

Weathering and Mass Movement

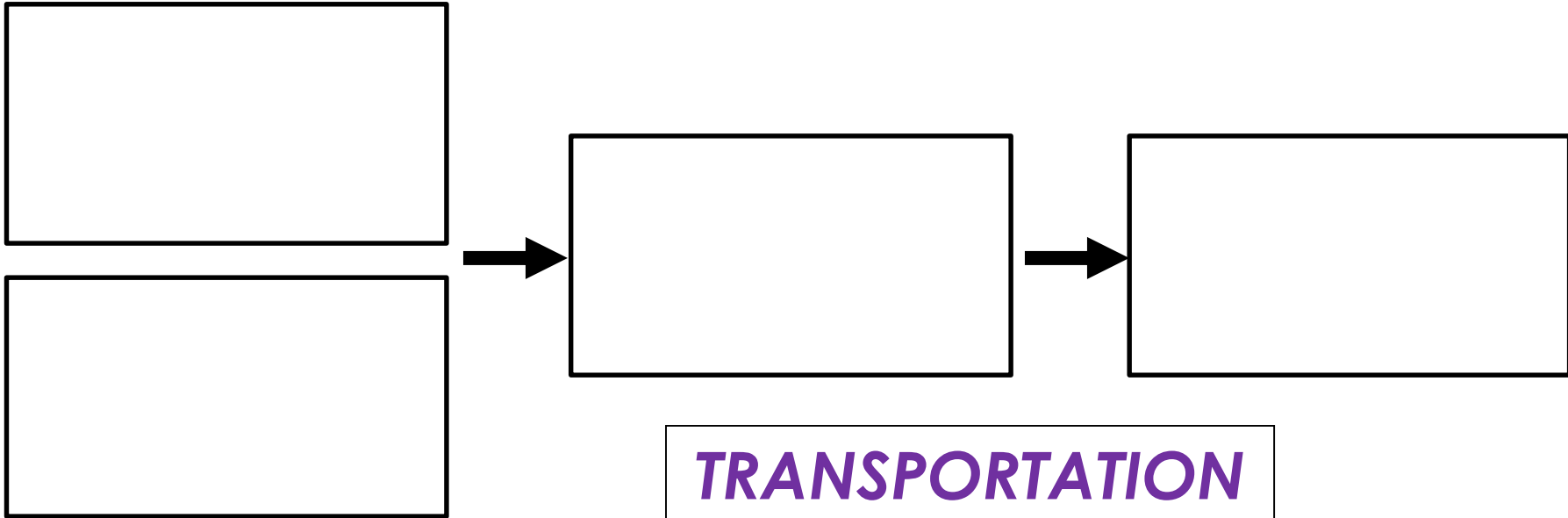
Learning objective:

- **Examine** the influence of sub-aerial processes

Learning Outcomes:

- **Compare** sub-aerial with marine processes
- **Explain** types of weathering
- **Assess** how mass movement occurs and the effects it can have

The coastal system...



Remember Year 8?

TRANSPORTATION

EROSION

DEPOSITION

WEATHERING

Sub – aerial processes are to do with...
Whereas, marine processes are to do with...



Sub – Aerial Processes

(weathering):

- Rain
- Temperature
- Animals
- Plants



Marine Processes:

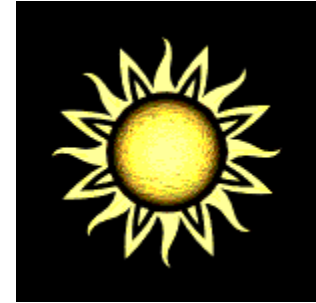
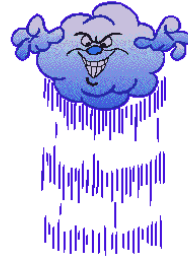
(erosion):

- Corrasion
- Attrition
- Solution
- Hydraulic Action



Weathering on the coast

- Weathering is:



“Weathering is the break up of rocks by changes in the weather – rainfall and temperature. They are also broken up by plants and animals.”



How can the weather cause this to happen?



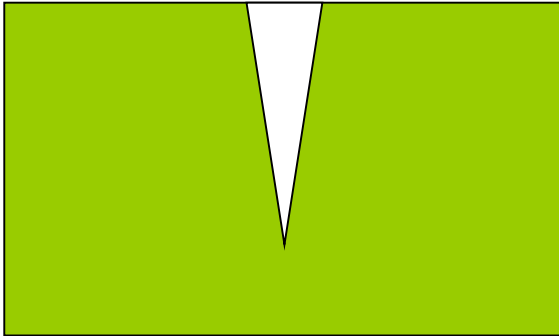
Can you remember the type of weathering common here?



