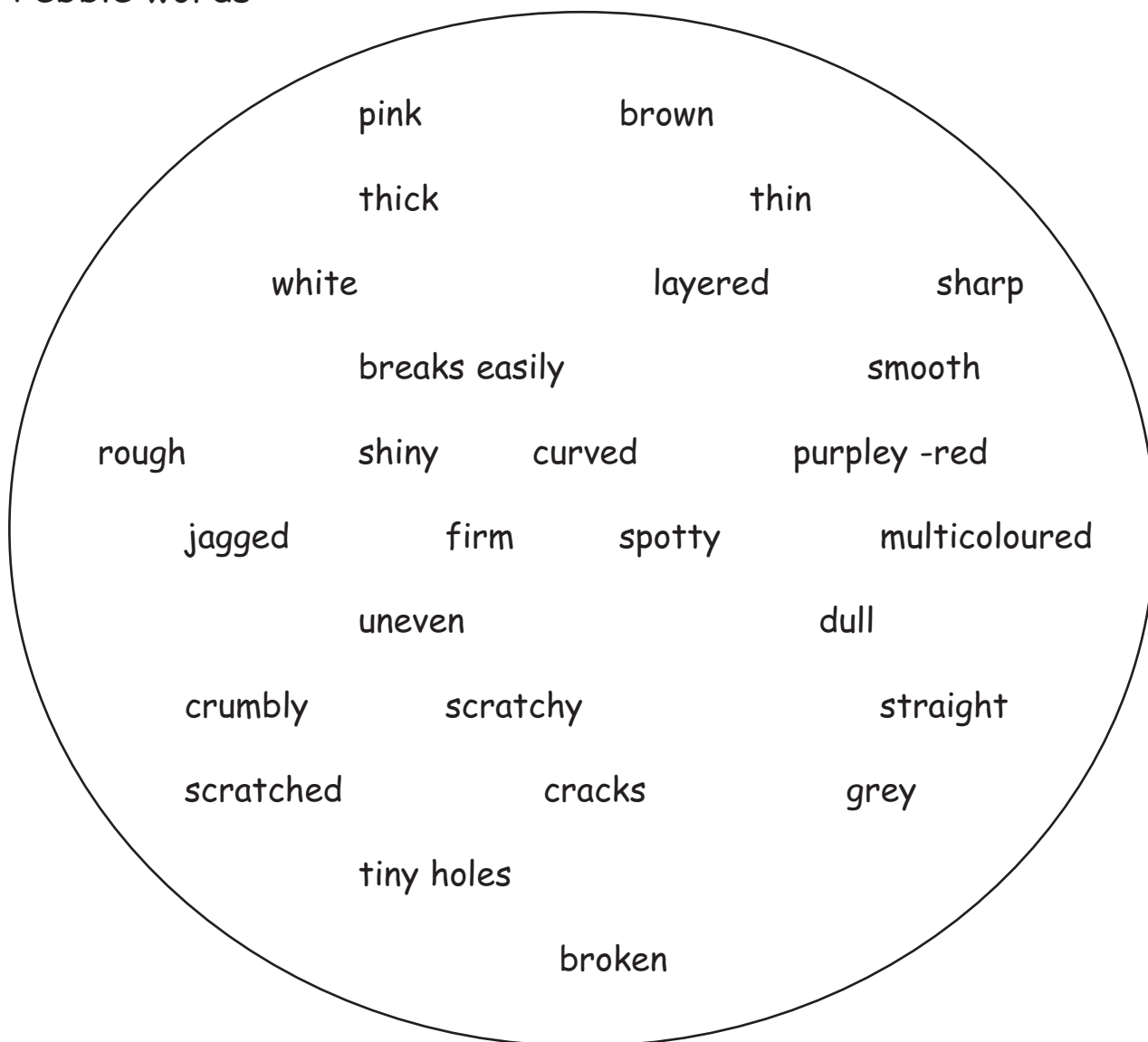
What features of the seaweeds help them to survive:

- when the sea is rough and they risk being thrown around and broken?

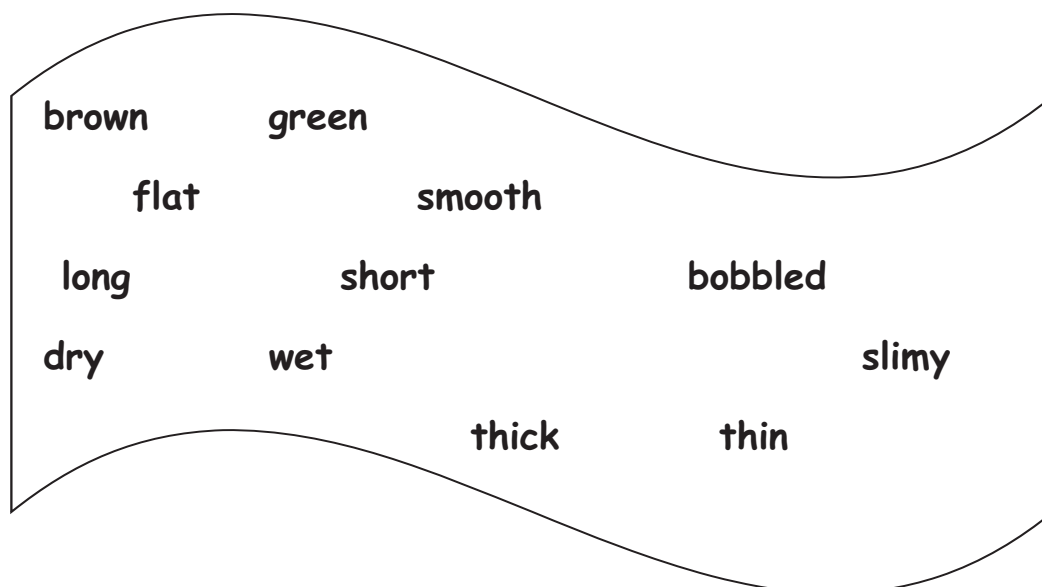
- when they are stranded on the beach at low tide and they risk drying out?

SEAWEED AND PEBBLE WORDS - 10A

Pebble words



Seaweed words



SEAWEED AND PEBBLE WORDS 10B

Use these words to help
you describe the
pebbles.

fine grain pink brown
layered solid fragile
smooth rough curved burgundy
jagged crystals streaks
powdery marbled firm thick lines
spotted multicoloured uneven dull
crumbly scratchy straight
scratched cracks grey
thick white shiny

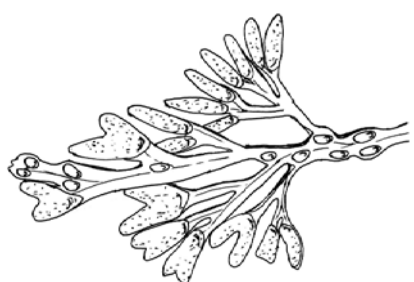
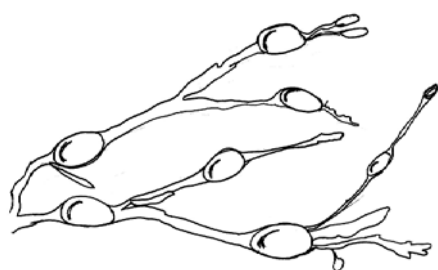


Use these words to help you describe the seaweed.

ridge flat
wispy sharp rough
tubes wet slimy thick thin wavy
branched splits air pouches narrow wide hollow
bendy stiff bright dull stringy
straight curled soft long short bobbled
brown green saw-edged holdfast feathery
sticky paired even
dry leathery
smooth

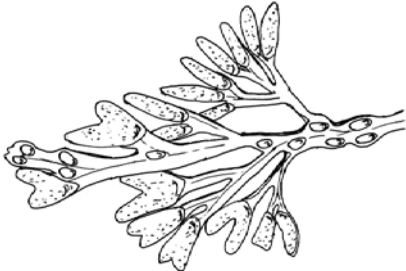
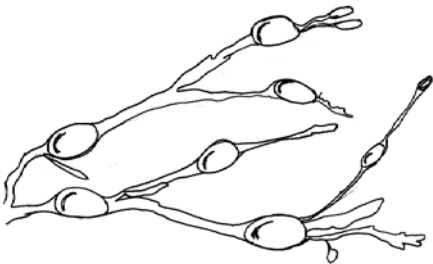


BROWN SEAWEED TALLY CHART 11A

A Tally Chart for Brown Seaweeds

By

Location down Shore	
Name of Seaweed	Tally
Bladder Wrack 	
Knotted / Egg Wrack 	
Flat / Spiral Wrack 	
Saw Wrack 	


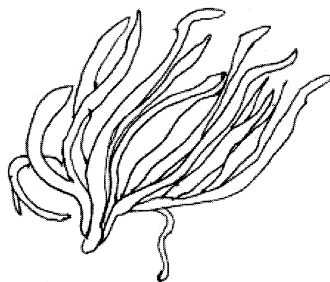
BROWN SEAWEED TALLY CHART 11B

Name of Seaweed	Tally (Tick when seaweed is seen)			Main Location	
	Upper Zone	Middle Zones	Lower Zone	In Rock Pool	On dry Ledge
Bladder Wrack 					
Knotted / Egg Wrack 					
Flat / Spiral Wrack 					
Saw Wrack 					


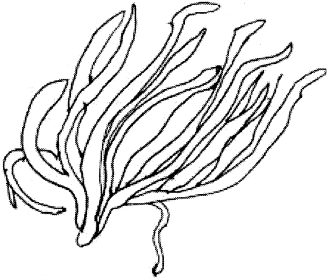
GREEN SEAWEED TALLY CHART 12A

A Tally Chart for Green Seaweeds

By

Location down Shore	
Name of Seaweed	Tally
Sea Lettuce 	
Tube Weed 	
Other green seaweed	

GREEN SEAWEED TALLY CHART 12B

Name of Seaweed	Tally (Tick when seaweed is seen)			Main Location	
	Upper Zone	Middle Zones	Lower Zone	In Rock Pool	On dry Ledge
Sea Lettuce 					
Tube Weed 					
Other green seaweed					

PEBBLES ON THE SHORE 13A

Name: _____

Look at the loose pebbles on the shore

Are the pebbles all the same
SIZE?

