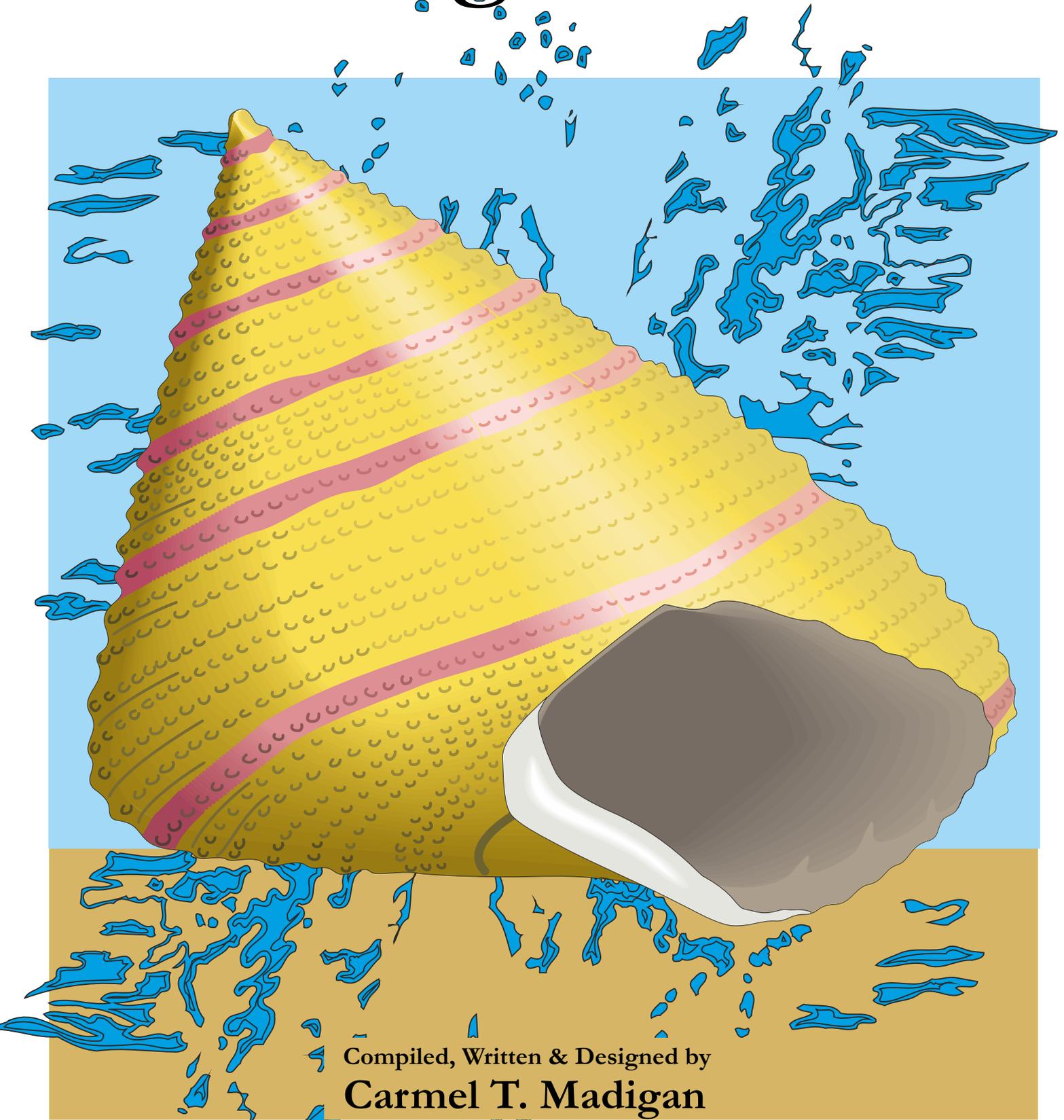


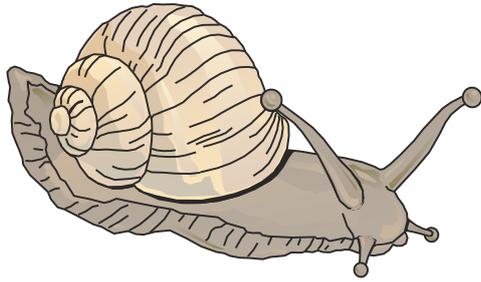
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# Amazing Sea Shells



Compiled, Written & Designed by  
**Carmel T. Madigan**

# Easy Facts about Sea Shells



A sea shell is a sea mollusc's protective home. Molluscs are a large group of invertebrate animals like snails, oysters, scallops. It is a home just for one..unlike human homes for instance.

