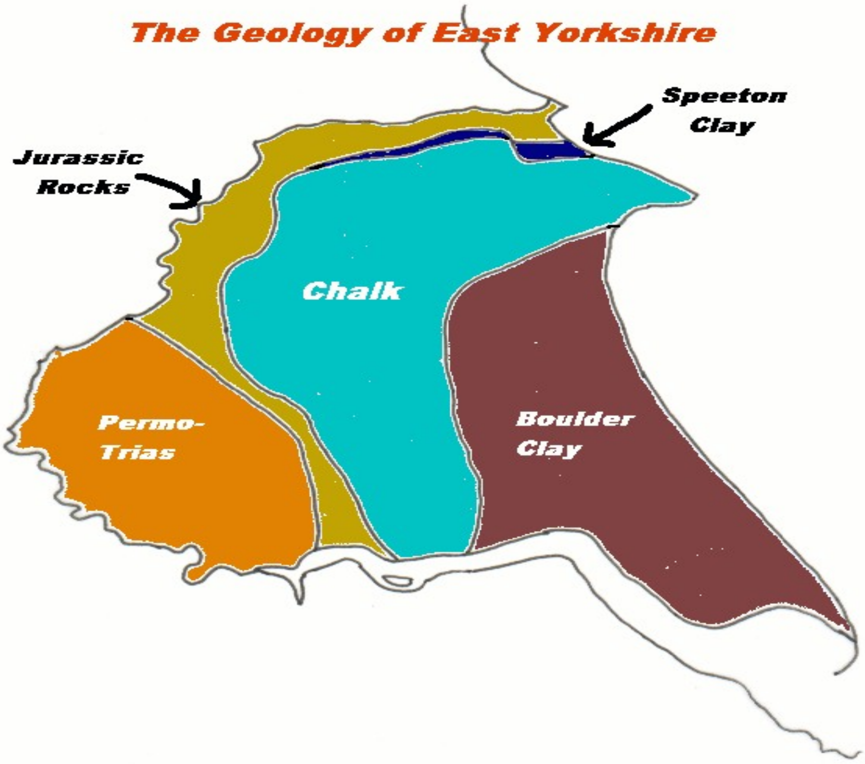
AS GEOGRAPHY FIELDWORK



NAME ....

NAME..

Work as a pair. You will only need to hand in one **copy** of the finished fieldwork folder. Some of the work will need to be done on the day, but some of it will need to be done in your own time in the week following the fieldwork day.

