Visit the ROCK POOLS

During class visits to the rock pools our aim should be to foster a better understanding of how the inhabitants of this environment have adapted to enable them to co-exist in the harsh conditions which sometimes exist. So we can do this without causing unnecessary damage to both the creatures and the environment teachers need to have prepared their students well in advance of the visit. Following are some ideas you may find useful when preparing for a visit.

Before the visit

- introduce the pupils to the creatures, zones, plants
- set up displays of pictures, books, empty shells
- discuss need for ordered working process to minimise damage and environmental carnage
- discuss likely habitats of creatures
- discuss features of creatures to assist in identification
- discuss and agree on planned strategy for pool search
  - sit and look (keep shadows off pool)
  - catch moving creatures in sieve and place in tray (or ice cream container) of pool water
  - identify and record non or slow moving creatures/plants
  - gently lift and investigate under rocks - **ensure they are replaced**
  - fill in record sheet
  - return all creatures to the pool
  - finalise all arrangements - travel, clothing, footwear, drinks etc.

On the day

- check all requirements and equipment
- take sunscreen/extra drinks/first aid kit
- organise working groups
- reinforce search strategy
- define boundaries
- allocate adult to each group
- issue equipment to each group
- begin search at high/med/low tide zone
- repeat search in other tide zones
- reassemble all pupils together - check numbers
- collect up and check all equipment
- ensure all creatures have been returned to the pools
- gather recording sheets from groups
- general clean-up of area

After the visit

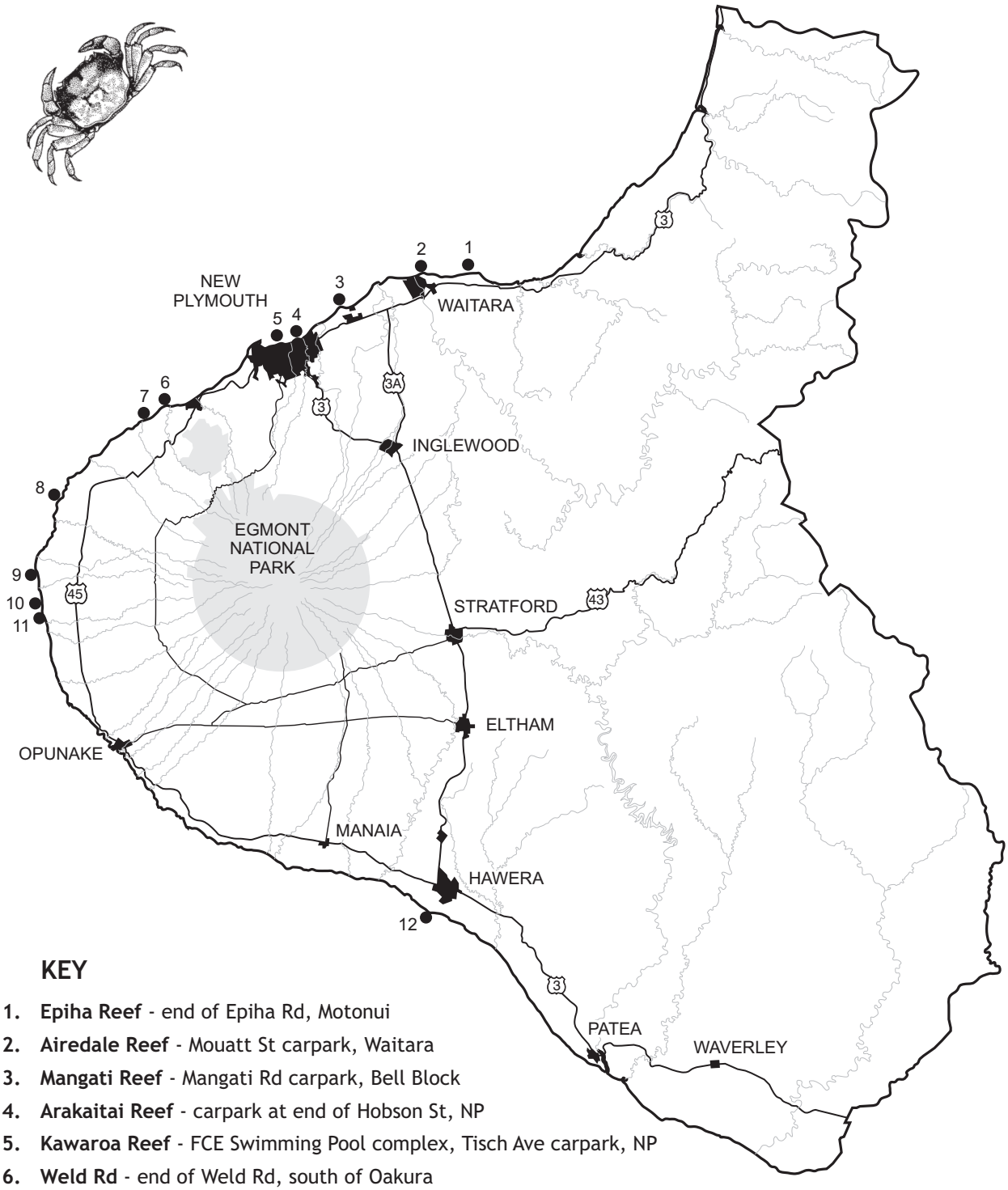
- review general procedures of the day
- begin research, presentation, display work
- review creatures/plants found
- letters of thanks to helpers (card with photo?)