The shell itself is excreted from the tiny baby animal and is mostly made up of calcium carbonate. Calcium Carbonate is a hard substance and provides good protection for the animal, who would otherwise be bashed about by the ocean and easily eaten by predators such as fish and crabs.

The inner shell can sometimes be lined with 'mother of pearl' a beautiful, colourful, shiny substance. As the snail grows, during certain periods of time, the shell grows..but not bit by bit every day!. Growth bands/ribs/coils are visible in some species.

A sea snail who has its own shell and who crawls around with it on its back is called a marine gastropod mollusc.

Some sea shells are bi-valves, i.e the creature is housed within a two shell structure that can open and close tightly. Examples of bi-valves are mussels and scallops.

When you find a seashell washed up on the beach, it is usually empty and clean. The animal inside has already died and its remains have been cleaned up by ocean predators.

In the future, it may be more difficult for sea snails to make shell by calcification due to ocean acidification.

Eventually dead shells break down and form hardened layers on the ocean bed or marine gravel/sand.

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## Shells Inspiring Modern Architecture



Apparently not only artists and collectors adore the beauty of seashells. The perfect houses mother nature provided for molluscs are inspiring modern architecture in many parts of the world.

One example of such design is the contemporary Nautilus House designed by architect Javier Senosiain in Mexico City. It is a wonderful mix of science, architecture and art.

'Biomimetic architecture' is the name given to this type of architecture which draws its influence directly from nature.



Above the Dahlian Shell Museum in China, designed like the Abalone Shell and housing a Museum of 20,000 precious shells. Every shell has its own story, and is cherished by the museum. There are over 5000 kinds of shells displayed in the museum, collected from world wide sources. What a beautiful place to visit!

# Tower Shell (*Turritella spp*) Marine Mollusc - Gastropod

**Maths & Architecture: Helical, Spiral Shell**

A helix is a 'curve' in three dimensional space, rotating around a 'fixed axis' These rotating curves are often described as 'whorls' or 'windings' and in the case of the Tower shell there can be 16-20 whorls. The tower shell grows to approx 6cm long and lives from the shallow sub-tidal to water depths of 220 metres. It lives burrowed in sediment and eats tiny deposits which are filtered through tiny hairs. It is commonly found along the North East Atlantic Ocean from North Africa to Norway.

**Tasks:**

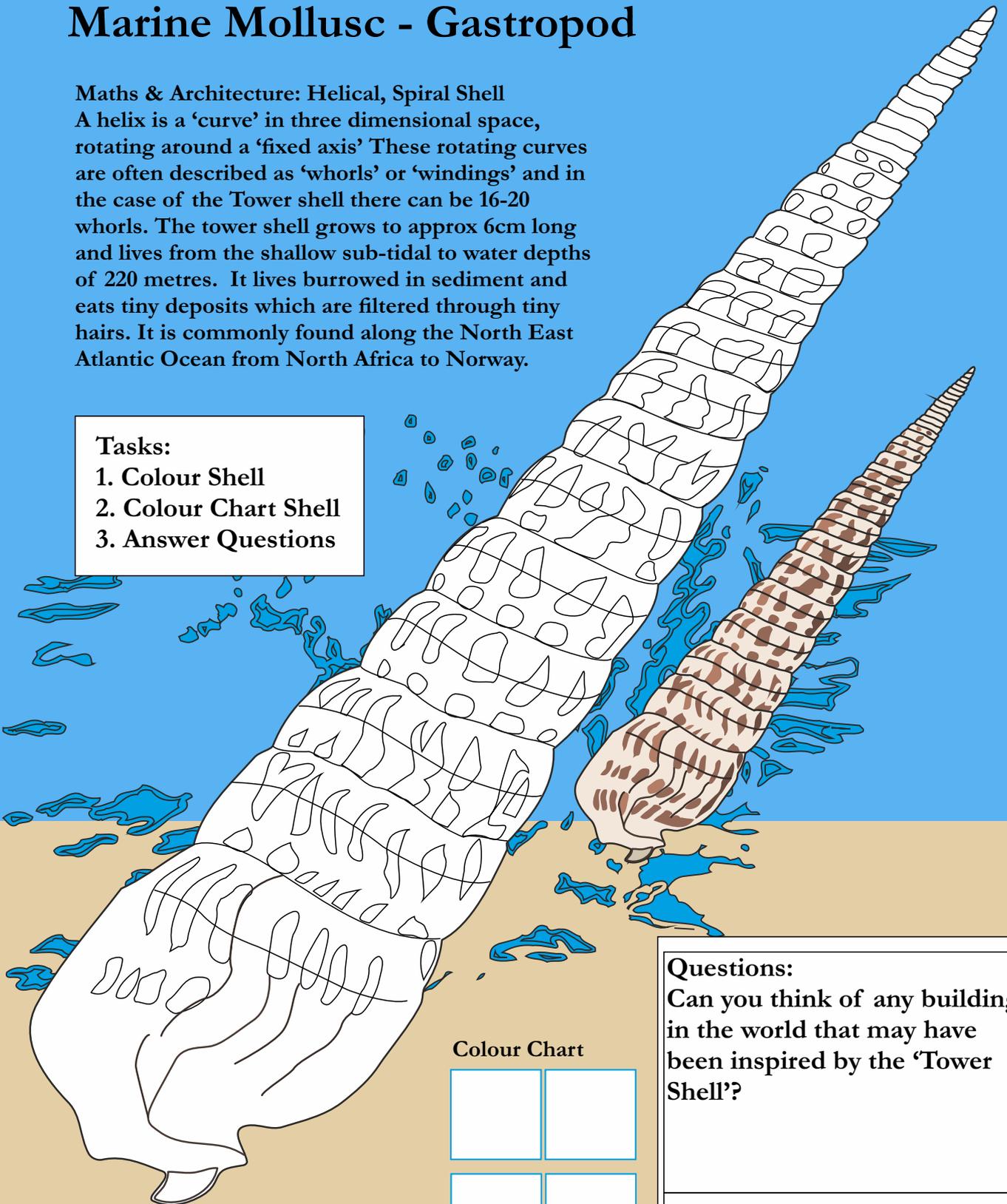
1. Colour Shell
2. Colour Chart Shell
3. Answer Questions