What COLOURS are the pebbles?
List all the colours:

Which colour is found most
often?

ROUGH or SMOOTH?
Tick 'rough' or 'smooth' for
each pebble you find.
Total no of pebbles
tested:

ROUGH ✓
Tally

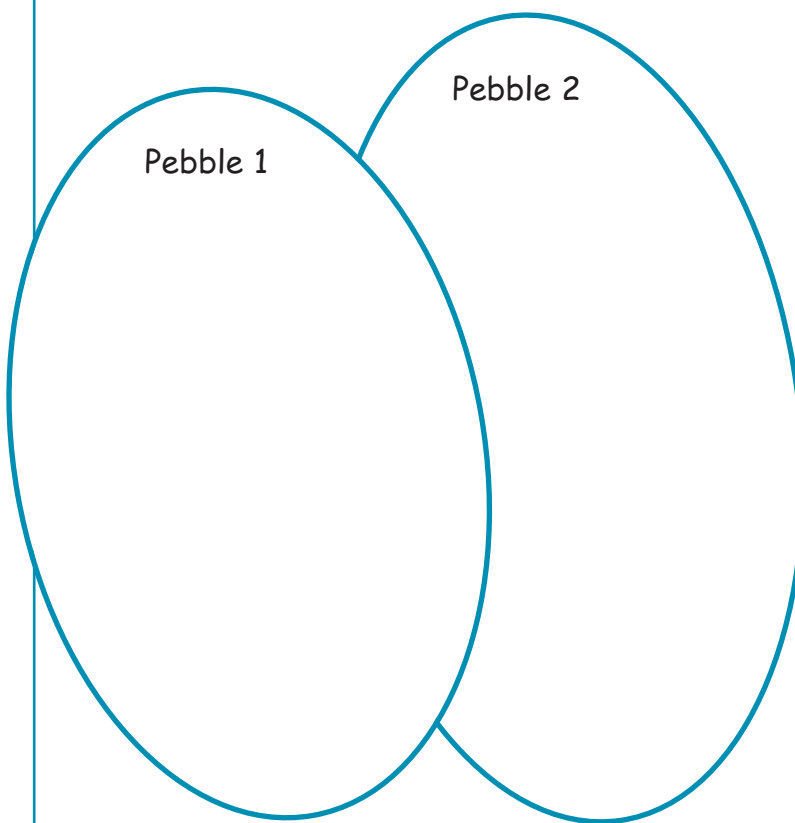
SMOOTH ✓
Tally

TOTAL

TOTAL

This shows that most
pebbles on Kilve Beach are
rough / smooth

Choose two very different pebbles
Make a word list to describe each one.



What other materials can you find on
the shore?

What is the strangest material?

Name:

Which colour is the most common?

Does this vary depending where you are on the shore?

Which type of pebble is most common: smooth or rough?

Does this vary depending where you are on the shore?

Choose two different looking pebbles.

Make a word list to describe each one (use the Pebbles Word list to help you)

1

2

Try to identify the rock from which each pebble was made, using the Pebbles and Rock Key.

1

2

Are there areas on the shore where there are no pebbles?

Why do you think this might be?

In which type of rock are most of the fossils found?

Why do you think this might be?

ROCKS OF THE CLIFFS 14

Name:

PATTERN: What pattern can you see in the rocks of the cliff?

These rocks have been affected by huge earth movements. What signs of this can you see?

COLOURS:

Look low in the cliff, where the sea keeps the rocks layers clean.
What are the two main colours of the rock layers?

COLOUR 1

COLOUR 2

Why are the colours less clear towards the cliff top?

INVESTIGATION: WHAT AFFECTS THE SIZE AND SHAPE OF THE PEBBLES?
Measure 5 pebbles 10 m. away from the cliff and 5 pebbles 30 m. away from the cliff

Pebble no.	SIZE (longest length) cm		SHAPE no. (from the pebble chart)	
	10 m. from cliff	30 m from cliff	10 m. from cliff	30 m the cliff

Do the results show a pattern of change?

Why do these changes happen?

IF IT IS SAFE find the biggest pebble, close to the cliff, and measure it.

SIZE of biggest pebble:
(longest length)

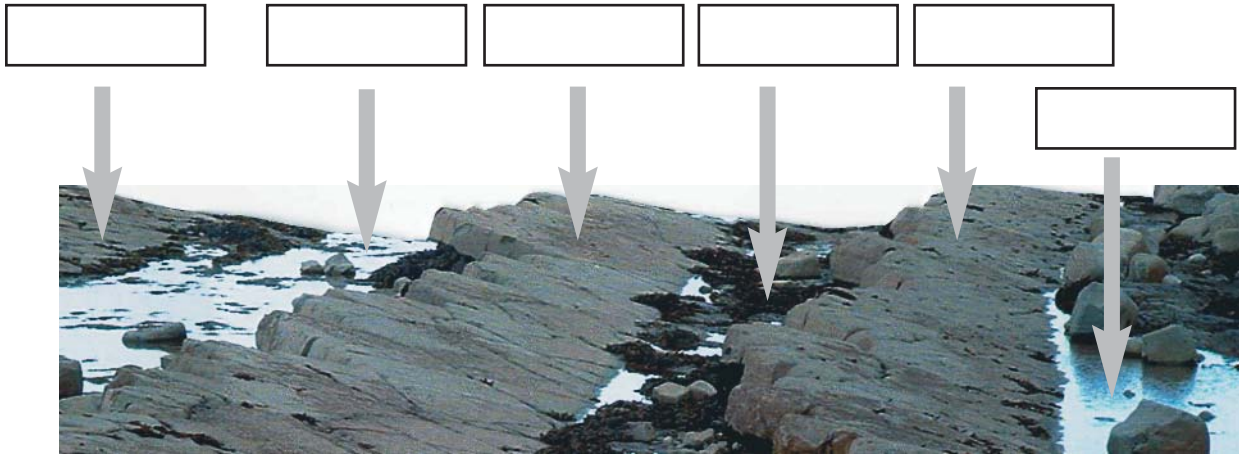
cm

SHAPE of biggest pebble
(use the pebble chart)

Why are the pale grey pebbles so large and so many?

When you walk down the shore you cross layers of solid rock. The rock layers make 'steps' which you step down as you go.

This picture shows the rock 'steps' at Kilve Beach. Write 'hollow' or 'step' in the labels.



At Kilve Beach, the solid rock layers are either

SHALE:
a darker grey,
flaky rock

Or

LIMESTONE:
a pale grey
hard rock

Look at the STEPS

Which rock makes the steps?

Tick ✓

LIMESTONE ☐

SHALE ☐

Why is this?

Look at the ROCK POOLS

Tick ✓

Are the rock pools in the hollows

ALWAYS ☐ SOMETIMES ☐ RARELY ☐ ?

Which rocks do the pools lie on?

LIMESTONE ☐ SHALE ☐ BOTH ☐

Where do the seashore animals and seaweed plants like to live?

	On the steps	In the hollows
Animals		
seaweeds		

Why is this?

These rocky steps and hollows are the stumps of old cliffs

What has worn them away?

This process is called:

DEPOSITION ☐

EROSION ☐

WHEN THE EARTH SHOOK! 16

Name:

Find the part of Kilve Beach shown here



The large slanting crack, F - F , cuts right through the rock layers.

- Choose a rock layer. What happens to it when it reaches the crack?

- How can you explain this?

The rock layers on the left have slipped down compared with those on the right.

- Does your layer bend UP ▲ or bend DOWN ▼ at the crack?

UP ☐ DOWN ☐

- How can you explain the bending?

When rock layers break and move like this, it makes the ground shake.

- What is this called?

A TSUNAMI ☐

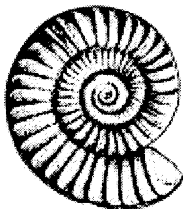
AN EARTHQUAKE ☐

A TORNADO ☐

Name:

Which fossils can you find?

1.



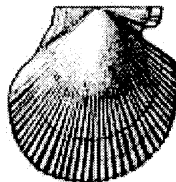
an ammonite

2.



a gryphaea

3.



a bivalve

4.



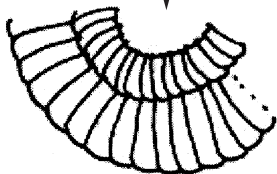
trace fossils

... and where?

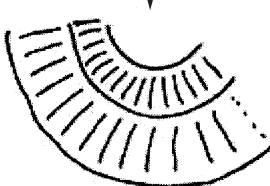
	Fossil 1	Fossil 2	Fossil 3	Fossil 4
On or in solid Rock				
Lying loose				

If you find more than one ammonite, do they all have the same pattern of lines on them?

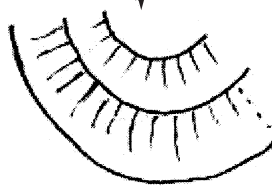
Are they like this?



or this?



or even this?



