



Question(s)

Define the key terms:  
- Abrasion  
- Attrition



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Answer(s)

Abrasion – caused by waves picking up material which is forced against the cliff face wearing it away  
Attrition – where stones and pebbles in the sea knock against each other causing them to become smoother and rounded.



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Question(s)

1. Define the key terms:  
a. Fetch  
b. Backwash  
c. Swash



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Answer(s)

Fetch – The distance over which wind has blown to form a wave  
Backwash – the movement of water back down a beach  
Swash – the movement of water up a beach



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Question(s)

Describe and explain the way in which waves form



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Answer(s)

- Wind blows over surface of water – creates friction
- Frictional drag causes water particles to begin to rotate and energy is transferred forward in the form of a wave
- as a wave reaches shallow water, friction between the sea bed and the base of the wave – causes the wave to slow down – shape becomes more elliptical
- top of the wave however – unaffected by the friction – becomes steeper – eventually breaks
- when it breaks – water moving up the beach in the swash and the water moving back down the beach in the backwash.



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Question(s)

Outline the main characteristics of constructive waves



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Answer(s)

- Low <1m
- Low energy
- Low frequency (<10/min)
- Swash>Backwash
- Deposition



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Question(s)

Outline the main characteristics of destructive waves



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Answer(s)

- High (>1m)
- High energy
- High Frequency (>10 min)
- Swash<Backwash
- Erosion



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Question(s)

Describe 3 factors which will affect the strength of a wave



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Answer(s)



- **Strength and speed of wind** – faster the wind – more energy transferred – bigger wave produced
- **Duration of the wind** – length of time for which the wind has blown – longer the wind blows for, the more energy is transferred to the wave.
- **Fetch** – the distance over which the wind has blown (i.e. how far the wave has travelled) – longer the fetch the stronger the wave.

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Question(s)

Outline a form of physical weathering operating at the coast



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Answer(s)



**Frost Shattering** – water gets into cracks in the rocks – if temperatures fall below freezing at night the water freezes and expands (9-10%); puts pressure on the rock around – then thaws. Freeze-thaw cycle gradually forces the rock apart.

**Salt crystal growth** – sea water contains salt from spray from the waves – when evaporates leave salt behind – salt crystals growing in the cracks in the rock can force the rocks apart

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Question(s)

Name and outline four examples of erosion processes operating at the coast



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Answer(s)



- d. **Abrasion** – where rock fragments in the wave are flung against the cliff face
- e. **Hydraulic action** – waves break against cliff face – pressure of the breaking wave compresses air in cracks – ‘mini-explosions’ force the rocks apart
- f. **Corrosion** – occurs where salt water is able to dissolve some of minerals in the rock (e.g. limestone cliffs gradually weakened).
- g. **Attrition** – rock fragments carried by the waves – hit against each other and gradually wear down.

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Question(s)

Outline the mass movement processes of (i) slumping and (ii) soil creep



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Answer(s)



**Slumping** – erosion at base of cliff may lead to rotational slipping of cliff above – particularly on clay cliffs – during dry periods the clay contracts and cracks and will become saturated during wet periods – moving downslope due to gravity.

**Soil Creep** – slow downhill movement of soil

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Question(s)

Name 4 examples of erosion landforms at the coast

Question(s)



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Answer(s)



- Headlands and Bays
- Wave Cut Platform
- Cliff
- Cave
- Stack and Stump
- Arch

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Question(s)

Name 3 examples of deposition landforms at the coast



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Answer(s)

- Beaches
- Spits
- Bars



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Question(s)

Describe and explain the process of longshore drift



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Answer(s)

This is the movement of material along the coastline. Material is moved up the beach by the swash at an angle controlled by the prevailing wind. The backwash then carries materials back down the beach at right angle to the coastline under the influence of gravity. Gradually the material is moved along the coastline, its direction controlled by the prevailing wind direction.