Colour Chart


**Questions:**

Can you think of any building in the world that may have been inspired by the 'Tower Shell'?

How many whorls can you count?



# Abalone Shell

## Marine Gastropod Mollusc

(*Haliotidae spp.*)

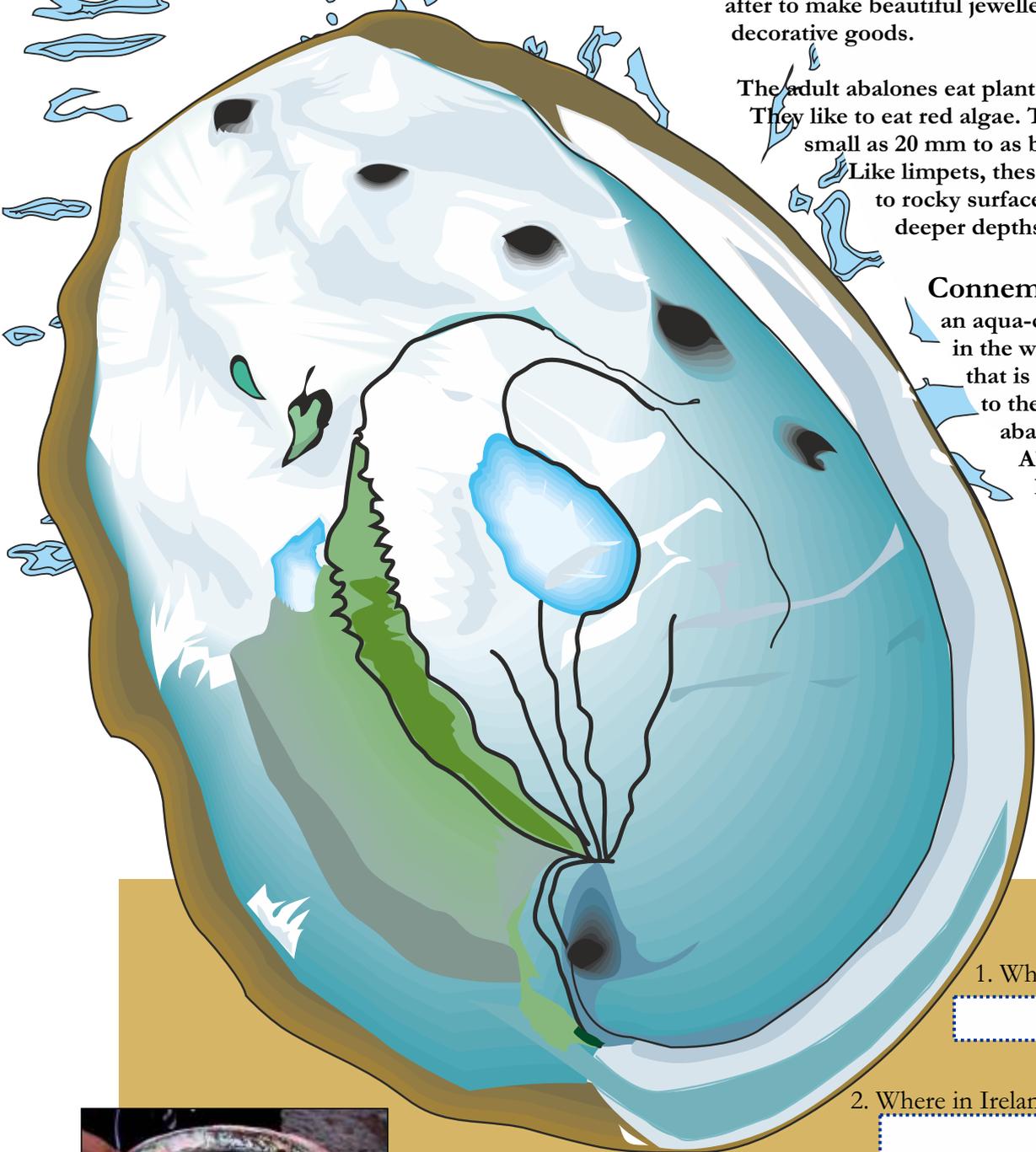
This 'JEWEL' of a shell, also known as Páua or Ormer shell is found in cold waters, along the coasts of New Zealand, South Africa, Australia, and Western North America and Japan.