FOSSIL HUNT 17B

Name: _____

The rocks _____ in the cliff were once layers of _____ !!

The mud lay on the bottom of an ancient _____.

It settled down through the _____ to make layers, one on top of another.

Delete appropriately

So the oldest rock layers are **at the bottom / at the top** .

The rock layers sometimes have _____ in them!

They are traces of _____ which once lived in the ancient sea.

creatures
water
fossils
mud
sea
layers

- Look for fossils. Look at the pebbles, and between the thicker rock layers in the cliff, IF IT IS SAFE.
- Draw your special fossils here or use the back to make a rubbing.

My FOSSIL
by

More facts
about my
fossil:

Name:

Rocks just under the ground are up by the weather.

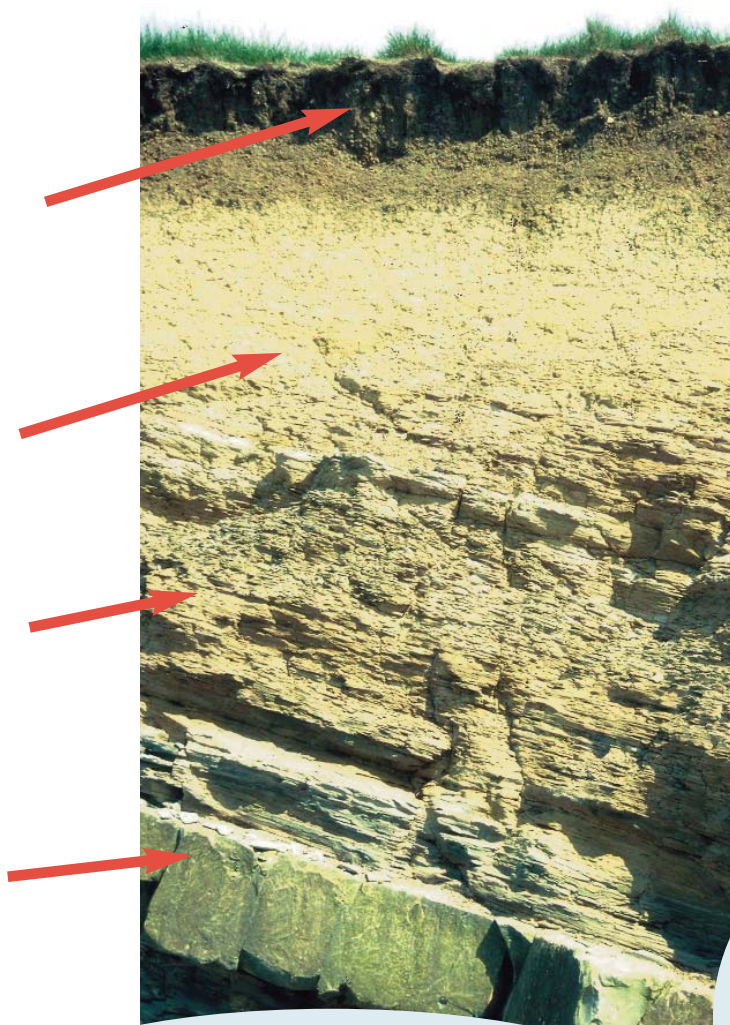
Rain the rocks and makes them crumble.

frost
rots
broken

The low cliff just East of Kilve Pill shows this well and safely.

Match these words to the labels.

solid rock
soil
crumbly rock
broken rock



Soil is a mixture of rock and rotted plants.
What colour is the soil here?

What is growing on the soil
a. 10 m from the cliff edge?

b. 100 m from the cliff edge?

What might eat the plants
a. 10 m from the cliff edge?

b. 100 m from the cliff edge?

What sort of soil is at your school?
Is it the same?

Test the soil with the
Sausage Test or the
Fingers Test (over the
page)

What sort of soil is it
here?

WHAT SORT OF SOIL?- 18 - CONTINUED

Name:



a) The Fingers Test

1. Wet a small ball of soil (with no stones)

2. Rub it between your fingers.

Does it feel smooth and sticky?

→ YES

It is a clay soil

NO

Does it feel very loose and gritty?

→ YES

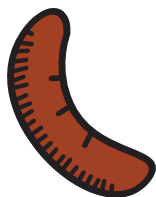
It is a sandy soil

NO

Does it crumble into smaller lumps?

→ YES

It is a loam soil



b) The Sausage Test

1. Wet a small handful of the soil (free from stones).

2. Try to roll the soil into a long sausage shape, about 5-6 mm diameter.

3. What happens? Tick the best description.

a.	Your soil makes a sausage which bends without breaking	<input checked="" type="checkbox"/>
b.	Your soil makes a sausage which begins to crack when you bend it	<input type="checkbox"/>
c.	Your soil makes a sausage which breaks when you bend it	<input type="checkbox"/>
d.	Your soil just about makes a sausage but it crumbles easily	<input type="checkbox"/>
e.	Your soil won't make a sausage, or only with great difficulty	<input type="checkbox"/>

'a' is CLAY soil

'b' is CLAY-LOAM soil

'c' is LOAM soil

'd' is SANDY-LOAM soil

'e' is SANDY soil

(or PEAT if it is black)

My soil is

Name: _____

As the tide comes in it pushes loose bits of seaweed up towards the cliffs.

- Look to see if the bits of seaweed reach the cliffs:

YES ☐

NO ☐

At high tide a rough sea will attack the cliffs and damage them. The sea picks things up off the shore and throws them at the cliff.

- What can a rough sea pick up that will chip away at the cliff?

The sea only reaches and attacks the lowest parts of the cliffs.

- What can you see which proves this?

When the lower part of the cliff is cut away by the sea like this, what happens to the upper part of the cliff?

- Can you spot:
 - a place where the rock, soil or grass has fallen from the cliff? ☐
 - a place where the rock, soil or grass has slipped down towards the sea? ☐

Even a gentle sea will soon wash away the smaller bits from a pile of collapsed rocks, stones, soil and grass

- What is left behind at the foot of the cliff?

SOIL ☐

STONES ☐

GRASS ☐

LARGE ROCKS ☐

OTHER ☐

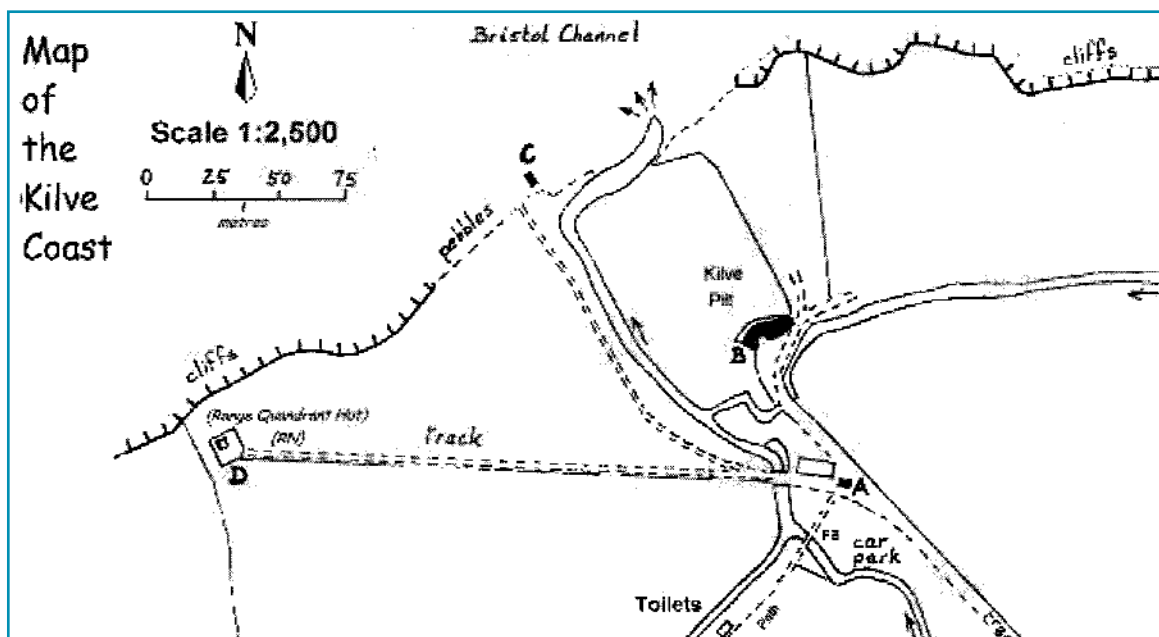
- What will happen as the sea throws more things at the remaining stones?

- Why does the seawater here look so dirty brown?

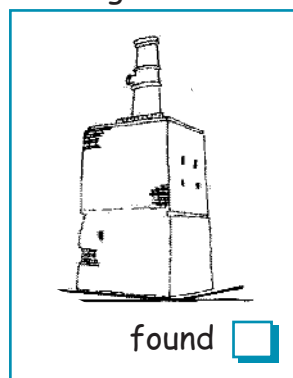
CHANGE: WHERE ARE THEY NOW? 20A

Name:

Map of the Kilve Coast



Building A



1.



- What was this building, at point A on the map? (Look for help nearby!)

2.

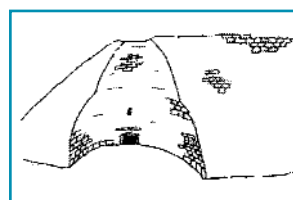


- Label features 1. and 2. on the drawing.

retort (oven)

chimney

Building B



1.



- Find Feature B. It is a ruined lime kiln, in the trees at point B.

People collected limestone rocks from the cliffs. They heated it in the kiln by burning coal. The rocks crumbled into a white powder called lime.