Equipment

- trays (ice cream containers)
- magnifying glasses
- recording sheets
- tape measures
- sieves
- identification sheets
- thermometers
- clipboards

TARANAKI REGIONAL COUNCIL

Visit the ROCK POOLS



KEY

1. **Epiha Reef** - end of Epiha Rd, Motonui
2. **Airedale Reef** - Mouatt St carpark, Waitara
3. **Mangati Reef** - Mangati Rd carpark, Bell Block
4. **Arakaitai Reef** - carpark at end of Hobson St, NP
5. **Kawaroa Reef** - FCE Swimming Pool complex, Tisch Ave carpark, NP
6. **Weld Rd** - end of Weld Rd, south of Oakura
7. **Greenwood Rd Reef** - end of Greenwood Rd, south of Oakura
8. **Stent Rd Reef** - end of Stent Rd, north of Pungarehu
9. **Cape Rd Reef** - end of Cape Rd, Pungarehu
10. **Manihi Rd Reef** - end of Manihi Rd, north of Oaonui
11. **Kina Rd Reef** - end of Kina Rd, Oaonui
12. **Waihi Reef** - end of Denby Rd, Hawera

TARANAKI REGIONAL COUNCIL

Risk management plan

Activity:			
Instructors:		Date:	
Group:		Location:	

Risks (potential losses)

1	4
2	5
3	6

Casual factors (lemons)		Risk reduction strategies
People *skills, attitudes, age, fitness, ratios, experience, health etc*		
Equipment *clothing, shelter, transport, activity specific gear, safety gear etc*		
Environment *weather, terrain, water, season etc*		

Risk Analysis and Management System Compiled by: _____

Name of school: _____ Date: _____ Class(es): _____ Activity: _____

Analysis

Undesired event				
Casual factors		People	Equipment	Environment
Risk Management Strategies	Normal Operations			
	Emergency			

Risk management plan

Activity:	ROCKY SHORE STUDY		
Instructors:	Mr J. Bloggs	Date:	27/02/05
Group:	Rms 6-7	Location:	KAIPITI RD.

Risks (potential losses)

1	Losing children	4	Heat exhaustion
2	Injured children	5	
3	Sunburn	6	

	Causal factors (lemons)	Risk reduction strategies
People *skills, attitudes, age, fitness, ratios, experience, health etc*	• undisclosed medical conditions	• check medical forms
	• skill levels of parent helpers	• appoint appropriately skilled adults to groups, discourage inappropriately skilled adults from participating or place in a group with a skilled parent.
	• childrens' behaviour	• ensure potential problem children are placed appropriately within groups or not taken on trip.
	• inexperienced children in outdoor activities	• practise routines in playground
Equipment *clothing, shelter, transport, activity specific gear, safety gear etc*	• inadequate clothing, footwear or headwear	• check before leaving
	• lack of water / food	• " " "
	• inadequate travel arrangements	• check that all cars have sufficient seatbelts, drivers are licensed. Travel by bus.
	• lack of First Aid equipment, trained personnel, cell phones, emergency vehicle	• assign people suitably qualified for each activity.
Environment *weather, terrain, water, season etc*	• unsuitable weather	• be prepared to postpone/ cancel visit or finish early
	• terrain (difficult)	• do a pre-visit to exact area of intended trip.
	• tidal movements, size etc.	• check tide times / size pre visit and monitor movements during visit.
	• adequate parking for emergency vehicle	• check on pre-visit
	• unclear boundaries	give " " " and clear instructions.

KISK ANALYSIS AND MANAGEMENT SYSTEM

Compiled by: John Smithson

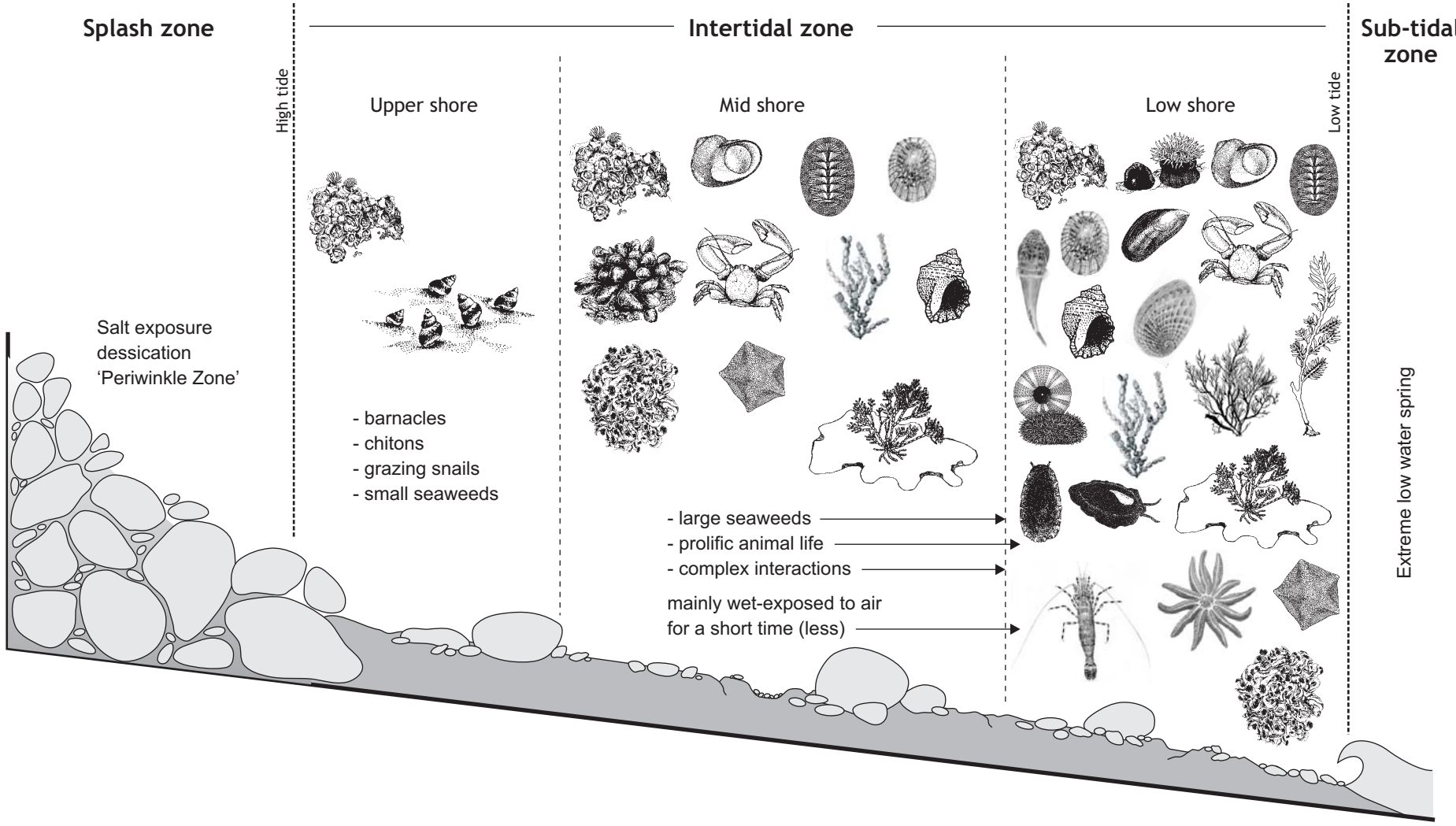
Name of School: BRIGHT SPARKS PRIMARY Date: 31/03/05 Class(es): Rms 6-7 Yrs 5-6 Activity: ROCKY SHORE STUDY