The inside of the shell is shiny, from a silvery white to green-red mother-of-pearl and this beautiful and hard material is highly sought after to make beautiful jewellery and other decorative goods.

The adult abalones eat plants and feed on algae. They like to eat red algae. Their size can be as small as 20 mm to as big as 200 mm.

Like limpets, these snails cling solidly to rocky surfaces but at much deeper depths in the ocean.

Connemara Abalone is an aqua-culture company in the west of Ireland that is 100% dedicated to the cultivation of abalone shellfish. Abalone are a highly-prized shellfish delicacy, especially now that they have become scarce in most countries around the world where they used to be plentiful.



### Tasks

1. What do Abalone eat?

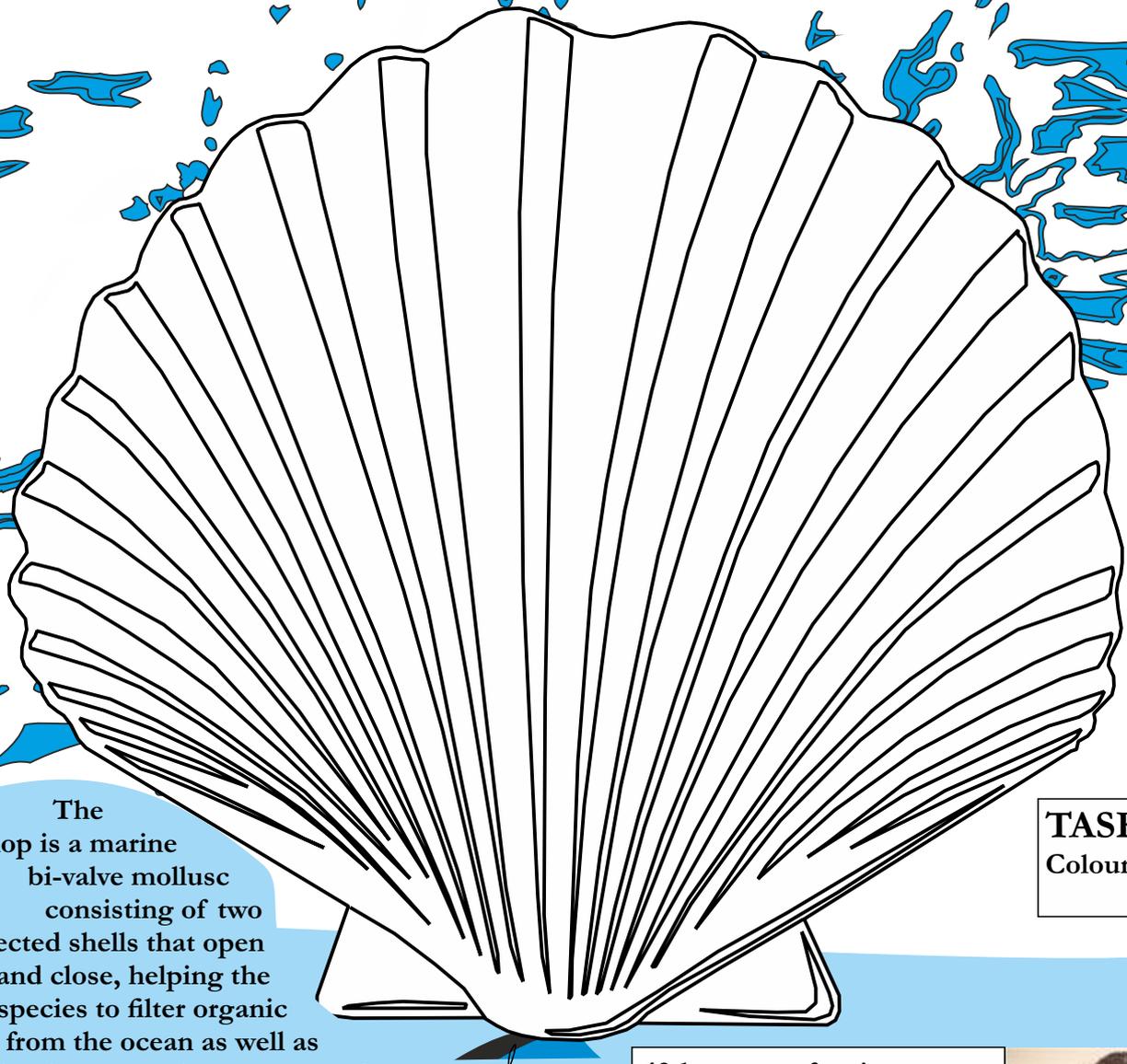
2. Where in Ireland is Abalone grown?