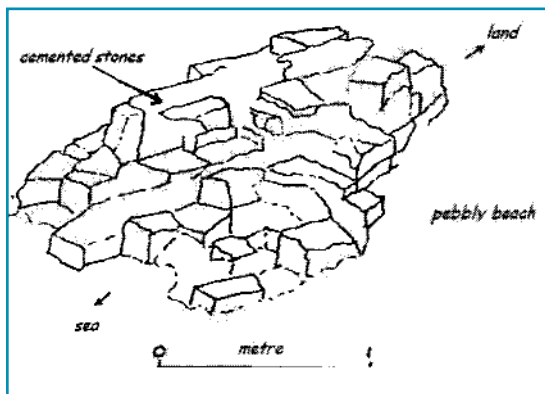
2.



- Why did the local farmers spread the lime on their fields?

Name:

Building C



1. Beach pebbles often cover this ruin at C. It was part of the old harbour wall, called Kilve Pill.
2. People used it to land coal from South Wales.

found ☐

Building D

The Royal Navy (RNs) lookout hut at D has gone, but the path is still there. The map shows the cliff edge about 25 m from the top of the path. Now it is only 8 m.

- What has happened to the cliff?

CHANGE: THREE MYSTERIES 20B

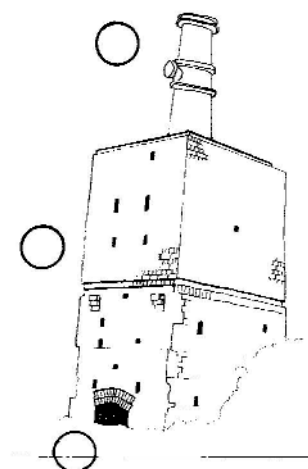
Name:

MYSTERY 1.

The building has a
fireplace, **1** an 'oven' **2** and a chimney **3**

Number these parts on the sketch.

The notice board will help with these questions. Tick the correct answer.



- When was the mystery building probably built?

1924 ☐ 1429 ☐ 1942 ☐ 1492 ☐

- What was heated in the oven?

lime ☐ lunch ☐ shale ☐ bread ☐

- What liquid came of it?

oil ☐ petrol ☐ water ☐ diesel ☐

- What was it?

a beach resort ☐ a school report ☐ an oil retort ☐

- Is it still used? yes ☐ no ☐

- How do you know?

.....
.....

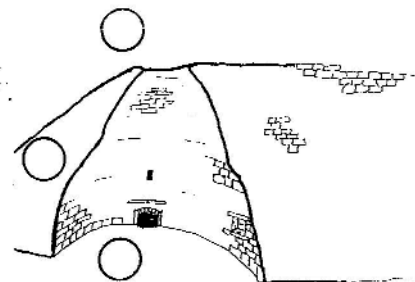
CHANGE: THREE MYSTERIES 20B - CONTINUED

Name:

MYSTERY 2.

This ruin is hiding in the trees down the path to the right of the retort.

It has a fireplace, **1** an 'oven' (behind the stone wall) **2** and a chimney-hole **3**



Number these parts on the sketch.
Can you find the fireplace in real life?

Connect these statements in the right order.

- When the limestone got very hot, it crumbled into white powder called lime.
- They brought the limestone here.
- The lime made the soil more fertile, so the crops grew well.
- Labourers dug limestone out of the ground in local quarries
- They lit a coal fire in the fireplace below the limestone lumps.
- They threw lumps of limestone into the oven through the hole in the top.
- Farmers spread the lime on their fields.
- When it had all cooled down again, they shovelled out the lime powder from the fireplace.

The ruin is:

An oil kiln ☐ a bread oven ☐ a lemon kiln ☐ a lime kiln ☐ a pottery kiln ☐

MYSTERY 3.

Behind the kiln the trees hide a secret hollow!

Clue: It was once where coal from Wales was delivered to heat the retort and the kiln.



Was the hollow:

a lorry-park ☐ a harbour ☐
a train station ☐
a helicopter pad ☐ a car park ☐

Why can't it be used now?

Clue: Look at the seashore end of the trees to find out.

.....

.....

.....

LIKES AND DISLIKES 21A

Name:

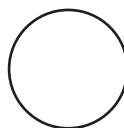
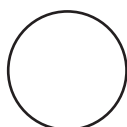
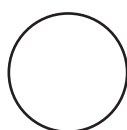
You have seen many things at Kilve seaside.

Think about them quietly.

Draw 😊 faces onto the places you like a lot.

Draw 😐 faces onto the places you like a little.

Draw ☹ faces onto the places you don't like.



How can the 😐 and ☹ places be made better?

.....

.....

.....

.....

QUALITY SURVEY: WISH YOU WERE HERE! 21B

Name:

What sort of place is the Kilve Coast area?

Tick what you have seen here.

Sandy
Beach

Rock
pools

Car
park

Houses

cliffs

Sport

Industry

Farm
fields

Harbour

Animal life

Shops

Entertainment

Woodland




Which is/are there most of?

What can you find that is no longer used?

.....

What does this show about how the Kilve Coast area has changed?

.....

What do you think of this area now? Tick the best face: ✓			
Parking arrangements			
Litter: car park			
Litter: beach			
Toilets			
Shopping and entertainments			
Things to do			
Safety			
Noise			
As a beach to visit			

If you came back here in 10 years time, what changes might you see?

Would you be pleased?

APPENDIX 1 - FIELD SKETCHES

Using Field Sketches

The use of field sketches is a very handy geographical skill to introduce and develop through school life:

- for quickly summarising (part of) a visit either on the spot or back in school;
- as a class or personal revision tool for class work or test.

A field sketch is not a detailed work of art.

It is a simple outline drawing (and may be prepared from a photo!) to which key words are added to indicate the main geographical features.

Word 'labels' are added only round the margin of the sketch and in a radial pattern so that the sketch is not obscured.

To save drawing time some features may be shown by using symbols.

The finished item should be given a title (where, what, and direction of view) and date as well as the recorder's name.

A field sketch is used, with appropriate discussion, help or guidance.

- to encourage observation,
- to introduce / use relevant geographical terminology,
- to create a pictorial record, with notes, of things seen,
- to encourage recollection of geographical features.

A progressive sequence of uses, according to age, ability, experience, practice needed, might be:-

1. A black and white copy-print of photo with a list of key words to add on numbered lines or to number appropriately (e.g. figure A).
2. Outline sketch with a little 'symbolic' detail. Label with words from a list, as above.
3. Outline sketch with a little 'symbolic' detail. Label, selecting words from a wider, general list, or from discussion on the spot (e.g. figure B, and list).
4. Outline sketch symbolically detailed to indicate each of a key list of features. Add feature descriptions to list to produce a key (e.g. figure C).
5. Outline sketch or basic photo only. Add selected detail and label appropriately.
6. Produce own labelled sketch of a restricted location and number of features.



Site to be sketched: Kilve Beach

APPENDIX 1 - FIELD SKETCHES - CONTINUED

Field Sketch A

Title: _____

Name: _____

Date: _____

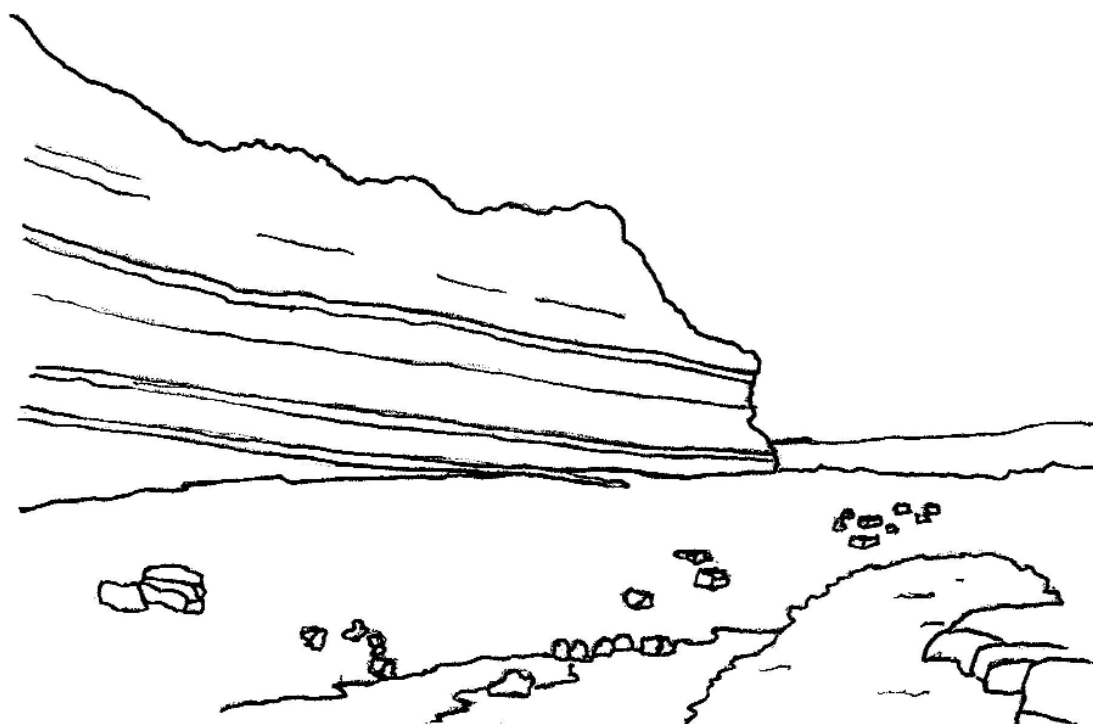
Feature	Number
Cliff	
Pool	
Pebbles	
Sand	
Seaweed	
Danger area	