Analysis

UNDESIRED EVENT sunburn, heat exhaustion, lost child(ren), cuts, abrasions, falls, stings				
CAUSAL FACTORS		People	Equipment	Environment
		• undisclosed medical conditions • poor supervision - unsuitable group composition • inappropriate behaviour • transport difficulties	• inadequate clothing, footwear, headwear	• high / low temperatures • wind • unexpected tide movements, size • unsuitable terrain
RISK MANAGEMENT STRATEGIES	Normal Operation	• check all medical forms • ensure all adult helpers are competent to carry out set tasks • ensure all children are aware of behavioural expectations • carefully consider group compositions - ensure all children have seat belts etc.	• check clothing / footwear, headwear requirements before departure • check all children have adequate food/drink • request children use toilets at school.	• obtain current weather report, have postponement, Cancellation procedures set • recheck tide tables and size of tides • set clear boundaries for work area
	Emergency	• have clearly defined emergency shelter available • advise of clear signals for finishing • check cell phone is available and operational • ensure at least one adult holds a current First Aid certificate	• check availability of whistles, cell phones, stocked First Aid kit, emergency vehicle and access for emergency vehicle.	• set clear, defined emergency shelter area

TARANAKI REGIONAL COUNCIL

Visit the ROCK POOLS



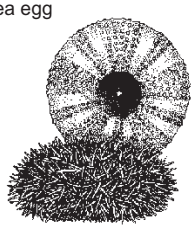
Identification Sheet

TARANAKI REGIONAL COUNCIL

Name: ..... Site: .....

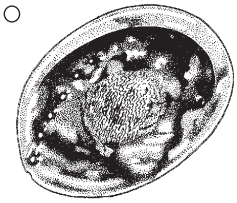
School: ..... Date: .....

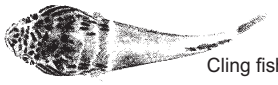
Sea egg ○



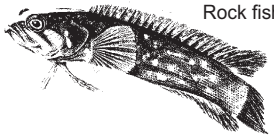
Black sea slug ○

Paua ○

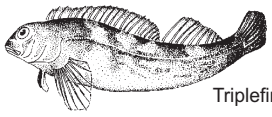




Cling fish ○

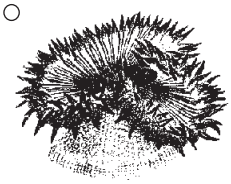


Rock fish ○



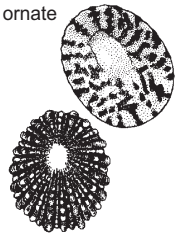
Triplefin ○

Anemone ○

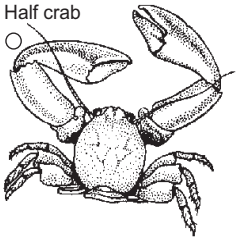


Limpet radiate ○

Limpet ornate ○

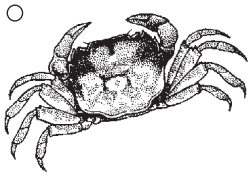


Half crab ○

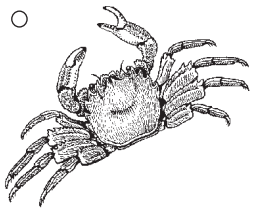


Hermit crab ○

Marbled crab ○



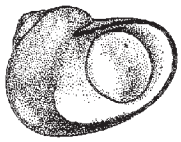
Red crab ○



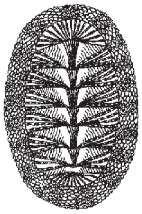
Camouflage crab ○

Dark top-shell ○

Cats eye ○

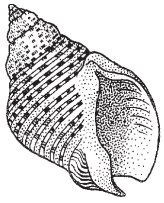


Chiton ○

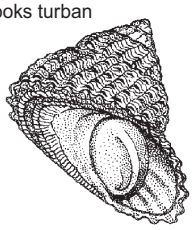


Oyster borer ○

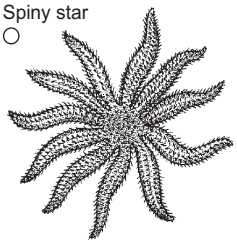
Whelk ○



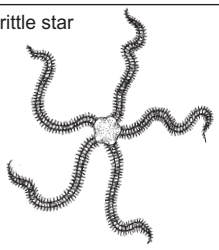
Cooks turban ○



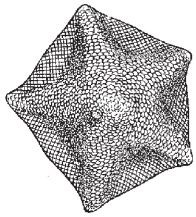
Spiny star ○



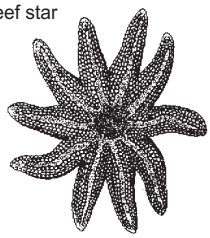
Brittle star ○



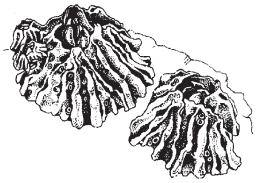
Cushion star ○



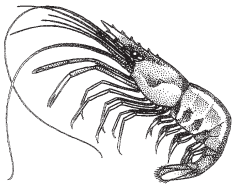
Reef star ○



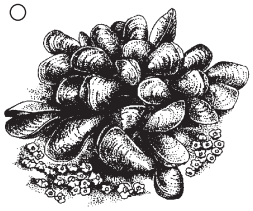
Barnacle ○



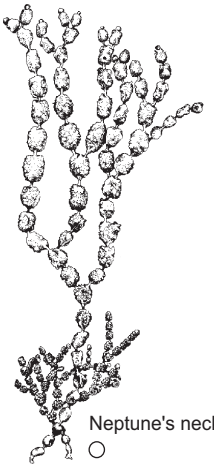
Prawn ○



Black mussels ○

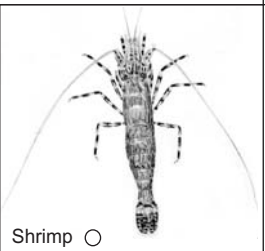


Flapjack ○



Neptune's necklace ○

Tube worm ○



Shrimp ○

Turf ○

Rocky Shore

Animal (tick)				
is:				
on rocks				
under rocks				
in sand				
on seaweed				
in a pool				
(number)				
feelers in (high, mid, low) zone				
has:				
shell				
hard body				
soft body				
legs				
mouth				
eyes				
moves by:				
swimming				
walking				
gliding				
darting				
hiding				
doesn't move				
numbers:				
one				
a few				
lots				