3. Colour Code the Abalone Shell


# Scallop

Marine Bi-valve Mollusc

(Pectinidae spp.)



The Scallop is a marine bi-valve mollusc consisting of two connected shells that open and close, helping the species to filter organic matter from the ocean as well as helping it to move by a process of jet propulsion. As an adult it is 'pelagic' (free floating in the ocean), while the juveniles are firmly attached to rock. The shell is fan-shaped with curved ribs (up to 20) and has a pinkish orange mottled colour. Scallops are fished around the Irish coast especially in winter and spring. They have approx. 60 eyes for detecting light and motion.

**TASK**  
Colour me!

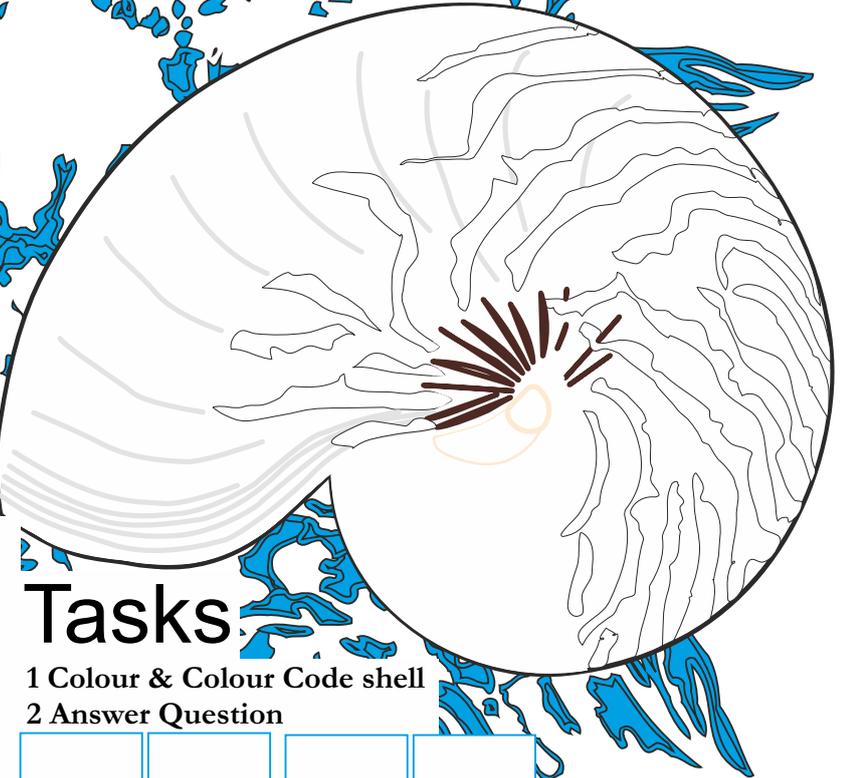
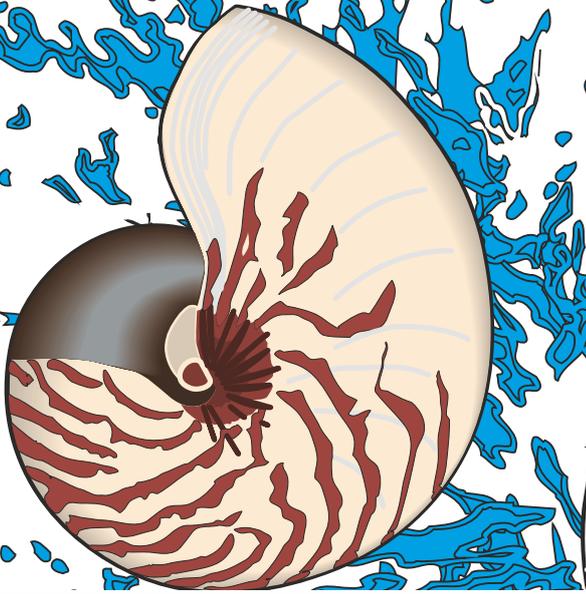
18th century furniture makers, such as Thomas Chippendale, appreciated the proportion and symmetry of the scallop shell. Chippendale incorporated them into his designs, realizing his world-traveled customers would also value the shell's symbolism of marine travel.