Field Sketch B

Title: _____ Name: _____

Date: _____



APPENDIX 1 - FIELD SKETCHES - CONTINUED

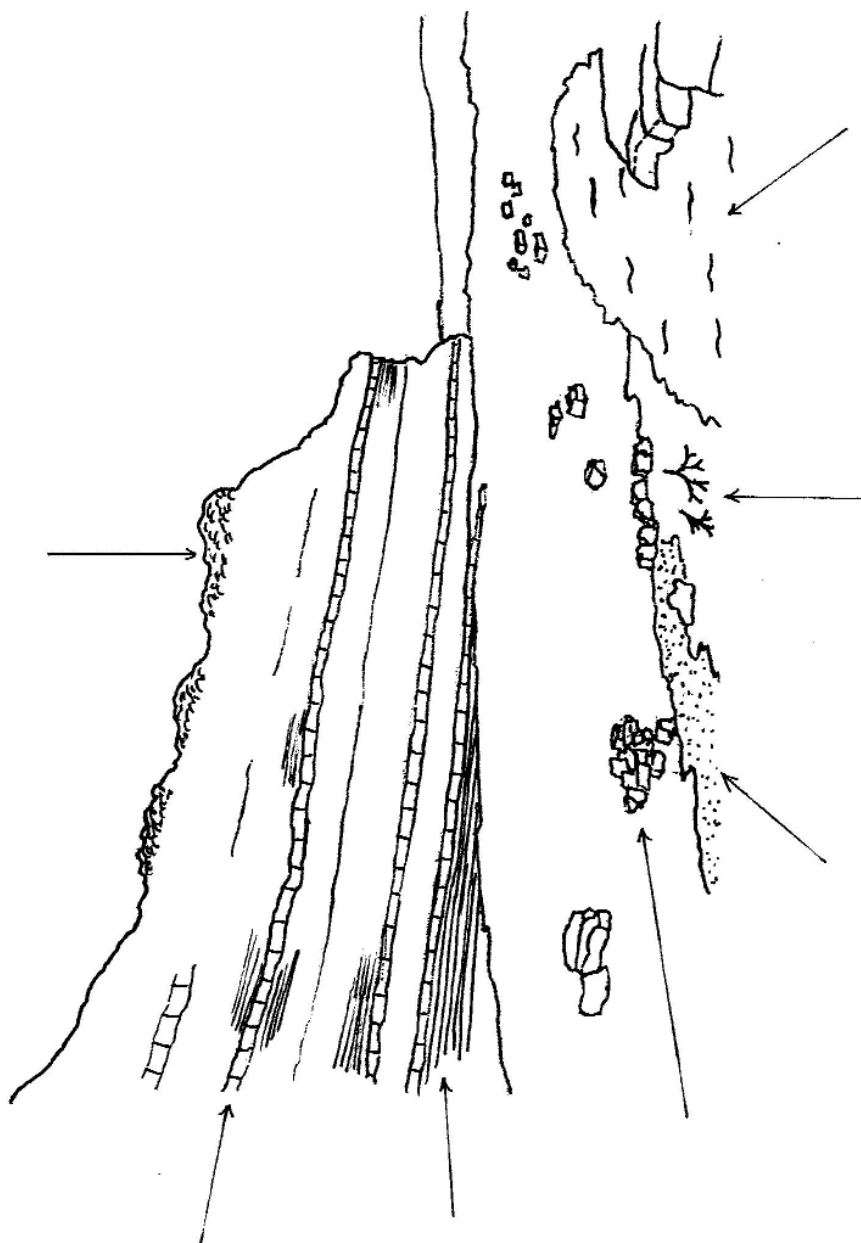
Field Sketch C

KS2 GEOGRAPHY and SCIENCE.

Name: _____

Date: _____

symbol	feature
	(bushes)
	(limestone rock layer)
	(shale rock layer)
	(sand)
	(seaweed)
	(pool)
	(stones; angular pebbles)



Cliff and upper shore near East Quantoxhead (map ref. ST 14.54-45),
Looking West.

APPENDIX 1 - FIELD SKETCHES - CONTINUED

SOME WORDS FOR LABELLING FIELD SKETCHES

cliff	flat	lines	rock	rough
pebbles	smooth	steps	sea	stripes
steps	layers	mud	stream	spots
waves	sand	high	holes	sky
low	hard	grass	tide	soft
beach	tree	building	seaweed	stones
pool	gentle	steep	wave-cut platform	

APPENDIX 2 - EARTH SCIENCE

‘Kilve, thought I, was a favoured place’

(William Wordsworth)

EARTH SCIENCE

1. Background Information.

- a) Safety.
- b) Coastline and Coasts.
- c) Cliffs.
- d) Shore.
- e) Beach.

2. The Cliff line at Kilve.

- a) General features.
- b) The rocks.
- c) Cross-cutting lines.
- d) White lines.

3. Kilve Shore features.

- a) Patterns.
- b) Up-folds and down-folds.
- c) Shore profile.

4. Kilve Beach.

- a) Strangers on the shore.
- b) Sea-shore life.

5. Weathering and Soil.

- a) Weathering.
- b) Soil.

6. Fossils.

- a) General information.
- b) A Fossil hunt?
- c) Removing fossils.
- d) The common fossils.
- e) Less common fossils.
- f) Trace fossils.

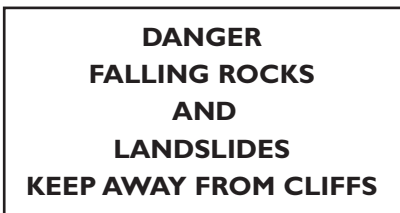
7. The Wider Picture.

EARTH SCIENCE

I. BACKGROUND INFORMATION

‘Oh I do like to be beside the seaside....’, but....

a. Safety



This sign at Watchet, West Bay, is a reminder of the potential dangers of any cliffed coastline. Be aware of them, assess them and give appropriate warnings. However with suitable care much useful, interesting and enjoyable work can be done safely on a rocky coast.

b. Coastline and Coast

The **COASTLINE** is literally the edge of the land: At Kilve this is the cliffline.

COAST is a term applied to that strip of land on either side of the coastline which is significantly affected by the sea. So it includes the seashore but extends inland to include features which depend on the sea-side location, e.g. harbour, resort, industry, vegetation.

c. Cliffs

(i) Why are there cliffs?

The water of breaking waves at the highest tide wears away the coastline.

It does this in 3 main ways:-

- by its own powerful impact which compresses air explosively in cracks;
- by bombarding the base of the cliff with pebbles;
- by a dissolving action.

These processes which also involve the removal of the resulting rock debris are known collectively as **marine erosion**.

(ii) The **HEIGHT** of cliffs depends on the height of the ground along the coastline.

(iii) The **vertical shape** of the cliffs (the **CLIFF PROFILE**) often depends:-

- (a) on the hardness of the rock(s) in the cliff, and/or
- (b) on the angle of slope (dip) of any layering of the rocks.

In practice many cliff faces are irregular because of:-

- variations in hardness of the rock layers; and
- the undercutting action of the sea at the cliff base.

This undercutting forms a **WAVE-CUT NOTCH**.

The notch may not always be obvious because the cliff above it keeps collapsing.

(iv) In **PLAN** the outline of a coastline is mainly due to variations in rock hardness along the coast.

Hard massive rock is cut back slowly by the sea and projects into it as a headland.

Softer or more broken rocks erode more rapidly and form bays.

APPENDIX 2 - EARTH SCIENCE - CONTINUED

d. Shore

This is the area sloping down gently to the sea and over which the tides advance and retreat twice a day.

The rocks underlying the shore are the eroded stumps of old cliff lines. Over centuries they have been cut back under the relentless attack of the sea's waves. **A WAVE-CUT PLATFORM** remains.

Detailed irregularities across the slope of the sea-shore depend on the hardness and arrangement of the rocks underneath it.

e. Beach

- (i) **The beach** is the superficial material lying on the shore, so a stony beach, sandy beach, muddy beach, etc.

These materials are broken fragments coming from either:-

- the wearing away of the cliffs by the sea, or
- the wearing away of the land by rivers running into the sea.

This means that:-

- some fragments will match the rock in the local cliffs, and
- some fragments will not because they have come from other places.

This may be because a river has brought them there or because the sea has washed them along the coast from another beach, or both.

LONG-SHORE DRIFT is the name given to the latter action.

(ii) Rounding and Grading

The majority of fragments will have come from the crumbling local cliffs. The freshly fallen blocks of rock will be angular and often relatively large.

As the sea attacks them the blocks are moved around and hit each other. This will chip off their corners and make them rounder (see Info 4).

They also become broken into smaller and smaller pieces. The smaller the pieces the easier it is for the sea to move them. As a result the beach often shows a general grading of rocky material from coarse near the cliffs to fine close to low-tide levels.

The finest material, the mud grains, may float in the water for a long time and so causes the brown appearance of the sea.

2. THE CLIFFLINE ROCKS AT KILVE

(a) General features

The cliffs are strikingly layered.

Most of the layers are either bands of thinly layered dark grey **SHALE** (this rock is less hard than slate), or of more thickly layered pale grey **LIMESTONE**. This rock is quite hard to break.

Beware! Both rocks are naturally shades of grey but the presence of some iron can give a rusty yellow-brown colour on exposed surfaces. This may make the rock look like a yellow sandstone.

Always look at the inside of a freshly broken piece of rock to judge its true colour! See also the 'rock key' for identification checks.