Rocky shore worksheet

Temperature (water)
- Low tide area = °
- Mid tide area = °
- High tide area = °

Key to plant/animal populations

A = Abundant (many examples in all pools within tidal area)
C = Common (several examples in most pools in tidal area)
R = Rare (only a few examples found in tidal area)
N = None (no examples found in tidal area)

Plant/animal	Low tide	Mid tide	High tide
Sea egg			
Black sea slug			
Paua			
Cling fish			
Triplefin			
Sea anemone			
Limpet (radiate)			
Limpet (ornate)			
Half crab			
Marbled crab			
Red crab			
Camouflage crab			
Dark top-shell			
Cats eye			
Chiton			
Oyster borer			
Whelk			
Cooks turban			
Spiny star			
Brittle star			
Cushion star			
Reef star			
Barnacle			
Black nerita			
Black mussels			
Tube worm			
Turf			
Flapjack			
Neptune’s necklace			

Information about Rocky Shore life

Grazers, filterers, killers, scavengers and thieves

Chitons

Chitons have a shell made up of eight overlapping plates. This allows them to move easily while having protection. Chitons have a leathery skirt around their shells. They graze on small algae. Young chiton have only seven pieces of armour. Chiton have metal in their teeth so they don't wear out.

Mussels

Mussels attach themselves to the rocks using fine threads. Mussels filter feed by opening their shells to allow water and food in. Because mussels feed in this way they can be dangerous to eat when collected from polluted water

Limpets

Many limpets return home at the end of each feeding session. They return to exactly the same spot and exactly the same position. Limpets feed by grazing and scraping tiny seaweed or algae off rocks.

Hermit Crabs

Hermit crabs use the discarded shells of other creatures to protect their soft bodies. One nipper is usually larger than the other and is used to block the opening to the shell. Crabs scavenge dead plants and animals using their pincers to pull the food apart.

Anemones

Anemones have stinging tentacles for catching their prey. They can also reproduce in an unusual way including splitting in half or breaking into pieces. Out of the water an anemone looks like a blob of jelly.

Seaweed

Generally green seaweed is found higher up the shore while browns are in the intermediate area and the reds deeper down.

Flexible Flapjack

This species has floats on it which help keep the fronds near the surface of the water closer to the sunlight.

Neptunes Necklace

This has thick walled bladders filled with liquid to prevent drying out. Plants growing higher up the shore have a bigger bladder than those lower on the shore.

Sea Urchin, Kina

The kina has long sharp spines which can swivel on a ball and socket joint. The animal can move along using these spines. Kina crawl over seaweed and grind it up with their teeth.

Starfish

Starfish generally have five arms although some have more than five. Their skin has small plates and the mouth is on the underside in the centre of the star.

Starfish are predators. They wrap themselves around mussels and cockles, pull their shells apart and push their stomachs between the shells.

Sea Cucumber

This is a sausage-shaped creature with limy plates on its skeleton. If it is disturbed it throws out sticky white threads.

Sea Horses

Sea horses use their tail to curl around seaweed to help them stay in one place. The male sea horse carries the babies as the female lays her eggs in the male's pouch.

Cockabullies (or triple fins)

These have camouflaged skins to help them tide in the rock pools. They prefer to hide in the rock pools, rather than going into the deeper water where there are bigger fish.

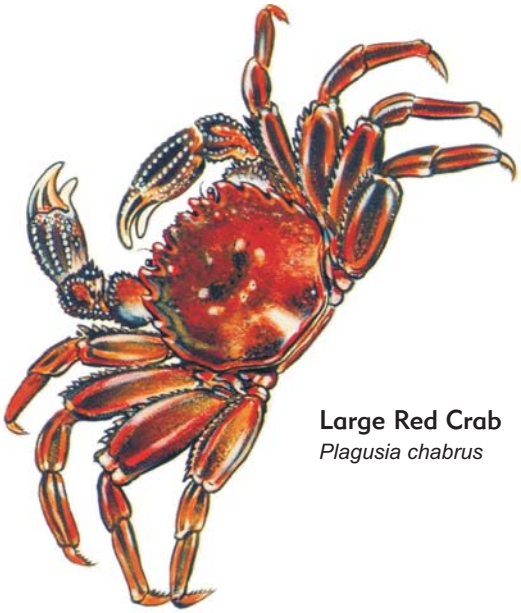
Topshells

These are creatures similar to snails in that they have a slimy body covered by a shell. Most graze on seaweeds although some are meat eaters. Whelks use their long rasping tongue to drill through shells to suck out the contents.