FLAMBOROUGH HEAD

Field sketch of coastal features of erosion

THE INFLUENCE OF GEOLOGY

Take down brief notes to show that you understand each of the following terms:-

Chalk

Beds

Joints

Flint

faults

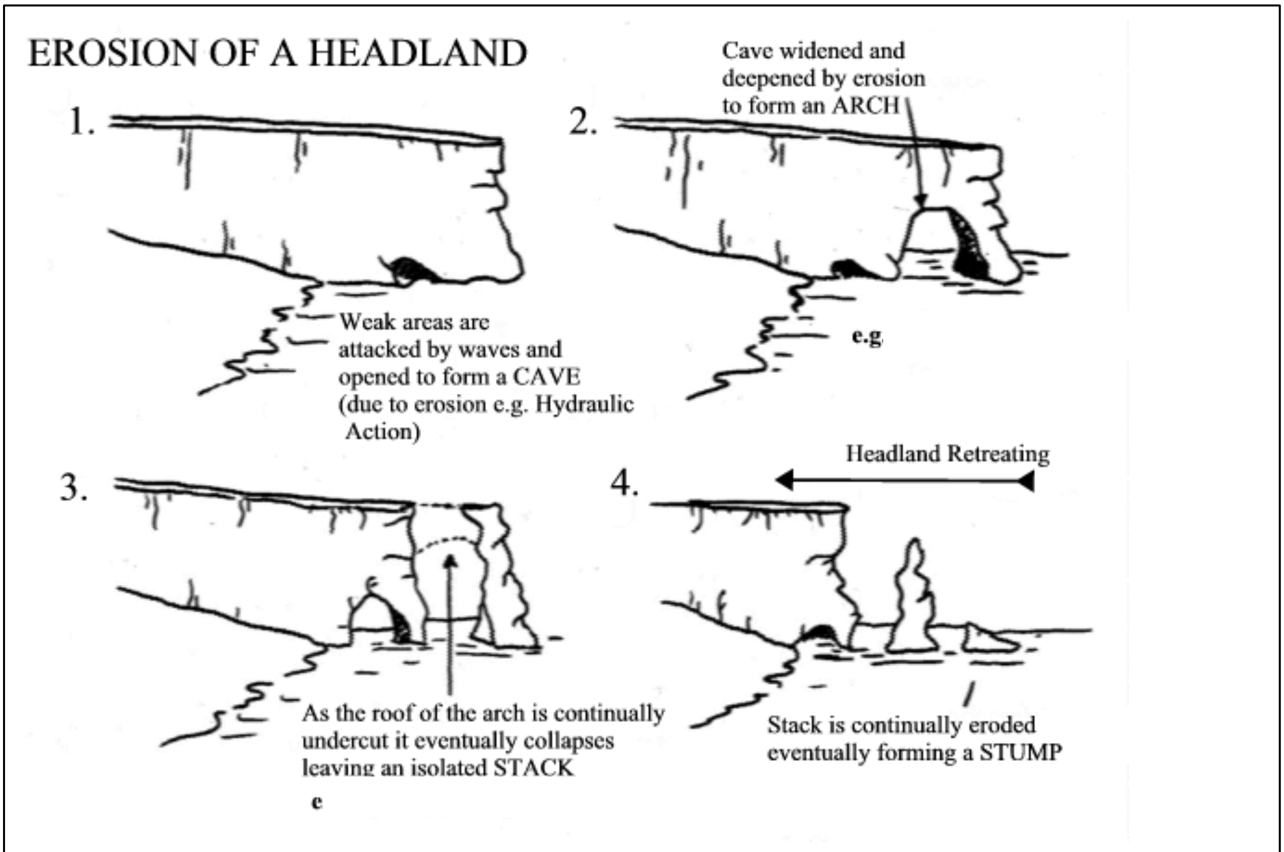
Field sketch of chalk beds, joints, faults and cave formation

FLAMBOROUGH HEAD NORTH LANDING

Geology

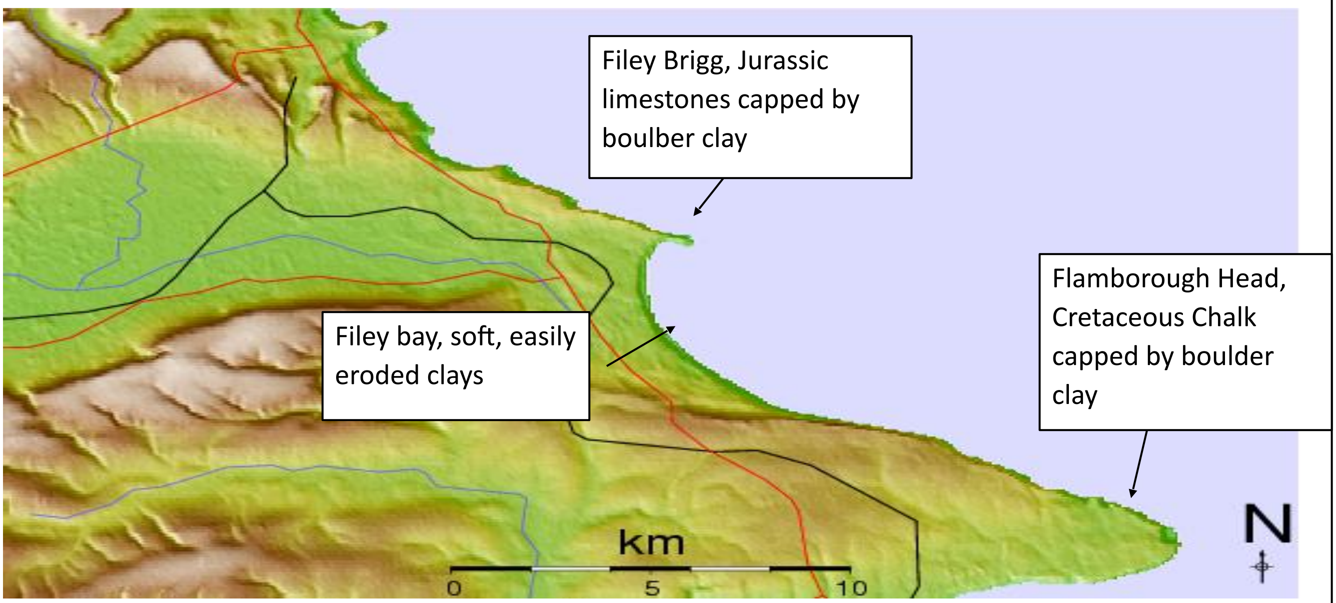
The most striking aspect of Flamborough Head are the white chalk cliffs that surround it. The chalk lies in distinct horizontal layers, formed from the remains of tiny sea creatures millions of years ago. Above the chalk at the top of the cliffs is a layer of till (glacial deposits) left behind by glaciers 18,000 years ago, during the last ice age. As the cliffs below are worn away by the action of the waves, the clay soil often falls into the sea in huge landslips.