Both types of rock may contain fossils (see sections 6 and 7) and were laid down as soft sediments on the floor of an ancient sea. The upper surface of each layer, however thin, was once the floor of that sea.

(b) The rocks are in alternating layers

- **SHALE** was once very thin layers of mud which pressure has hardened into rock. The tiny mud particles must have floated out from distant land and settled to the bottom of quiet water. The darker the shade of grey then the more decayed plant or animal material there is in it. Oil can be found in this material and there is sometimes an oily smell to a freshly broken bit of the darkest shale. The thinness of the individual shale layers (1mm. or less) makes the rock weak.
- **LIMESTONE** A thicker layered muddy sediment rich in lime (calcium carbonate, CaCO_3). The lime probably formed in shallower water under the influence of a warm, evaporating, climate and low rainfall. It acts as a cement and makes these layers quite hard. It also makes this rock a paler shade of grey. The rock has a smooth broken surface.

(c) Lines cross-cutting the layers

The rock layers are often broken into roughly rectangular blocks by cross-cutting cracks. These fractures result from the strains and stresses caused by earth movements after the layers were hardened into rock.

(i) If the layers remain continuous, though cracked across, the fractures are named **JOINTS**.

(ii) Sometimes the layers do not carry on directly across a larger crack. They have been displaced and replaced by another set of layers. The two sets of layers do not match directly because there has been a sliding movement up or down on either side of the fracture. The sliding movement usually bends the ends of the rock layers **up** (on the down-slid side) or **down** (on the up-slid side). The type of fracture is known as a **FAULT**.

A fault marks a line where an earthquake once occurred!

(d) White lines'

...and no parking tickets!

Joints and faults in the solid rock may be filled with a white crystalline mineral.

In the grey rocks of Kilve this will be made of **CALCITE** crystals (calcium carbonate, CaCO_3 , the same mineral as stalactites and stalagmites are made of). See also section 4 and Part D.

The white lines are named **VEINS**.

These crystals have grown out of watery solutions which seeped along the fracture lines when the limy rocks were buried. The water later evaporated. These crystals can be scratched by a coin, carpenter's nail or a knife. (See the 'local pebbles' key in Rock Activities for identification checks).

3. KILVE SHORE FEATURES

'On Kilve's smooth shore, by the green sea' (William Wordsworth).

- The alternating dark shales and paler limestone bands make **sweeping patterns** of lines and curves across the shore.
Sometimes they are abruptly terminated by cross-cutting fault lines (ref.2c (ii)).
- The curves were formed where the rock layers bent (rather than broke) in response to earth movements. Similar curves also show in the cliffs as **up-folds (anticlines)** and **down-folds (synclines)**.

APPENDIX 2 - EARTH SCIENCE - CONTINUED

- (c) The **profile of the shore** is markedly stepped or saw-like. The harder limestone forms the **STEPS** (the risers), while the softer shale is worn into **HOLLOWS** (the treads) where pools of water lie. Most of the seaweeds and many of the seashore creatures are found in these wet hollows.

4. KILVE BEACH

(a) 'Strangers on the shore!'

Many stony fragments of the beach will not match the rocks of the local cliffs. They have been brought naturally from Exmoor cliffs by marine erosion or from the Quantock Hills by river erosion.

Because they have travelled some distance and been knocked around a lot they will have become well rounded.

- A common one is dull reddish-grey or brown and very hard. It is named **OLD RED SANDSTONE**. Its coarse grains of sand are usually clearly visible, especially on a freshly broken surface.
- Another stranger is another white crystalline stone. This one is very hard, unlike the local calcite crystals (see 2d). It cannot be scratched when tested with a coin, carpenter's nail or knife. It is the mineral **QUARTZ** (silicon dioxide, SiO₂). Good, very small, crystals of quartz are used in quartz watches and clocks. See Info sheet 5.

All sorts of other 'stony' bits may be found on the beach, mostly from dumped rubbish or broken sea defences, e.g. concrete, brick, tile.

- (b) **Sea-shore life** is much more varied than may at first appear.

Please see Appendix 3 (Natural Science) for detailed information and some possible investigations.

5. WEATHERING AND SOIL FORMATION

'Change and decay in all around, I see'

*'And now there came both mist and snow,
And it grew wondrous cold' (S.T. Coleridge)*

(a) Weathering.

This is the name given to the effects of the weather on solid rocks especially on the land. It concerns their disintegration and decay. This process should not be confused with 'erosion' which involves the removal of already broken fragments.

Weathering operates on rocks in the ground and in buildings.

The aspects of the weather especially involved are sun, frost and rain.

- SUN.** Daily temperature changes cause rock, and the grains which make it, to swell (expand) and to shrink (contract) minutely but quite regularly. The strains set up can eventually break the rock into smaller and smaller pieces.
- FROST.** The freezing of water causes it to expand by about 10%. If it is trapped between the layers or grains of a rock, this swelling will push the rock apart. Repeated freezing and thawing will eventually shatter it. Farmers use this process when they plough sticky clay soil in the autumn and leave the lumps to crumble by the effects of the winter frosts. The growth of plant roots can have a similar effect.

(iii) **RAIN**, especially acid rain, causes chemical rotting of the minerals in the rocks.

One common effect is the rusting of iron. Many rocks contain some iron and its change to crumbly iron oxide in damp air gives it the rusty brown crust seen on an old scratched car or a bicycle wheel. This process is most effective on rock surfaces where damp air (with oxygen) can reach. Of course it changes the outside colour of the rock affected (see also 2a).

The results of the weathering processes are to produce a layer of broken rock debris over the parent rock beneath and coating the whole land surface.

(b) Soil

i. 'All flesh is grass'.

Soil supports the plant life on which all creatures depend.

It is a thin but variable mixture of weathered rock and plant and animal remains. At any place its fertility is determined by the particular composition of that mixture.

The soil is a very fragile layer, easily stripped away by wind, rain, flood and ice, or rendered worthless by over-use, lack of replenishment or poisoning by contamination.

Continual treading on a pathway soon wears the soil away too.

ii. 'Digging deeper'

The formation and nature of this vital layer is conveniently seen in the low cliffs of the shore immediately right (East) of the Kilve stream.

- Looking slowly upwards from the solid 'parent' rock at the cliff base the rock layers are seen to become opened up, broken, softer and less clear. These effects are all due to weathering (ref. 5a)
- Towards the cliff top the layers can't be distinguished at all because the rock material has become a soft, grey-brown crumbly mass. It is very well weathered. In wet weather it becomes a sticky clay. This is the sub-soil.
- Close to the cliff top, under the grass, this material is a darker brown. It is darkened by the mixing in of rotten and rotting plant and animal remains from the grassland on the top. This is the top-soil and it is the most fertile part. The burrowing of animals and plant roots helps to mix up, aerate and drain this layer.

The whole pile of material from the parent rock to the vegetation base is known as a **SOIL PROFILE**.

6. FOSSILS

'Let the waters bring forth abundantly the moving creature that hath life' (The Bible).

(a) General information

'A Jurassic Park?'

The impressions or remains of some very ancient forms of life are preserved in the rocks along the Kilve Coast. These traces are known as **FOSSILS**.

Usually their shape is preserved as a stony print or in-filled as a solid stony or crystalline cast.

Most of these fossils were parts of sea animals, only a very few are plant remains. This suggests that when the animals were alive and the rocks were forming as soft muds, the whole area was covered by

APPENDIX 2 - EARTH SCIENCE - CONTINUED

an ancient sea with bits of driftwood floating out from a distant land area or islands.

This area was not a 'Jurassic Park' - more a 'Jurassic Pond' (but a very large one)!

Most of the things represented no longer exist.

(b) A fossil hunt!?

Firstly, remember not to hunt below potentially dangerous cliffs or where an incoming tide might cut you off. Nobody wants to find you fossilised!

A fossil hunt is fun, and can be rewarding, but finding fossils is not easy because they are usually still enclosed in the rock. However, careful looking along the surfaces of the rock layers or blocks will often reveal some.

- Fossils in the shale were usually crushed flat as the soft muddy layers had the water squeezed out by new layers settling on top. This rock splits easily but the thin layers may crumble easily too. Sometimes the fossils are harder than the shale and they can be found lying loose amongst the small broken rock remains.
- In the limestone the fossils are of much better shape because the lime helped the layers to set hard quickly. However that hardness can make it hard to get the fossils out!

With careful searching the animal fossils are often clearly recognisable by their shapes or the patterns on them. As usual 'practice makes perfect' - but there is still an element of luck.

(c) Removing fossils is permissible if they are loose and thus in danger of being smashed by waves and pebbles. Otherwise 'finds' will have to be recorded by rubbings, drawings or photos - especially if they are in a large lump of rock!

Flying bits of sharp rock make it dangerous to try using a hammer. Please don't.

This area is internationally important for its rocks and fossils.

Any particularly good fossils, or ones different from those described below, should be shown or mentioned to any expert you can find, e.g. via the local museum, the Quantock Rangers or Kilve Court. They would rarely wish to add them to a museum collection, but to know of them and where they were found can be helpful.

You never know - surprises sometimes turn up and several fossils have been named after their amateur discoverers, children as well as adults!

(d) The common fossils.

'Bringing life out of death'.

Sizes are indicated by centimetre scale lines.

For additional details see Info sheets 6 & 7.

(i) AMMONITES. ('Saint Keyna's Serpents').

These are the main fossils found here and easily recognised by their flatly coiled, round shapes (when complete).

They are not all the same; note the differing patterns on each ammonite in the photographs.