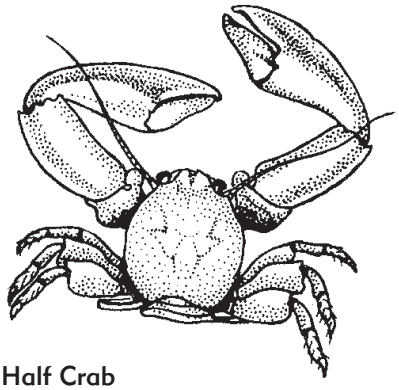
Life along our coastline

Crustacea

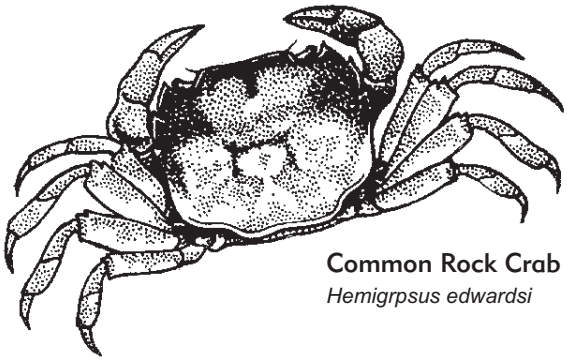
Crustaceans have undergone extensive adaptive radiation with appendages becoming specialized for sensory reception, breathing, reproduction, swimming, walking, food capture and consumption. This category includes crabs, barnacles, shrimp and crayfish. All crustaceans have hard outer protective shells. They also have jointed legs. Crustaceans go through a series of moults as they grow too large for their shells. Moulting crabs are prey for fish and other animals in rock pools.



Large Red Crab
Plagusia chabrus

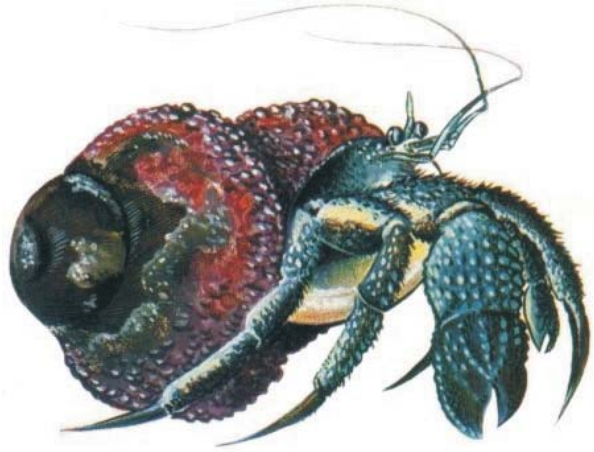


Half Crab
Petrolisthes elongatus

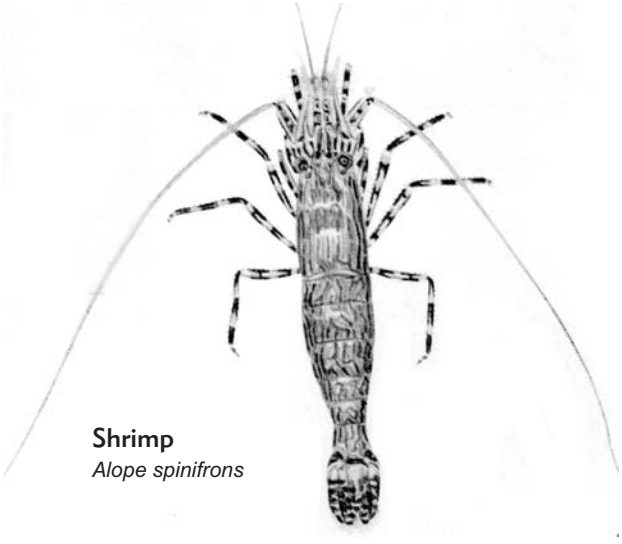


Common Rock Crab
Hemigrpsus edwardsi

Camouflage Crab
Notomithrax ursus



Hermit Crab
Pagurus novaezelandiae

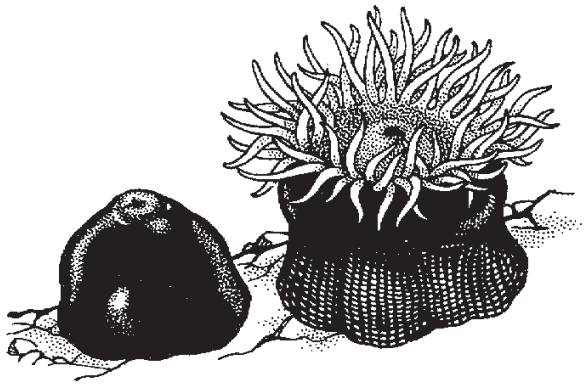


Shrimp
Alope spinifrons

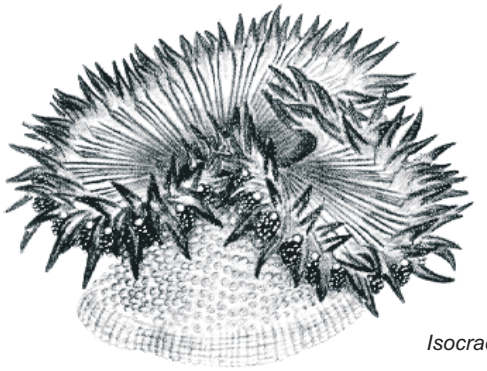
Life along our coastline

Sea Anemones

These unshelled animals live under boulders, in crevices and in other sheltered areas where water loss is not a problem. They are very sensitive to mechanical stimuli and use this adaptation in their feeding habits. Stinging cells paralyse fish and other prey when they brush past the anemones' tentacles. These tentacles then manoeuvre the prey into the anemone's mouth. Contrary to common belief, anemones are not always sessile and may not be sensitive to light.