**Biomimetic Architecture (right) - Abu Dhabi** - In tribute to the city's maritime heritage, the architects of this building designed a shaped framework of diagonally intersecting steel ribs to create the building's striking curved glass skin. The building was inspired by the Scallop Sea Shell and is 23 story's tall.

(Left): Huge Scallop Sculpture - India





### Nautilus Shell

Pelagic marine mollusc (*Nautilidae spp*)

The Nautilus is a 'pelagic' marine mollusc..that is ..it free-floats in the ocean. It is related to Octopus and Squid.

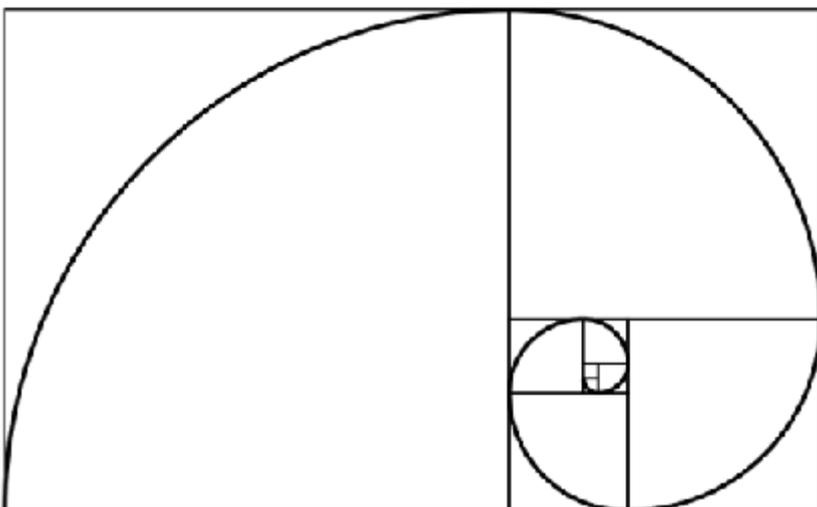
People collect nautilus because of their beautiful shells which are sold as ornaments.

Nautilus can reach 8 to 10 inches in diameter. Its shell is white to orange in color and covered with brown stripes. Inner side of the shell is pearly. It lives in the Indian and Pacific oceans.

Nautilus has 90 long tentacles, located outside the shell.

Nautilus are living fossils. They are living on the planet 500 million years without any changes in their appearance. Nautilus inhabited the Earth 265 million years before dinosaurs appeared. **Ancient!**

Mathematicians have fretted over the Nautilus spiral for many centuries, attempting to decipher a 'Golden Spiral' ratio based on the diagram below.



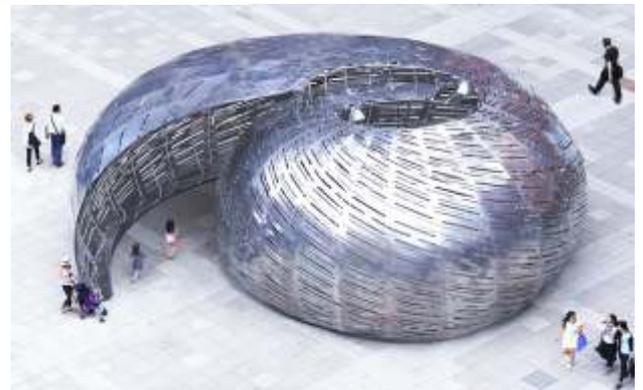
### Tasks

1 Colour & Colour Code shell

2 Answer Question

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Question: - How many squares can you count in the 'Golden Spiral ratio graph below?



NASA commissioned architects to create an installation that resembles a shell for hearing the vast sounds of satellites. The 'orbit pavilion' was designed as a traveling exhibition to spotlight the invisible sounds and trajectories of 19 NASA satellites orbiting the earth. Building on a childhood memory of listening to sea shells, the architect created a chambered nautilus structure using 3,500 square feet of cut aluminum panels inscribed with over 100 orbital paths fitted together and bolted to a curved framework of aluminum tubes.