It was traditionally thought that St. Keyna (of Keynsham) turned a plague of snakes to stone ('snake stones')! In fact they were tube-shaped sea shells with an octopus-like creature living in the outer, widest part of the coil.

(ii) BIVALVE SEASHELLS.

They come in a variety of shapes and sizes but are clearly seashell shaped, i.e. roughly oval like mussel shells. In life, two similar 'valves' (shells) fit together to make the whole seashell. This protects the soft animal inside.

As fossils the valves are normally found separated. The outsides of these fossils usually show a pattern of fine lines, either fanning out from one end (radial) or roughly circular, like spreading ripples (concentric). The former are corrugations to strengthen the shell; the latter are growth lines.

The insides of the fossil are usually full of grey rock (once a mud) which got there when the soft, dead animal rotted away and left a space to be filled. When only the inside is visible it is often just the outline of the fossil shell valves which shows up.

(iii) OYSTER SHELLS: GRYPHAEA ('Devil's Toe Nails')

These were also bivalve seashells but look so different that they are noted separately.

In life, one of the two valves becomes very curved and thick, the other almost flat and fitting like a hinged lid. As an adult they lived on the sea floor and so the curved shape helped to keep the creature inside just clear of the muddy bottom. Legend has it that the curved, claw-like, valves were once the Devil's toe nails!

(e) Less common fossils (or less easily noticed!)

(i) BELEMNITES ('Thunder-bolts')

These fossils are bullet-shaped, about the size of the end of a rounded, pointed pencil.

In life the broad end was hollow and, as with an ammonite, had an octopus-like creature living in it. In fossils the hollow end is usually crushed or missing.

They were once thought to be 'bullets' fired when lightning flashed from a thunder cloud!

(ii) BONES (of 'sea monsters').

Odd bits of the skeletons of ancient marine reptiles may be spotted. Most likely are (part of) an elongated limb bone or a thick rounded disc, a vertebra.

Very rarely several may be found together or even as a part skeleton. There is a fossil Ichthyosaur ('fish-lizard') on the floor of Stogursey church and a Plesiosaur ('nearer-to-a-lizard') in Taunton Museum; both found locally.

These carnivorous reptiles were strong swimmers. Their fossilised droppings contain bits of the fish, ammonites and belemnites which they hunted.

(iii) CRINOID STEMS ('sea lilies').

Small bits of these animals sometimes show up as white shapes on larger lumps of grey rock. They may be short lengths of their straight stems or star-shaped cross-sections.

They get their nickname from the flower-like shape of the whole creature.

(iv) GASTROPODS ('sea-snails').

These coiled but cone-shaped fossil snail shells are rare and easily missed amongst the smaller rounded pebbles.

APPENDIX 2 - EARTH SCIENCE - CONTINUED

(v) **PLANT FRAGMENTS.**

Occasionally dark pieces of woody-looking stem or branch show up in the grey rocks. The wood may be preserved as coal and/or show a fibrous structure.

As they are found in what was a muddy sea floor sediment, they must have been waterlogged bits of driftwood.

(vi) **SEA URCHIN SPINES.**

The short needle-thin spines of fossil sea urchins (echinoids) may be seen rarely.

The soft bodies of these small creatures were armoured by a rounded shell of many pieces. The surface of their shell carried an array of sharp, defensive spines. The shell breaks up when the animal dies and rots away; the hard shelly bits and spines then get scattered over the sea floor.

(f) **Trace fossils.**

'Oh no they're not!'

No, these are not the actual remains of a once living creature, but evidence that one (or more) had been around.

The most common example at Kilve is the network of tubular markings seen on the surface of many of the grey rocks. These were the burrows of creatures which scavenged on sea-floor debris.

The burrows show-up because they were filled with mud of slightly different colour after the creature(s) had passed through.

Footprints could be another trace fossil but not here. All the fossil evidence (above) is that this area was under the sea.

The current scene at Kilve is just the latest stage of a long-running saga; the most recent frame of an historic cine film.

7. THE WIDER PICTURE.

If you have got this far you will know that the constant theme running through all the information about the Kilve rocks and fossils is that they were formed in or lived in sea water and a long time ago.

The same rocks and fossils are also found many miles from any modern sea - in central Somerset, in the English Midlands, North Yorkshire, Switzerland and even the Himalayas, for example. Their sea was another much, much, older sea or ocean, about 200 million years old in fact.

The number and variety of fossils found over many years indicate that this ancient ocean was full of life. Of course not all the creatures which once lived are found. Can you think of one or two reasons why?

These sea-creatures were alive when there were dinosaurs on land elsewhere; they are of Jurassic age. The indications are that the climate was probably sub-tropical (ref.2 b).

From the evidence which is available at Kilve it is possible to picture what this area of Somerset looked like in Jurassic times. (See 'INVESTIGATING FOSSILS').

NATURAL SCIENCE OF THE KILVE SHORE

'I thought of Kilve's delightful shore' (William Wordsworth).

1. Background information

- a) The nature of the sea-shore.
- b) Tides.
- c) The pattern of shore life.
- d) Dangers and difficulties.

2. The Living Sea-shore

- a) Sea plants.
- b) Sea creatures.

3. Dipping Deeper.

I. BACKGROUND INFORMATION

a) The Nature of the sea-shore

The sea-shore is usually the richest hunting-ground for animals that there is and the only place where their way of life is unaffected by people.

Exploring it can be exciting and instructive.

But first it's necessary to pick a time when the tide is out or going out!

This also applies to the planning and 'health-and-safely check' stage necessary to establish suitable rules for a safe and enjoyable visit.

b) Tides

The tide ebbs and flows (retreats and advances) across the shore twice a day, each time about 45 minutes later than before. Remembering that the moon rises later each day by about the same amount gives the key to the fact.

Tidal movement is caused by the gravitational attraction of the moon on the great mass of mobile sea-water. The sun also attracts the water similarly. So every two weeks when it, the moon and the earth are in line the two effects work together and cause the highest tides ('spring-tides').

A week later the sun and moon are at right angles to each other relative to the earth and their two attractions nearly cancel each other out; the high tides are much lower ('neap tides').

c) The pattern of the shore life.

The tidal movement makes the sea-shore a strange and difficult place for sea life, part of the time land and part of the time sea. The life-forms, which came from the sea originally, have had to adapt themselves to survive the dangers of the twice daily exposure.

Of course the length of time for which the shore is exposed to the air varies from most of the time on the upper shore to a short time on the lower part. The plants and animals are therefore different, or differently adapted, across the shore; they and the beach can be zoned.

In practice the zone boundaries will be blurred. The zones will probably be indicated more by concentrations of particular plants or animals at particular beach levels, rather than sudden changes.

Because of the gentle slope of the mid-shore at Kilve its Middle Shore zone is about twice as wide as each of the other zones.

APPENDIX 3: NATURAL SCIENCE - CONTINUED

d) Dangers and difficulties

The especial problems faced by sea life on the shore are:

- drying out, caused by sun or wind.
- being eaten by air or land-based predatory animals, e.g. seagulls, foxes, humans.
- damage from breaking waves and rolling stones.
- the changes between the sea's salt-water (and its food) and the fresh-water of stream or rain.
- human interference.

Disturbance and collecting should be kept to the minimum.

Live creatures must be treated carefully and not removed.

Shore life has developed a variety of protective responses to survive:

- Seaweeds are generally tough and leathery. Some having float bladders on their fronds to buoy them up in rough water. They are firmly anchored by a 'hold-fast'.
- Molluscs and marine worms grow or construct shelter in the form of shells and burrows in sand or rock.
- A few animals have colours or patterns which give some protective camouflage.
- Many creatures use the shelter of rock crevices, or hide under rocks and seaweeds. All these sites also remain moist.
- Retaining moisture in their shells or bodies helps some creatures to survive.
- Sea-water pools usually offer a micro-marine refuge, with some of the other protective features.

It may be tempting to make a salt-water aquarium at school. That is difficult. The salt in the sea is a mixture of many common chemical 'salts', of which common salt is about three quarters. Lime, for instance, is needed to build and repair shells.

The sea water also contains a variety of plant and animal life, large and minute, living and dead, which forms part of the necessary food chain. Recreating and maintaining the right balance needs careful and constant attention.

2. THE LIVING SEASHORE

'Yea slimy things did crawl with legs upon the slimy sea' ('Ancient Mariner', S.T. Coleridge).

- a) Sea plants are usually algae; they have no flowers but regenerate by spores. Most are microscopic but enormously abundant and are the basis of all animal life in the sea.

The larger kinds are the seaweeds, or 'wracks', characteristic of the shore and shallow water where there is enough light for their growth. The mud-clouded waters of this coast are not helpful.

They all contain chlorophyll, the green pigment which uses the sun's energy to make their food, but its colour may be masked by other pigments. So there are brown seaweeds, some pale green ones, and a few red ones.

All live firmly anchored to rock or stones so that they don't often get washed away. The point of attachment is known as a 'holdfast'! (See also Info Sheets 2 and 3)

From the sixteenth century to the nineteenth century, all along this coastline the seaweeds were burnt to provide potash for local land manuring and for glass manufacture in the Bristol area.

Looking out over Kilve shore, from land or sea, the seaweeds are not immediately obvious. They are often in the more sheltered hollows.

The following ones are always present.

THE BROWN SEaweEDS

The brown seaweeds at Kilve show a regular distribution pattern across the shore zones.