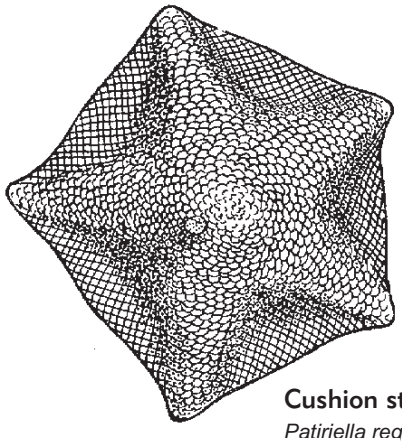
Red Waratah
Isactinia tenebrosa



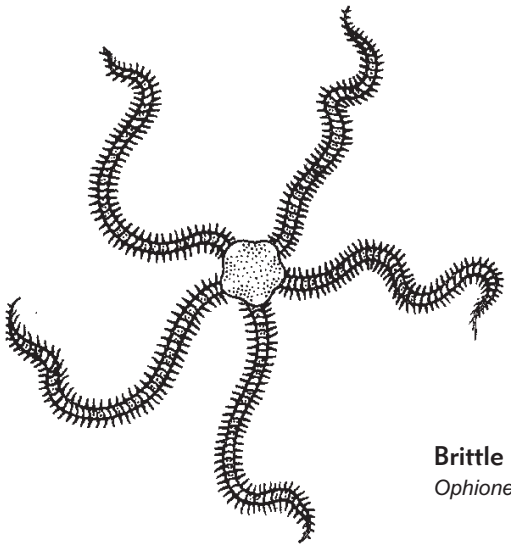
Isocradactis magna - diameter disc 80mm

Starfish

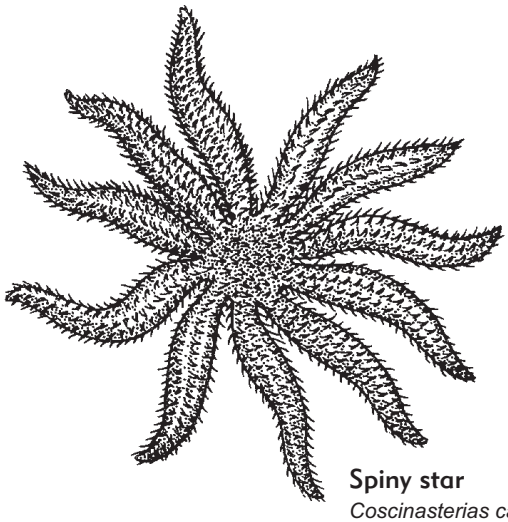
Starfish belong to the group Echinodermata (meaning 'spiny skinned'), as do kina (see Edible Species page) and sea cucumbers. Their skin consists of a network of spiny plates embedded in tissue and muscle. The arms which extend from a central disc, and which have a simple light sensitive organ at their tip, have grooves on their underside containing tube feet. These feet are operated by a complex water pumping system and are used for locomotion and adhesion.



Cushion star
Patiriella regularis



Brittle star
Ophionereis faciata



Spiny star
Coscinasterias calamaria

Life along our coastline

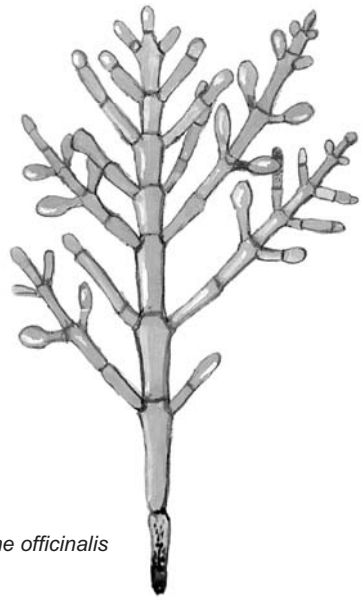
Seaweeds

Although seaweeds are simple in structure, their life histories and reproductive bodies are complicated. They do not have supporting tissues and are supple thus they just flop over onto the rock as the tide retreats and can bend with the water current when immersed.

Seaweeds are well adapted for the marine environment. They reduce water loss in such ways as producing mucilage, or having thick-walled cells, they can withstand a wide range of temperatures (even to having three-quarters of their water converted to ice) and light intensities (for example, from being exposed on bright sunny days to the dim light deep in the ocean). All seaweeds contain chlorophyll necessary for photosynthesis, but in many algae this green pigment is hidden by other pigments also engaged in trapping sunlight energy. There are four groups of algae principally classified on their colour: blue-green, green, brown and red.

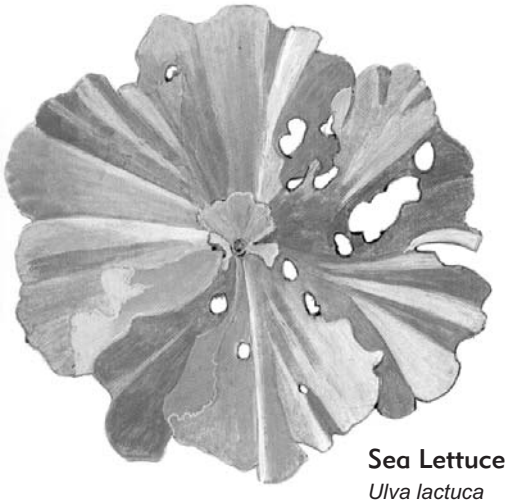
Scytothamnus australis

Neptunes Necklace
Hormosira banksii



Turf
Corraline officinalis

Common Flapjack
Carypophyllum maschalocarpum



Sea Lettuce
Ulva lactuca

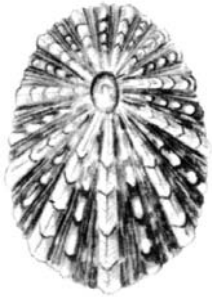
Life along our coastline

Limpets

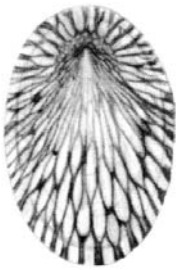
The true limpets have an oval to rounded, conical to cupshaped shell. They are highly adapted for intertidal grazing with specialization of the mantle cavity, streaming of the shell, and the possession of a strong, toothed radula (a rasping tongue-like structure).

Encrusted limpet
Patelloida corticata

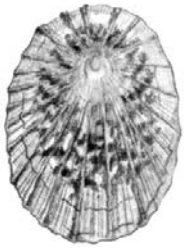
Notoacmea parviconcoidea



Ornate limpet
Cellana ornata



Notoacmea daedala



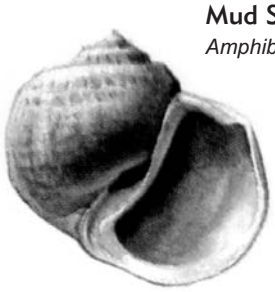
Radiate limpet
Cellana radians

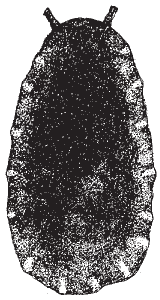
Pulmonates

Pulmonates belong to the class Gastropoda and are usually terrestrial or live in freshwater habitats. There are a few marine species and these are found in intertidal or estuarine areas.