The sea attacks the coast around the headland in two ways. Waves beat against the vertical cliffs and, at the high water line, weak points in the chalk are worn away into caves. The weakest points are where vertical cracks or fault lines have appeared in the horizontal beds of chalk. At places on the cliffs where the chalk juts out, these caves are worn away into rock arches. If the top of an arch collapses, the result is a pillar of chalk cut off from the rest of the headland - this is called a stack. Flamborough Head has many caves and arches, as well as a few stacks. The process of erosion that has created them can take hundreds of years to do its work.



FILEY BRIGG AND FILEY BAY

- A Discordant coastline is found where the rocks and relief trend at right angles to the coast
- The resistant rocks are not eroded a great deal and form a headland
- Less resistant rocks are more easily eroded to form bays
- The Yorkshire coast at Flamborough and Filey has headlands of chalk and limestone
- A beach forms in Filey bay eroded in softer clay between the two headlands
- Waves form cliffs, caves, arches and stacks on the headland, but deposition



"There is a rich untapped reservoir of history, Geology and Archaeology which is unique to our area" - said Tony Green of the Filey Bay Initiative commenting on the discovery of a Plesiosaur in the cliffs to the South of Filey.

Filey Bay is the home to the Jurassic Coast , with the Geologically important Filey Brigg to the north of the bay and to the South, the famed Speeton clay cliffs, and following on from a fault line that roughly bisects the Bay in an easterly direction, the white chalk stone cliffs of the Cretaceous period leading to Flamborough Head. You can trace back in time when the dinosaurs trod the ooze of the river estuaries here over 140 million years ago. The **Jurassic** is the second epoch of the Mesozoic era, lasting for 45 million years during which dinosaurs and ammonites flourished.

Because of its geological importance, Filey Brigg to the north of the Bay is a site of Special Scientific Interest (SSSI) and is also designated as a local Nature Reserve. In the Jurassic period of about 150 million years ago the hard rocks were laid down as silt and the Brigg and Carr Naze were built up by layers of material that were laid down over the subsequent millennia.

The Brigg consists of the hard rocks jutting out to sea in the form of a peninsula topped by the "Boulder Clay" cliffs known as Carr Naze. The Brigg and Carr Naze are easily identifiable and they form a recognisable feature that readily identifies with the town of Filey.

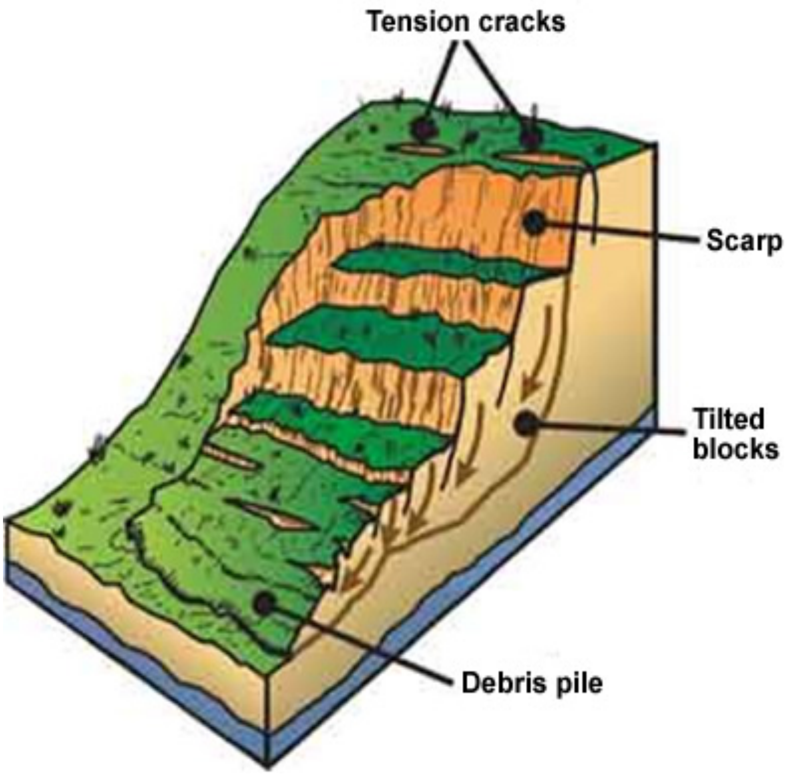
FILEY - WELL LABELLED / ANNOTATED FIELD SKETCHES