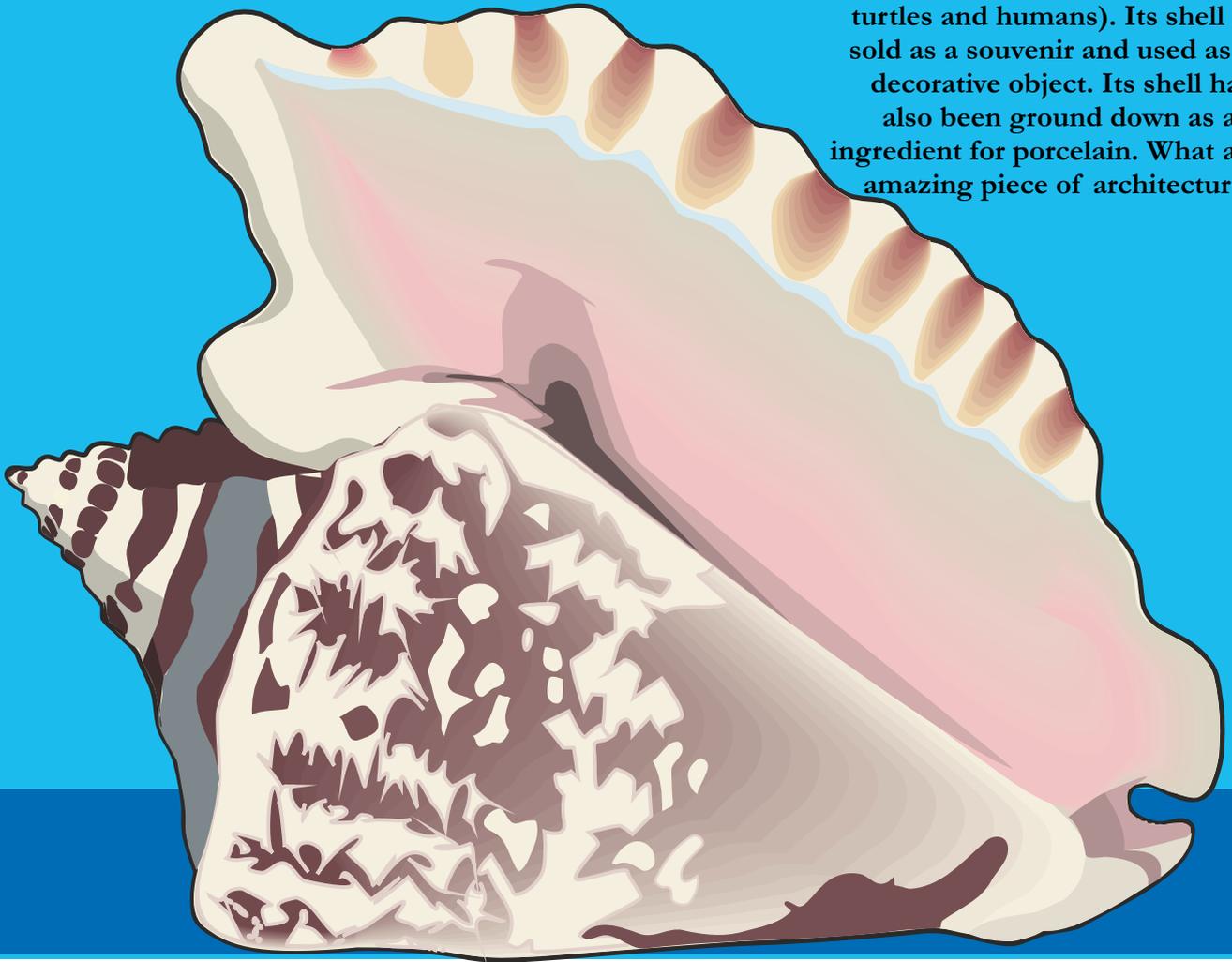
How difficult!...a Nautilus shell creature can 'just grow its own'!

# Queen Conch Shell

*(Lobatus gigas)*

Marine Gastropod Mollusc

This is a very large mollusc species found on the Tropical North West Atlantic Coastline (e.g Florida)The queen conch is eaten by several species of large sea snails, and also by starfish, crabs and vertebrates (fish, sea turtles and humans). Its shell is sold as a souvenir and used as a decorative object. Its shell has also been ground down as an ingredient for porcelain. What an amazing piece of architecture!



Another example of seashell architecture, is found on Isla Mujeres, a tropical resort in Mexico. The house is named “Shell House” and its design has been inspired by the Conch Shell shown above..with some windows added of course!