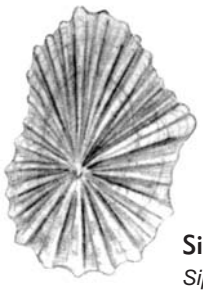
Marine gastropods generally respire using gills, however the pulmonates have a vascularised mantle cavity which acts like a lung. They are hermaphroditic (that is, can produce both male and female sex cells).

Mud Snail
Amphibola crenata





Onchidella nigricans



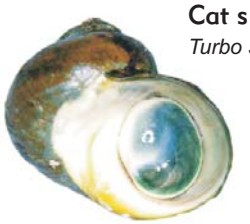
Siphon limpet
Siphonaria zelandica

Life along our coastline

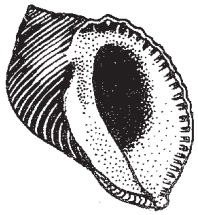
Topshells/gastropods

Topshells (limpets, periwinkles, whelks, snails and slugs) form the largest and most diverse of the six classes of mollusks. They have a single, asymmetrical shell, a well developed head and a broad, flattened foot. In many individuals the foot bears a horny disc (the operculum) and this protects the animals from desiccation and predation.

The majority of topshells are herbivores although some are carnivorous predators.

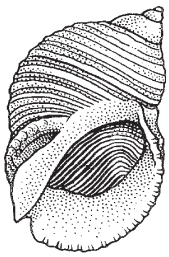


Cat s eye
Turbo smaragdus



Dark Rock-shell
Haustrum haustorium

Oyster borer
Lepsiella scobina



White Rock Shell
Thais orbita

Dark Top-shell
Melagraphia aethiops

Speckled whelk
Cominella maculosa

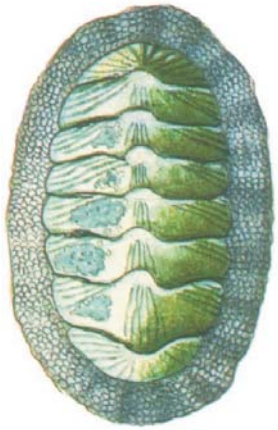
Chitons

The chitons are ovoid, bilaterally symmetrical and greatly flattened dorsoventrally. Their heads are indistinct with neither eyes nor tentacles. They possess a broad foot and an articulated shell which enables them to move across and adhere to sharply curved rock and shell surfaces. Their shells are divided into eight overlapping transverse plates which are embedded in and surrounded by thick mantle tissue. This girdle is highly variable, and may be smooth or covered in scales, bristles or calcareous spicules.

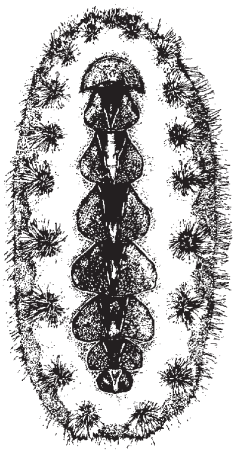
Chitons move about when they are submerged, feeding on fine algae and other micro-organisms, which they scrape from rock and shell surfaces with their radulae.

They are single sexed, with both eggs and sperm being shed into the current where fertilization occurs.

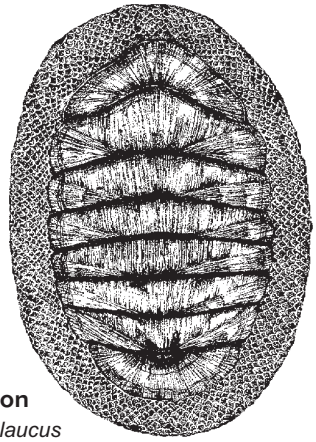
Most chitons inhabit shallow water where they are often found on the under surfaces of rocks. If dislodged the chiton will roll into a ball.



Snakeskin Chiton
Sypharochiton pelliserpentis



Bristle Chiton
Acanthochitona zelandica



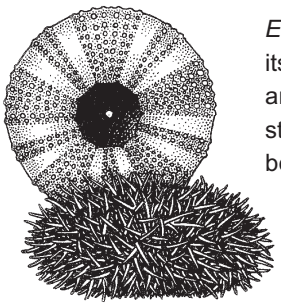
Green Chiton
Armaurochiton glaucus

Life along our coastline

Common edible species

Evechinus chloroticus (sea egg, kina)

Sea eggs are recognized by their covering of strong, fairly long, green tinged spines. Ball and socket joint link the spines to the body making them highly movable. The spines and the long red tube feet between them are thus used to move the sea egg along during locomotion.



Evechinus uses its tube feet to hold itself securely between the rocks and in crevices and to fasten small stones and shell pieces against its body as camouflage. The stones provide protection from large predators, and pincers (situated between the spines) give protection from would-be squatters. The mouth consists of five triangular teeth which move in and out to scrape small encrusting animals and algae and break down larger algae such as kelp.

Perna canaliculus (green-lipped mussel)

Perna is typically found on the open coast at low shore level. It varies in colour from bright green with brown rays (on open shores) to dull greenish-brown to black (on the more sheltered shores). Subtidally it may reach up to 15 cm in length, although those found intertidally rarely exceed 10 cm. Full size is reached in two to three years.

Perna generally lives in crowded sheets on hard rock. The shells are flexibly anchored by byssal threads running from shell to shell and to the rock mass below. The mussels are not permanently attached and can relax the byssal threads and move along with their mobile, extensible foot.

Mussels filter feed when covered by the tide. Their cilia draw a current of water which contains minute organisms and small particles, through the opening between shell valves. When the tide is out the two valves are tightly closed to protect the mussel within from desiccation.

A small peacrab may sometimes be found residing inside the mussel's shell.

This species must not be confused with *Xenostrobus pulex* the small black must be found in the upper to mid shore region.

Cookia sulcata (Cook's turban)

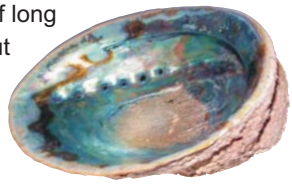
This is one of Taranaki's largest intertidal gastropods. It is conical in shape and has a roughly textured surface. Individuals are found at low tide and subtidally. They graze on seaweed (such as *Carpophyllum*) until they become too heavy to be supported by the weed, when they then move onto rocks to scrape off encrusting seaweed.