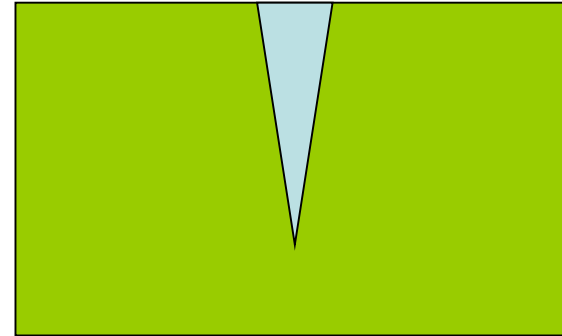
Why is **freeze thaw weathering** effective here?

Porous (contains holes) and permeable (allows water to pass through)

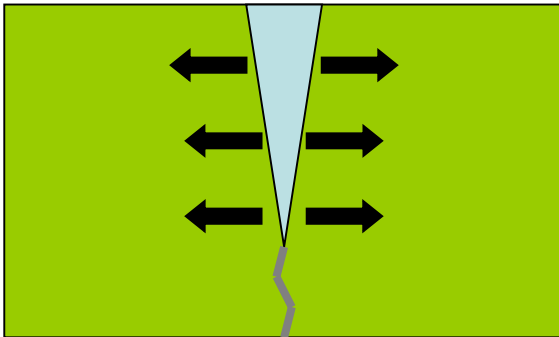
Freeze – Thaw weathering



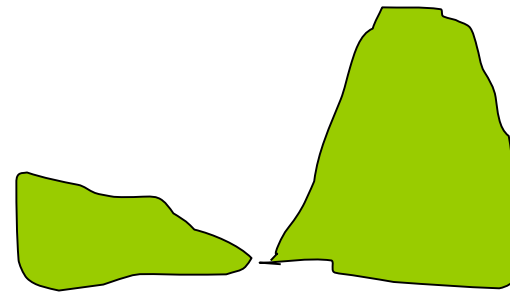
Rocks have many cracks.



Rain water fills the cracks.



Water freezes. Expansion causes stresses and cracks are enlarged. When the ice thaws, the crack contracts.



Repeated freezing and thawing happens. Rock fragments break off and collect as scree at the foot of the cliff.

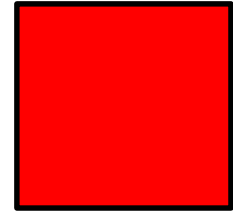


Explain how chemical weathering happens.



Try to include as many keywords from the list as you can.

- rainwater
- acid rain
- carbonic acid
- dissolve
- greenhouse gasses
- acid
- chalk
- reacts
- alkaline
- limestone



