MARINE EROSION PROCESSES.

Read the course booklet.

You will need to know and be able to explain the four methods of coastal erosion and two of weathering.

The next few slides illustrate these processes.
Hydraulic Action

The force of waves hitting a cliff (or sea wall) compresses water and air into cracks and joints. This increase in pressure may lead to cracks widening and pieces of rock breaking off.
**Abrasion**

Rock fragments may be picked up by waves and thrown against the rock face of cliffs by subsequent waves.

Sometimes the softer strata are abraded more than the harder ones, giving a striped appearance.

Abrasion is most effective at the base of cliffs.
Wave attrition

Rock fragments are worn down into smaller and more rounded pieces.

Currents and tidal movements cause the fragments to be swirled around and to grind against each other.

This type of erosion produces pebble beaches.
Water-layer weathering

Alternative wetting and drying - as happens with the rise and fall of the tides - can disintegrate porous or coarser rock layers.

Salt crystals growing in rock spaces can do the same thing.
Corrosion (solution)

Salts and acids in sea water can react with rocks, slowly dissolving them away.
Rates of erosion depend on many factors:

- Waves - strength, frequency, height
- Weather - frequency of storm conditions
- Geology of the coastline:
  - type of rock
  - orientation of stratification (the way the bedding planes in the rock face the sea)
The FETCH is the distance travelled by waves from one shore to another.

The waves hitting the southwest coast of England have a fetch of about ten thousand miles!
Many erosion features are a result of rocks of varying hardness occurring beside/below each other. The **DIFFERENTIAL EROSION** between them creates the landform.
There are eight erosion-related features you need to learn. In groups of 4 using a new text book each you will make notes on all the erosion features...

You all need to be able to ;-)

✓ Describe them using their proper terms
✓ Explain IN DETAIL how they form
✓ Draw simple LABELLED SKETCHES of them
✓ Give EXAMPLES of them in the UK.

BAY AND HEADLAND
STACK
STUMP
CAVE AND BLOWHOLE
NEEDLE
ARCH
ABRASION NOTCHES
WAVE-CUT PLATFORM
See how the base of this cliff is being broken up by the attrition of the cobbles— and litter— at its high tide mark.

Note the softer layer of shale at the cliff foot!
Headland erosion near Noss Point Caithness

The sea is eroding this headland back leaving a wave-cut platform below the waves.
There is a copy of this diagram to stick into your jotters.
How Are Wave Cut Platforms Formed?

- Erosion is greatest when large waves actually break against the foot of a cliff.
- The foot of the cliff is undercut to form a wave cut (abrasion) notch.
- As the notch gets larger the cliff above becomes increasingly unsupported and in time collapses (often by a mass movement process!)
- As this process continues the cliff will slowly retreat.
- The flat land left at the foot of the cliff is called a wave cut platform.
Cliffs and Wave Cut Platforms
Durdle Door arch behind a Wave Cut Platform at low tide.
Sea Inlet near Noss Point

Caused by hydraulic action at a weakness in the rock.
Sea Inlet At Duncansby Head
The headland diagram - You MUST LEARN THIS!
Smoo Cave near Durness
A Blowhole or 'gloup' may form if the erosion at the back of the cave breaks through the roof to the top of the cliff.

This usually happens at high tide in stormy weather.
An arch forms when the sea breaks through to the other side of the headland.
Durdle Door.
The Pinnacles at Ballard Point—stacks
Old Harry stack, Dorset Coast

Old Harry used to have a ‘wife’, but she has almost disappeared as a stump!
Coves are a special feature and we will learn about them by looking at a case study of Lulworth Cove.
Lulworth Cove was formed by differential erosion. The next slides will explain how this happened.
The hard rock at the coast has been breached. The sea can now get in to erode the softer rock behind, creating the cove. The second layer of hard rock stops the cove growing much larger.
LITHOSPHERE CORE

COASTLINES

Chalk

Sandstones and clays

Limestone
LITHOSPHERE CORE

COASTLINES
When you are revising this topic, for each feature mentioned, look back through your unit booklets and this presentation. You are looking for named examples of as many features as possible.
You have now completed the erosion section of this unit.

You should be familiar with the following terms and be able to define and use them in your answers. Copy this list.

**PROCESSES**
- Solution
- Wave Pounding
- Abrasion
- Attrition
- Hydraulic Action
- Water-Layer Weathering

**FEATURES**
- Blowhole
- Arch
- Needle
- Cave
- Stump
- Stack
- Cove
- Inlet
- Bay and Headland
- Notches
- Wave-Cut Platform

**RELATED TERMS**
- Fetch
- Stratification
- Rock
- Orientation
- Differential Erosion

END