Scutus breviculus (black sea slug, ducks bill-limpet)

The black sea slug grows up to 15 cm long and has a small, white, oblong shell roofing its anterior end. It makes a homescar beneath rocks on the lower inter-tidal region, and returns to this after each feeding foray. It feeds nocturnally, probably on algae and sponges.

Haliotis iris (paua)

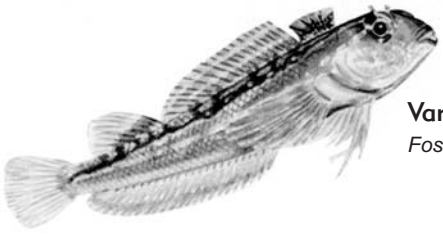
The shell of this species is broadly ovate with an iridescent interior. The animal which is almost entirely black, has a skirt with a row of long fine processors which stick out under the shell when the animal is moving.



Fish

In the intertidal region fish are generally restricted to rocky platforms where tide pools form. They are usually small, benthic and coloured so they blend into the background, living amongst algae and rocky shelters. They are often found in narrow gaps beneath boulders, or in crevices in rock pools. Cling fish have a large sucker on the underside which is used to adhere to rocks.

Rock Fish
Acanthoclinus quadridactylus
(length 150mm)



Variable Triple Fin
Fosterygium verium

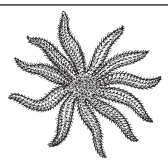
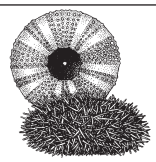
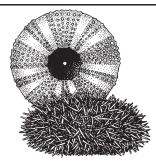
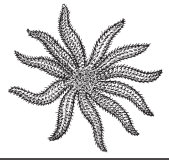
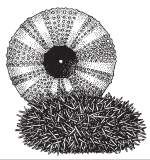
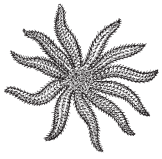
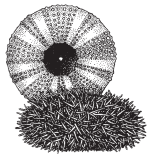
Cling Fish
Trachelochismus melobesia
(length 80mm)

Rocky shore: Dominoes

Domino games can be used to lean factual material. Each domino must have a name and a symbol. Players match a name to a symbol.

Rules

- each player takes 6 cards
- place the rest face down
- pick up a card if you cannot go
- first to discard all their cards is the winner
- the person with domino having matched name and symbol, starts the game

sea anemone 	**sea anemone** 	**sea anemone** 
sea anemone 	**cat's eye** 	**cat's eye** 
cat's eye 	**cat's eye** 	**starfish** 
starfish 	**starfish** 	**starfish** 
rock crab 	**rock crab** 	**rock crab** 
rock crab 	**hermit crab** 	**hermit crab** 
hermit crab 	**hermit crab** 	**sea urchin** 
sea urchin 	**sea urchin** 	**rock crab** 
sea lettuce 	**sea lettuce** 	**sea lettuce** 
sea lettuce 		

Tide pools

In groups of 6 the students can determine where on the shore various organisms live using the information provided on the cards. Give each student one of the ‘tide pool’ cards on this page. Give the group a copy of a blank ‘zone’ page and a set of the picture cards.

Tide pools

These are your clues to help solve the group's problem. Read them to the group but do not show them to anyone.

Problem: *Place the plants and animals on the tidal zone where they live.*

- ☐ Neptune's necklace and tubeworms live in the middle tide zone where living things are covered and uncovered twice daily.
- ☐ The banded periwinkle and the cat's eye live the furthest apart.

Tide pools

These are your clues to help solve the group's problem. Read them to the group but do not show them to anyone.

Problem: *Place the plants and animals on the tidal zone where they live.*

- ☐ The low tide zone is usually under water except during very low tides.
- ☐ Coastal lichen, chitons and black nerita each live in two zones.

Tide pools

These are your clues to help solve the group's problem. Read them to the group but do not show them to anyone.

Problem: *Place the plants and animals on the tidal zone where they live.*

- ☐ Chitons can live in the same zone as cat's eyes and kelp.
- ☐ The surf barnacle is covered with water only during high tide.

Tide pools

These are your clues to help solve the group's problem. Read them to the group but do not show them to anyone.

Problem: *Place the plants and animals on the tidal zone where they live.*

- ☐ Cat's eyes and kelp are usually under the water.
- ☐ The high tide zone is not under the water except at the highest tide.

Tide pools

These are your clues to help solve the group's problem. Read them to the group but do not show them to anyone.

Problem: *Place the plants and animals on the tidal zone where they live.*

- ☐ Rock oysters, Neptune's necklace, chitons and black nerita all live in the same zone.
- ☐ In the spray zone, living things tolerate extremes of saltiness and temperature.

Tide pools

These are your clues to help solve the group's problem. Read them to the group but do not show them to anyone.

Problem: *Place the plants and animals on the tidal zone where they live.*

- ☐ Surf barnacles, coastal lichen, ornate limpets and black neritas all live in the same zone.
- ☐ Coastal lichen and banded periwinkles can tolerate extremes of saltiness and temperature.

Tide pools - zones

SPRAY
Tidal Zone

TOP
Tidal Zone

MIDDLE
Tidal Zone

LOW
Tidal Zone

Tide pools - pictures

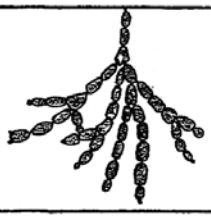
Cat's eye

Kelp

Banded periwinkle

Chiton

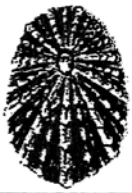
Neptune's necklance



Chiton

Surf barnacle

Ornate limpet



Coastal lichen

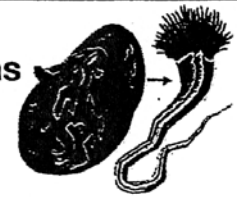
Black nerita

Coastal lichen

Black nerita

Rock oysters

Tubeworms



Answers

SPRAY
Tidal Zone

Coastal lichens
Banded periwinkles

TOP
Tidal Zone

Coastal lichens
Surf barnacle
Black nerita
Ornate limpet

MIDDLE
Tidal Zone

Tube worms
Rock oysters
Neptunes necklace
Ornate limpet
Black nerita
Chiton

LOW
Tidal Zone

Kelp
Cat's eye
Chiton