- (i) On the upper shore the short, narrow and leathery fronds of the **FLAT (or spiral) WRACK** are able to survive long periods of dryness. Battering by breaking waves is reduced by the small surface area. Spotty pods on the ends of the fronds contain the spores which are released, when ripe, to grow into the next generation.
- (ii) The middle shore has two brown flexible wracks whose fronds carry smooth float bladders as well as the spotty spore pods on the ends. These enable them to rise with the water and so to survive the battering of breaking waves which always cross this zone twice a day.

BLADDER WRACK (*Fucus vesiculosus*), with bladders usually in pairs like water-wings, is found right across the zone.

The KNOTTED (or EGG) WRACK (*Ascophyllum nodosum*), with single bladders like large knots along a piece of string, occurs towards the seaward edge of the zone and beyond. It prefers the deeper water.

- (iii) In the lower zone the **SERRATED (or SAW) WRACK (*Fucus serratus*)**, has toothed edges to its saw-like fronds, but no bladders.

The large **OAR (*Laminaria* spp.)** and **TANGLE WEEDS (*Chorda filum*)** of the lower edge of the lower zone area are absent at Kilve, possibly because of the brackish and muddy water.

THE PALE GREEN SEaweEDS

Pale green seaweeds are tolerant of fresh and diluted-salt water and so, at Kilve, are found on the upper shore and lower down where the stream water runs.

- (i) **ENTEROMORPHA**, sometimes named **GUT or TUBE WEED (*E. intestinalis*)**, forms a mass of unbranched tubular fronds. Their alignment normally shows the direction of water flow very clearly.
- (ii) The broad lettuce-like, fronds of **SEA LETTUCE (*Ulva lactuca*)**, are distinctively different.
- (iii) Very much less often found are the very fine, thread-like fronds, of **CLADOPHORA or HAIR WEED (*C. rupestris*)**. They form small mat-like clumps.

THE RED SEaweEDS

Red seaweeds are uncommon on this shore. The one most likely to be seen is **CORALLINA (*C. officinalis*)**. Its tiny branching fronds are hard and coral-like. The protective white, limy covering often shows up clearly and looks like a tiny skeleton.

APPENDIX 3: NATURAL SCIENCE - CONTINUED

b) Sea creatures

'Alive, alive oh!'

(See also Info sheet 1)

At Kilve the presence of both seaweed and rocks is immediately helpful to the sea creatures for they both offer protection. The Kilve shore is a good place to explore as well as a convenient one. In each zone the animals will be distributed according to the needs they have and the protection they use.

The main places to look are:-

(i) On exposed rock surfaces.

These will only be used by animals which can trap moisture in their shells, shut themselves in and sit tight!

The limy shells of limpets, barnacles and chitons are conical and the water of a breaking wave is diverted to either side. This can actually help to hold them in place.

THE LIMPET (*Patella vulgata*), makes a smooth, shell-sized patch for itself and then holds on very firmly with its muscular, sucker-like foot. The perfect fit helps it to retain water inside the shell at low tide. Trying to remove them usually only results in damaging the shell which will then not fit its patch securely and so allows water loss.

When hungry it moves about to feed on the slimy algae on the rock. This is scraped off by its long, flexible rough tongue, leaving behind a zig-zag grazing pattern of fine, concentric scrape marks. These are often thought to be fossil markings!

BARNACLE SHELLS (*Balanus balanoides*) are permanently cemented to the rock. When the tide is in, the creature inside opens the top plates of its shell, pushes out its modified feathery legs and sweeps tiny bits of food down to its mouth!

THE CHITON ('Coat-of-mail') SHELL also feeds and fixes itself very firmly like the limpet. If it is accidentally dislodged, its segmented shell enables it to roll up into a protective ball, rather like a woodlouse. Its oval shell makes it look like a woodlouse too but it is about twice the size.

(ii) In rock surfaces : holes and joint cracks

Occasionally stones are found dotted with holes about the diameter of a round pencil. These are made for its protection by the very fragile, cylindrical shells of the **PIDDOCK (*Pholas dactylus*)**. The two valves of the shell are rough and their edges quite sharp. This enables it to drill a sheltered hole in the rock by twisting from side to side. As it grows it has to enlarge its home and so the hole becomes bulbous inside the stone. Quite often one of the tubes will contain the empty white shell left by a dead piddock.

Similar, but much smaller and shallower, holes are created by the **BORING SPONGE (*Cliona celata*)**.

The criss-cross pattern of joints is characteristic of the hard limestone layers on the beach. They, and similar crevices, offer some protection to many of the sea creatures. One in particular is the **MUSSEL (*Mytilus edulis*)**. The two valves of its dark blue shell are anchored to the rock by several thread-like strands (a byssus). As a filter-feeder it has to open its shell slightly to collect small particles when covered by the sea. Otherwise it stays tightly shut to stay moist.

(iii) Under stones, rock ledges and seaweed.

These are good places for protection from breaking waves and larger predators. Larger stones frequently shelter the tough and aggressive green **SHORE CRAB (*Carcinus maenas*)**. Its flattened shape suits this location well.

The same applies to the many-legged but much smaller **SANDHOPPERS (*Gammarus locusta* and *Talitrus saltator*)**. Their bodies are flattened from side to side. They often move in pairs, the female held within the curve of the male body. They hide in sand and under seaweeds to stay moist and unseen. They scavenge on seaweed and animal fragments.

The need to replace stones carefully and exactly as found should be obvious.

(iv) Under and in seaweed, especially where it drapes over rock faces. The various spiral shelled **SEA SNAILS (*Gastropods*)**, are often common here. Most graze on the seaweed. Their slimy feeding tracks wandering across fronds and rocks show up afterwards because a film of mud sticks to them.

THE WINKLES (*Littorina* spp.) and **TOP SHELLS (*Gibbula cineraria*)**, have stout shells which protect them even if they are dislodged. The animal is then able to seal the end of its shell with a shelly disc to stop it from drying out.

To avoid taking any live creatures away it is important to see that this disc is absent. Only if the animal is already dead will it be missing. To be sure, it may be necessary to shake the shell or to blow into the opening to remove the little bead of water which can obscure it.

'Winkling them out'

The winkles show zonation on the shore, though their communities do overlap.

THE ROUGH WINKLE (*Littorina saxatilis*), is the most frequently found, especially across the upper-middle shore boundary.

THE FLAT WINKLE (*Littorina littoralis*), and the conical **TOP SHELLS** occur on the mid shore.

COMMON (or Edible) WINKLES (*Littorina littorea*), can also be found there but more likely on the lower shore.

Being spread across the zones like this reduces competition for their algal food.

Their shells are nearly all darkly coloured or banded as camouflage against predators which include whelks.

WHELKS (*Nucella lapillus*), have a larger, usually whitish, shell and are predatory carnivores. Their flexible, file-like tongue penetrates the shells of other sea snails to digest them.

Empty shells are usually found washed up from low on the shore. Just occasionally those may be occupied by a sheltering, soft-bodied **HERMIT CRAB**.

(v) In sand

Though there is little sand on Kilve shore, fishermen may sometimes be seen digging for marine **LUGWORMS (*Arenicola marina*)**, to use as fish bait. They live buried in sandy sediment on the middle and lower shore.

APPENDIX 3: NATURAL SCIENCE - CONTINUED

Their presence is shown by the little piles of sandy faeces which mark one end of their U-shaped burrows. The other end has a little hollow produced by the worm sucking down sand which contains its organic food.

(vi) In rock pools all the above sites, and so their animals and plants, may be found. The greatest variety of life is likely to be where the seawater is not diluted by freshwater. The significant presence of the latter is often indicated by the pale green seaweeds.

Some shore creatures can only survive in the rock pools.

SHORE FISH, such as the **COMMON GOBY (*Gobius microps*)**, is one example. Though only a few centimetres long, they are quite easily spotted as they dart across a pool. It's as they come to rest that they disappear - an illusion due to excellent camouflage! Small crustaceans are their main food.

The green and red jelly-like blobs of **SEA ANEMONES (*Actinia equina*)**, are usually in or very close to salt water pools too. They are fairly common on the lower and middle shore waiting to feed when the tide comes in. They are filter-feeders but can also paralyse and catch their prey - mostly sand hoppers, shrimps or gobies - with an array of stinging cells on their ring of tentacles. These can be fully revealed by gently splashing the anemone with pool-water; they think that the tide is coming in and open up widely!

3. DIPPING DEEPER

'This sceptred Isle set in a silver sea' (W. Shakespeare)

The 'Here be sea monsters' types of annotation on old maps suggest some of the mystery and apprehension of the world's vast uncharted oceans. Glimpses of twenty five metre-long whales or huge squids and octopuses, maybe of similar size to their boats, would provoke such legends. Yet the oceans are still only patchily known. It's not many years since the first living Coelacanth was found, a large 'fossil' fish thought to have died out two hundred and fifty million years ago! It is an offshoot from the line of sea-creatures which became the first four-legged amphibians to inhabit the land.

The information given here and the work resulting from a visit give another glimpse of the variety and strange lifestyles of sea-shore life. Because it seems so alien to our land-based environment the vast marine environment has been widely little understood, undervalued and used thoughtlessly.

- The sea is used as a dump: oil from spills and routine flushing, plastics and chemicals contaminate and kill marine life.
- Over-fishing reduces fish stocks for us and for sea-birds.
- The dredging of minerals and shellfish beds is causing some seafloors fauna and flora to be irreparably damaged.
- Unsaleable fish, dolphins and porpoises are caught and thrown back dead.
- The full consequences of deep-sea waste dumping are still unknown.

The 'silver sea' has become rather tarnished.

There is an urgent need to manage mankind's marine activities more thoughtfully and to conserve marine life for its and our futures. It could be helped by a caring and thoughtful trip to the Kilve Coast.