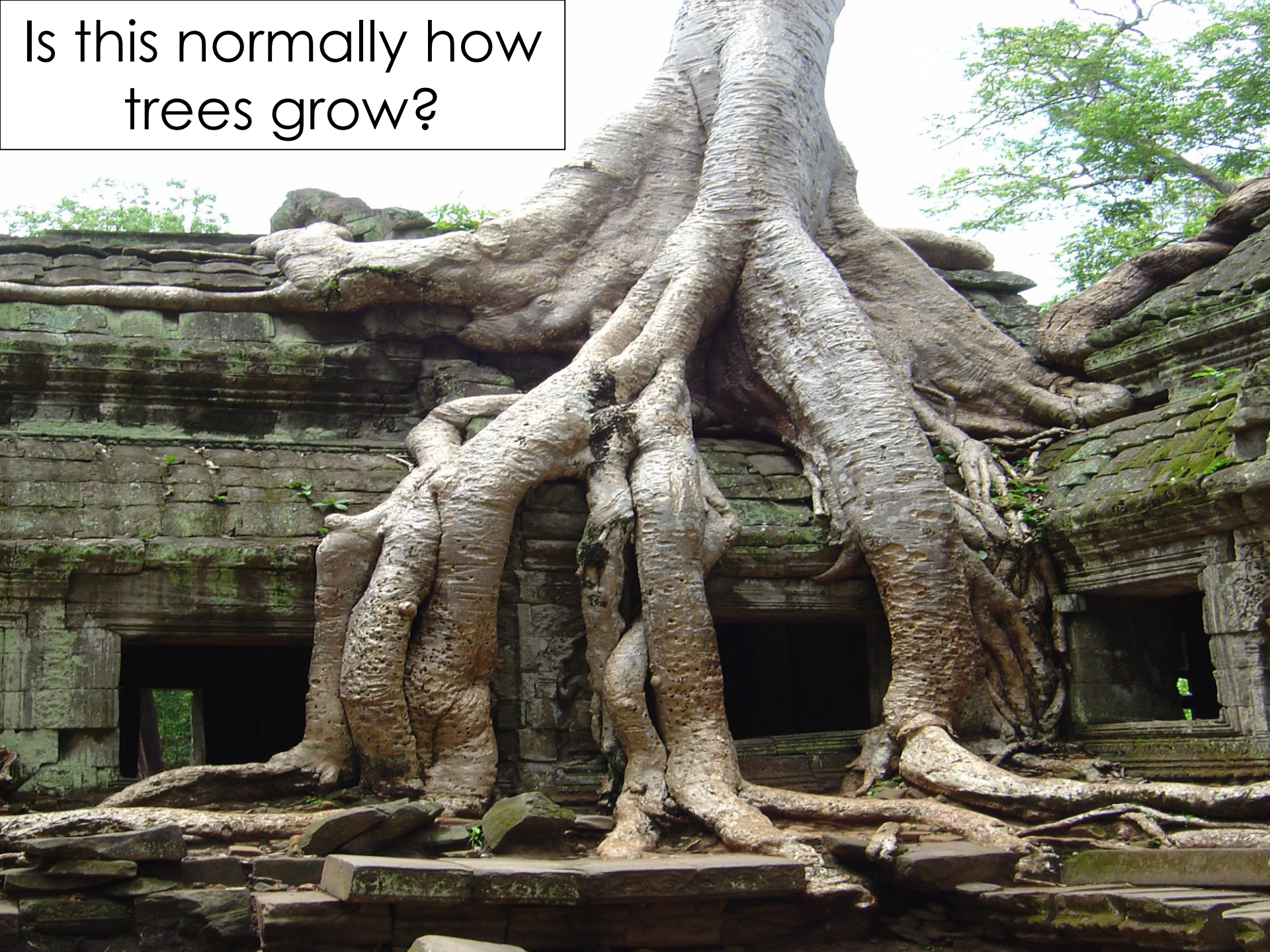
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CHALLENGE

Chemical weathering is caused by the action of **rainwater**.
Rainwater contains small amounts of **acid** that attacks **alkaline** rock
such as...

Peer Assessment

Chemical weathering is caused by the action of **rainwater**. Rainwater contains small amounts of **acid** that attacks **alkaline** rock such as **limestone** and **chalk**. The acid is called **carbonic acid** (H_2CO_3) and is made when CO_2 **reacts** with rainwater as it falls. This causes the rocks to be **dissolved** by rainwater. **Acid rain** makes rainwater more acidic than normal and is caused by **greenhouse gasses** dissolving in water found in clouds.

Is this normally how
trees grow?



Mass movement:

Downhill movement of material under influence of **gravity**

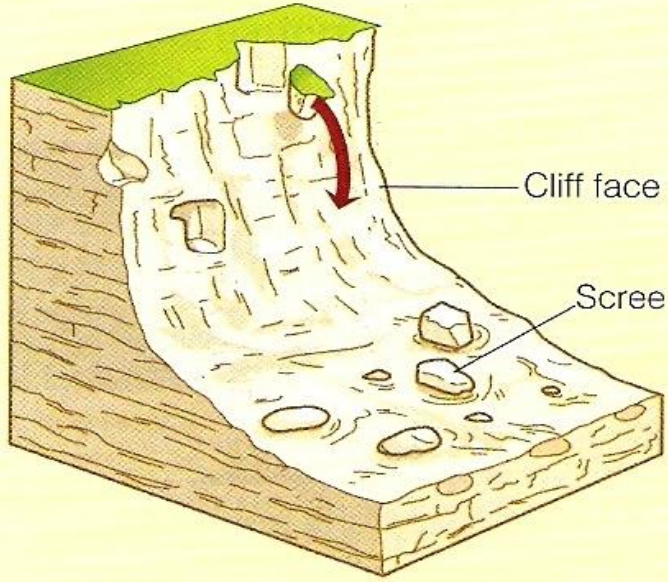
This material and weathered material is carried away by waves along the coast

Landslip at Holbeck Hall, Scarborough:

60m of cliff slid onto beach

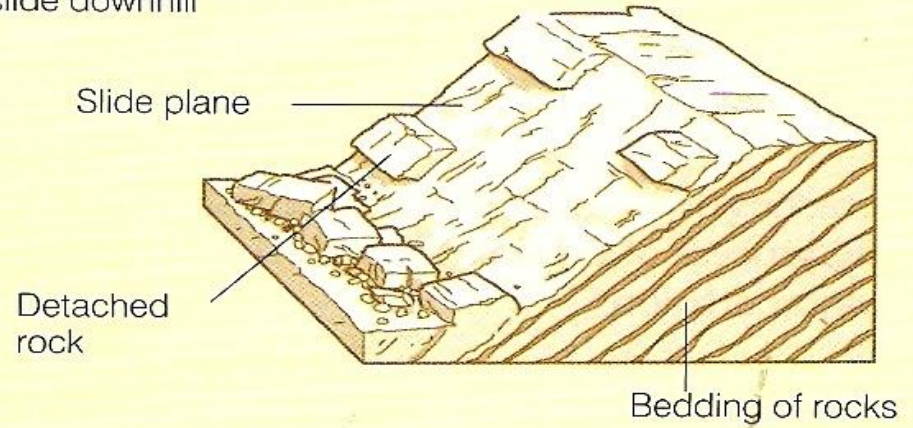


a Rockfall – fragments of rock break away from the cliff face, often due to freeze–thaw weathering

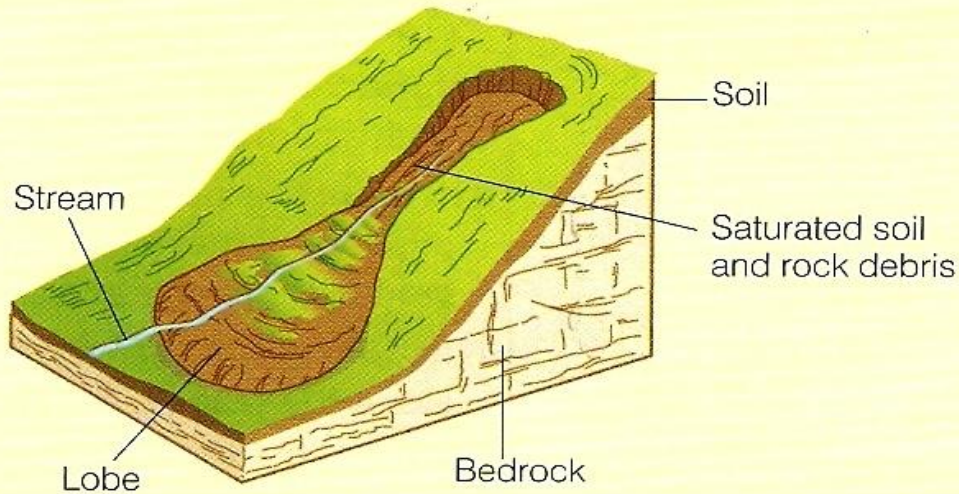


Types of mass movement at the coast

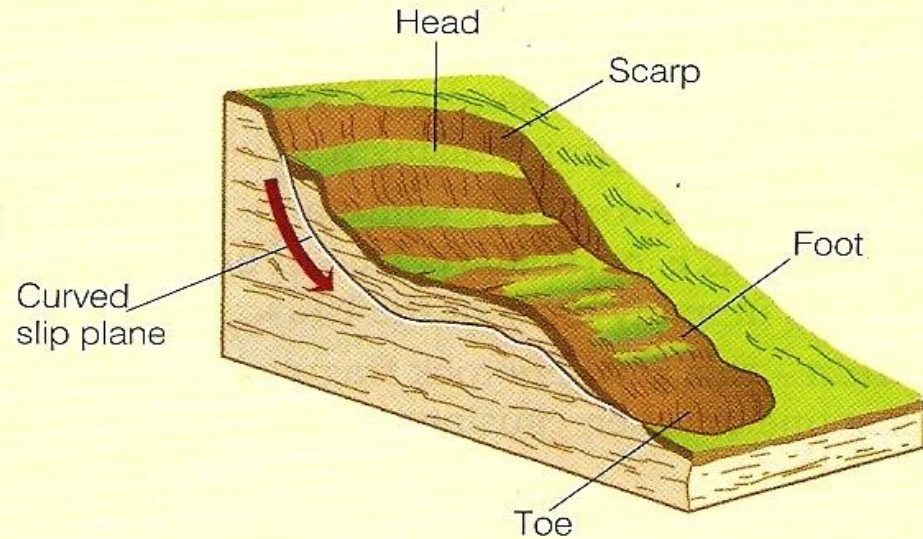
b Landslide – blocks of rock slide downhill



c Mudflow – saturated soil and weak rock flows down a slope



d Rotational slip – slump of saturated soil and weak rock along a curved surface



Define mass movement. (2 marks)