EROSION OF THE BARMSTON CLIFFS

Make brief notes on each of the following sets of processes that causes the cliff line to recede

WAVE EROSION PROCESSES

SUB-AERIAL PROCESSES



Explain how this process of landslipping works

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TAKE RANDOM SAMPLE OF BOULDERS / CLASTS FROM THE BOULDER CLAY / GLACIAL TILL AND FROM THE FLUVIO GLACIAL

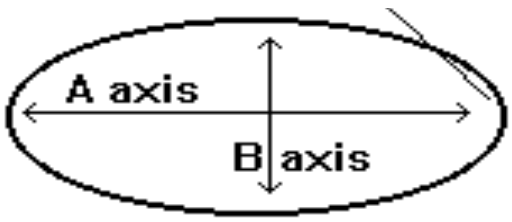
BOULDER CLAY / TILL

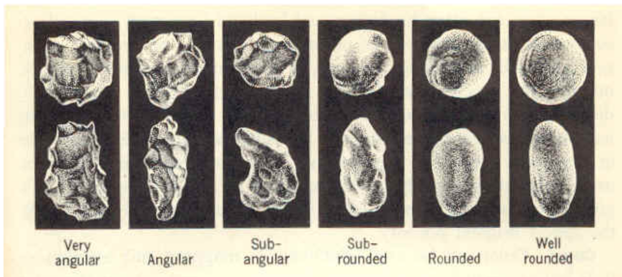
SAMPLE	LONG AXIS mm	**Powers score 1-6**
1		
2		
3		
4		
5		
6		

FLUVIO-GLACIAL MATERIAL

SAMPLE	LONG AXIS mm	**Powers score 1-6**
1		
2		
3		
4		
5		
6		

The long axis is A, the longest axis you can find on the sample





1 2 3 4 5 6

Powers roundness score

The character of material that has been deposited by glaciers and that deposited by fluvio-glacial meltwater streams should be significantly different. Water aids the process of **ATTRITION**, that erodes the material being transported.

Any material transported and deposited by water should be:-

SMALLER

More **SPHERICAL / ROUNDED**

SMOOTHER

Better **SORTED** (have a smaller range of sizes)

STRATIFIED to some extend (in layers)

After a brief look at your two samples do you think that they are significantly different, and does the data support the theory set out above? (Support your answer with data from the above tables)