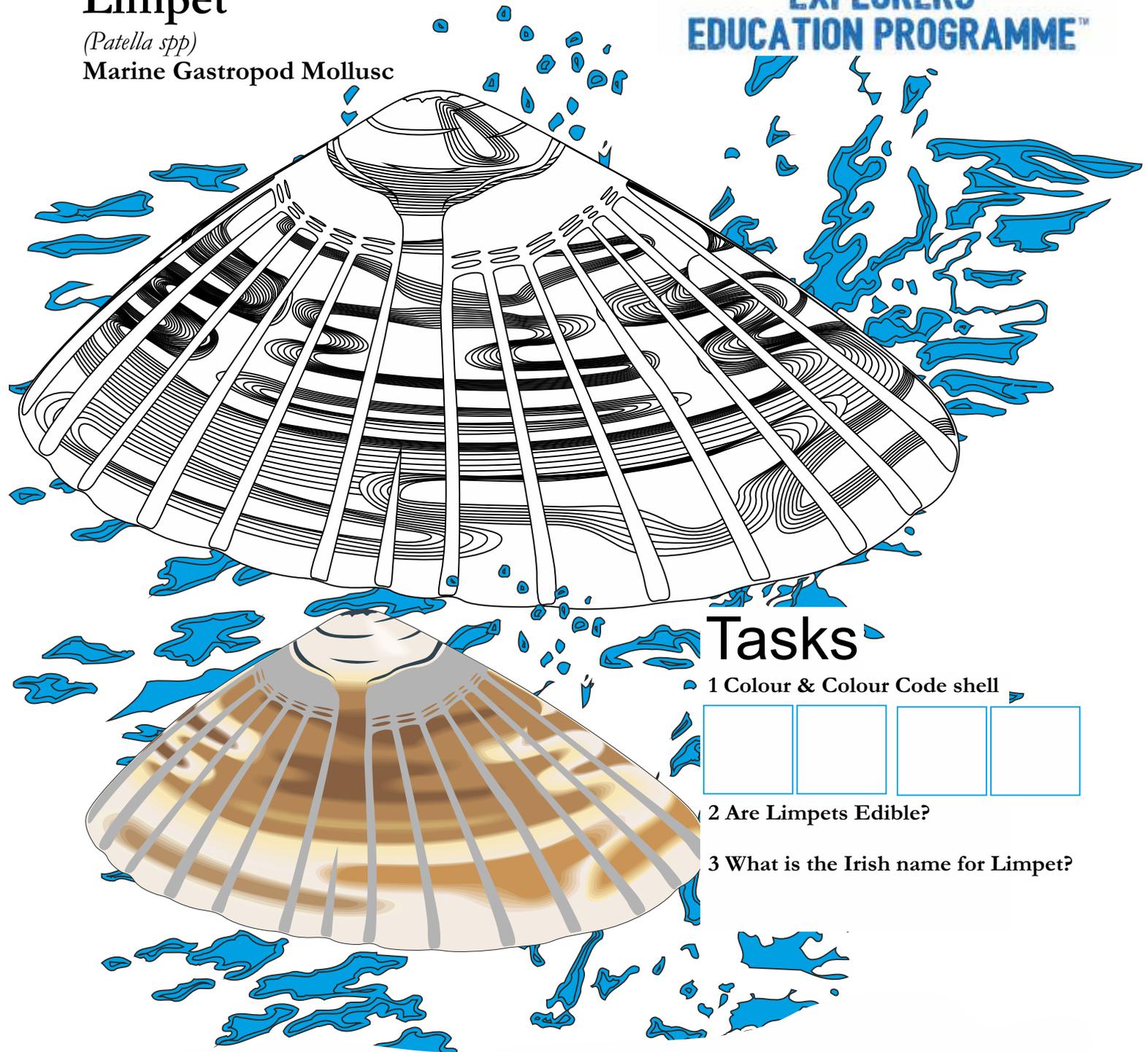
Tasks - Colour Code Shell


# Limpet

(*Patella spp*)

Marine Gastropod Mollusc

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## Tasks

1 Colour & Colour Code shell

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2 Are Limpets Edible?

3 What is the Irish name for Limpet?

**Limpets** are one of the most recognisable gastropod molluscs found on rocky shore all around the Irish coastline. The shell shape is roughly conical to pyramidal and adapts its shell shape to its particular environment. Although the limpet has ribbing on its shell, these are often worn away by erosion on an exposed living position. Therefore, meeting dead limpet shells on the shore, it is possible to decide which location on the shore the limpet had actually lived.

**She sells seashells by the sea shore!**

Conchology is the study of mollusc shells.

Browse

and read this Sea shell presentation many times, complete the tasks and then share it with your family and friends! Think about what it would be like living in a house versus living in a sea shell. Write down your thoughts!

The Explorers Education Programme™ is supported by the Marine Institute and is funded under the Marine Research Programme by the Irish Government.