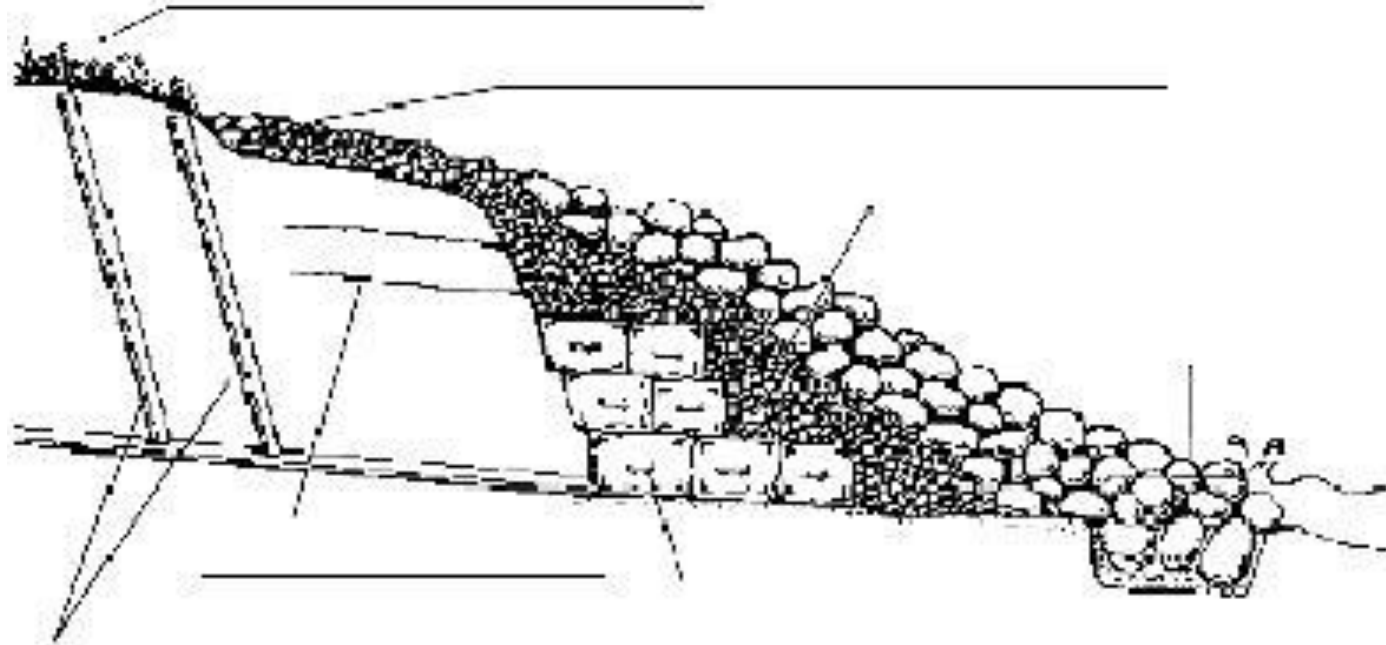
The downward movement of loose material (1) under the influence of gravity (1). It may rapidly transform the coast / cliffs (1) via sliding / slumping / rockfalls (1).

Sketch this photograph, then **describe** the process of **mass movement** and **suggest** the causes.



Since the landslide occurred, the cliff has been strengthened at a cost of over £1.5 million.

- (a) the slope where the landslide occurred has been made **flatter** - the flatter it is, the less likely it is to give way
- (b) new **vegetation** has been planted (a salt-resistant type) to stabilise the cliff top
- (c) **drainage pipes** have been dug into the cliff to help rainwater drain away rather than collecting on top of the impermeable clay layer in the cliff
- (d) a layer of large rocks have been put at the toe (base) of the cliff - this is **rock armour** to protect the base of the cliff from wave action - it has been cemented into place
- (e) the cliff has been infilled with a layer of **small rocks** to allow the rainwater to pass through easily
- (f) permeable **geotextile bags** filled with clay from the original landslide have been packed against the slope
- (g) **geotextile sheets** (a special type of strong plastic which lets the water through) have been placed within the cliff





Odd one out?