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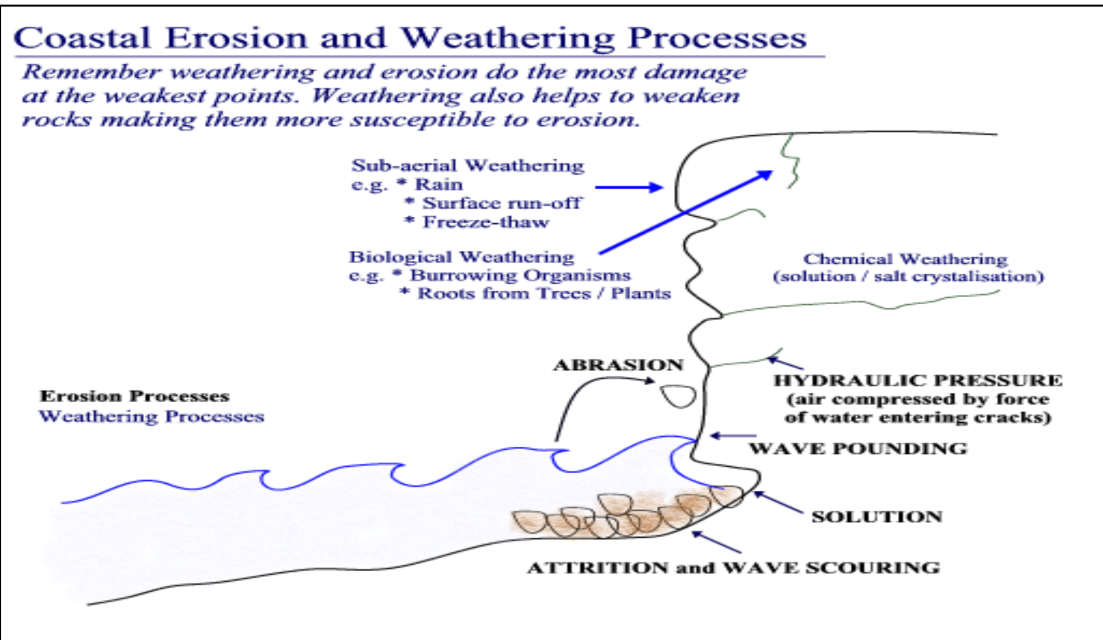
STATISTICAL WORK TO COMPARE THE TWO SAMPLES

Boulder clay / glacial till	Fluvio-glacial material
Dispersion diagram of long axes	Dispersion diagram of long axes

Compare and attempt to explain the differences in the size, degree of sorting and shape of the two samples

ANNOTATE THIS IMAGE FULLY TO SHOW THE FACTORS THAT AFFECT THE DEVELOPMENT OF THE COAST



The most visible of the erosion zones, the cliff face undergoes erosion whenever the tide is high enough to allow wave action to strike its base. Wave impact and abrasion forces are then capable of removing material so steepening the cliff face to a point where it collapses spilling material onto the beach, this clay is then rapidly removed by subsequent tides. If beach levels are particularly low then a higher number of tides will reach the cliffs and more erosion will occur. This erosion state will usually continue until beach levels recover, which can be anything from months to several years. A period of relative calm will then follow until the cycle repeats again which may be in years or even decades time.

As unpredictable beach levels play such an important role in controlling cliff erosion rates there is considerable variation in erosion over time and at each location. Opposite stable managed frontages erosion has been reduced to near zero, whereas on exposed stretches erosion rates have on occasion been consistently recorded at over a metre a month. The average rate however for the Holderness area south of Atwick has in the long term been fairly consistent at just over 1.7m/year.

MAPPLETON

Mappleton is an excellent case study of an attempt at coastal management. In 1991 two rock groynes and a rock revetment made from huge blocks of Scandinavian rock were built.
As a consequence a substantial beach accumulated between the groynes halting erosion. However, further south the rate of erosion has increased significantly. This is because material which is being carried south is not being replaced (it is trapped within the groynes). Therefore there is no beach to protect the cliffs. Even during a neap tide (a tide which is 30% less than the average tidal range) the sea reaches the base of the soft cliffs and erosion occurs.
There are 4 main elements to the defence at Mappleton

1. Two rock groynes to try to limit southwards longshore drift of beach material
2. Replenishment of sand on the beach to build it up and absorb wave energy
3. Armouring the base of the cliff with energy absorbing igneous and metamorphic rocks (rip-rap)
4. Degrading the angle of the cliff to limit sub-aerial processes of weathering and slumping. Grassing and draining the clay on the cliff to limit slumping

How have the defences at Mappleton affected rates of erosion to the south and why?

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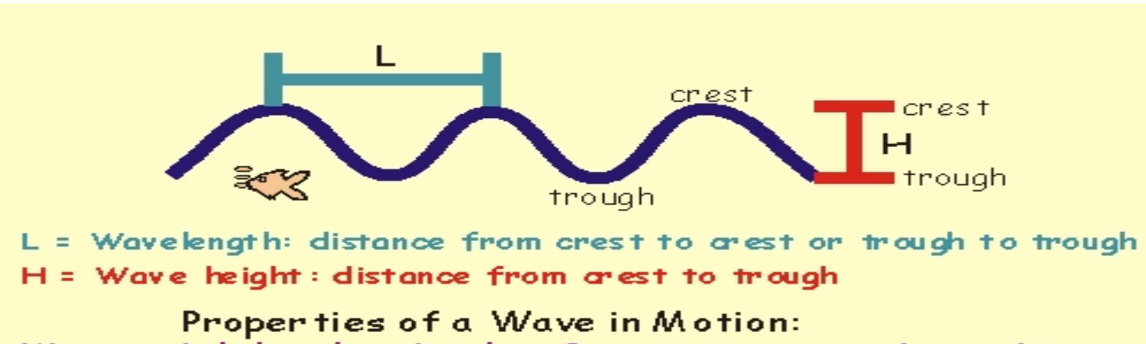
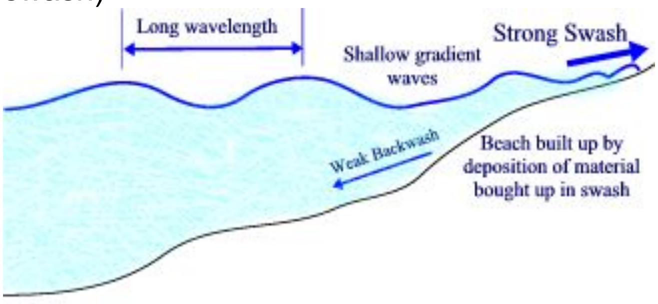
Annotated field sketch of the Mappleton defences

WAVE MEASUREMENTS



Constructive Waves Destructive Waves

- small in height
- gentle angle
- less energy
- strong swash and weak backwash (material is moved up the beach by the strong swash)



Constructive Waves

- large in height
- steep
- lots of energy

Make a simple record of the waves at Mappleton

Wave record site …………………………… date …………….. time ………………..

Wave orientation (degrees) ……………………………………………

Time for 10 waves to break ……………………………………secs

Wave period (time for each wave) divide total time by 10……………………secs

Wave height ………………..cm converted to metres ……………… m

Which direction is longshore drift today? North or south

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Are the waves constructive or destructive? (explain your answer)

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Are they high or low energy waves? (explain your answer)

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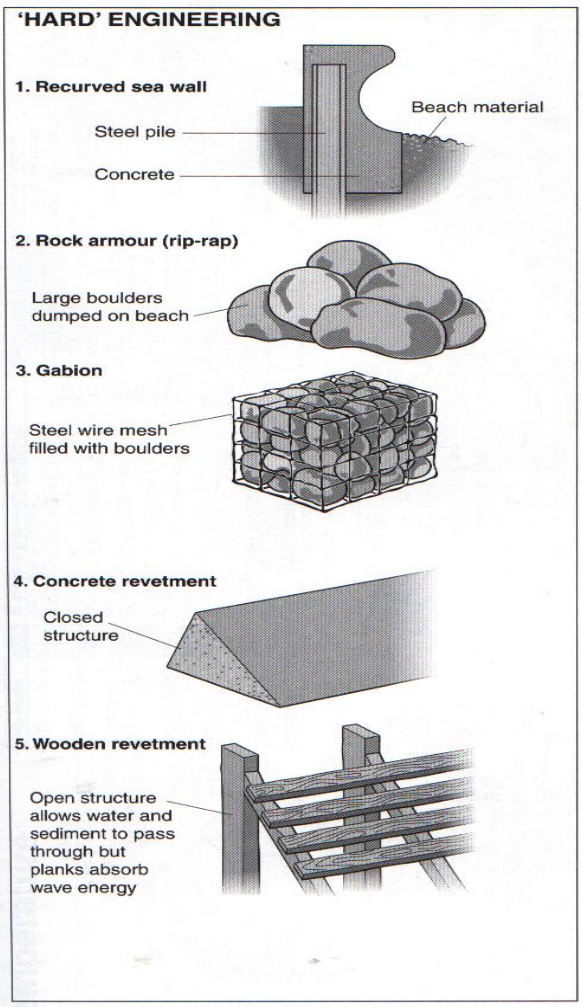
WITHERNSEA

Managing coastal areas



1. Which of these techniques of coastal defence can you see being use at Withernsea?

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2. How do you think the techniques work?

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Can you see a 'soft' method of defence?

Name it and suggest how it works

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DRAW A LABELLED CROSS SECTION OF THE DEFENCES AT WITHERNSEA