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Question(s)

Give named examples of the following features:

- Headlands and Bay
- Wave-cut platform
- Stack
- Arch



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Answer(s)

- Headlands and Bays (Swanage Bay and the Foreland – Dorset)
- Wave-cut platform – Kimmeridge (Dorset Coast)
- Stack – Old Harry (Dorset)
- Arch – Durdle Door



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Question(s)

Describe and explain how Headlands and Bays form



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Answer(s)

- Headlands form along discordant coastlines (bands of hard and soft rock outcrop at right angles to the coast)
- Leads to differential erosion (soft rock eroding quicker than the harder resistant rock)
- Bays (indents in coastline) form where the erosion of the soft rock is rapid
- Headlands (hard rock outcrops) – left sticking out into the sea
- The exposed headland then becomes vulnerable to the force of the destructive waves



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Question(s)

Describe and explain how cliffs and wave-cut platforms form



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Answer(s)

- Erosion of cliff at base in wave-attack zone (hydraulic action and solution) – undercuts the cliff and forms a wave-cut notch
- Cliff face affected by abrasion (rock fragments hurled against cliff)
- Undercutting continues – overhanging cliff eventually collapses – cliff retreats
- As cliff retreats – gently sloping rocky platform (wave-cut platform) left behind and exposed at low tide.



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Question(s)

Describe and explain the erosion of a headland



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Answer(s)



- The sea attacks foot of cliff – erodes weaknesses such as joints / cracks (processes like hydraulic action and abrasion)
- Cracks get larger – form into small caves
- Further erosion widens the cave – where the fault line runs through the headland – eventually forms arch which passes through the headland
- Further wave attack at base of arch and weathering of roof of arch – weakens structure – roof of arch eventually collapses – leaves a stack (free standing column of rock)
- Stack eventually collapses forming stump (covered at high tide)

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Question(s)

Give named examples of a (i) spit (ii) beach and (iii) bar



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Answer(s)



- Spits – Spurn Head (Holderness Coast)
- Beach – Hunstanton
- Bar – Slapton Sands (Devon)

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Question(s)

Give 3 main sources of beach material



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Answer(s)



- Rivers – where fine muds and gravels are deposited at the river mouth
- Longshore drift (bringing material from elsewhere along the coast)
- Constructive Waves (bringing material up the beach from the sea) and from cliff erosion

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Question(s)

Describe 3 factors which affect the rates of coastal erosion



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Answer(s)



- Resistance of Rocks** – limestone / chalk and granite – more resistant and less resistant rocks (e.g. clay) erode faster
- Shape of the Coastline** – where discordant coastline – outcrops of hard and soft rock – resulting in differential erosion
- Strength of the Waves** – longer the fetch the stronger the winds – greater the rates of cliff recession
- Coastal defence** – rates of cliff recession are slower where coastal defence techniques are used.

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Question(s)

Describe 3 reasons why coastal management is needed at Lyme Regis

Question(s)



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Answer(s)



- Lyme Regis is built on unstable land
- the town is exposed to strong destructive waves from the SW with a long fetch.
- it is an actively eroding coastline prone to landslips

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Question(s)

Give 4 advantages of the coastal management scheme at Lyme Regis



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Answer(s)



- The new beaches have increased tourism and businesses are thriving (multiplier effect)
- It is now possible to walk along the whole beach even at high tide
- Provides long term protection against coastal erosion and landslips
- New sea wall provides a promenade along the sea front and will protect 500 homes.

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Question(s)

Give 4 disadvantages of the coastal management scheme at Lyme Regis



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Answer(s)



- Some think the new defences have spoilt the natural coastal landscape
- The sea wall may interfere with coastal processes and increase erosion elsewhere
- There has been an increase in visitors – has caused conflict with locals.
- The area is a world heritage site famous for fossils – some fossils may never be uncovered if landslips are prevented.

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Question(s)

Distinguish between hard and soft engineering in the context of coastal management



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Answer(s)



Hard engineering involves the construction of man-made defences to control the natural processes (e.g. groynes and sea walls) whereas Soft Engineering works with natural processes, not involving construction. It is usually visually unobtrusive and considered more environmentally friendly

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Question(s)

Describe how a groyne works and give one advantage and one disadvantage



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Answer(s)



Groynes (often wooden – but sometimes rock or concrete) are fences built across the beach, stretching from the coastline into the sea.  
ADV – Prevents LSD – leads to build up of beach in front of cliff – natural defence reducing erosive power of the waves.  
DISADV – unattractive / access becomes difficult; looks ugly; starves areas down the coast of beach material which can increase erosion in these areas.

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Question(s)

Describe how Rock Armour (rip rap) works and give one advantage and one disadvantage



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Answer(s)



Rip Rap – large resistant rocks placed in front of the cliff  
ADV – absorb wave energy – protect cliffs behind, can be cheap (depending on rock type)  
DISADV – can make beaches inaccessible – not effective in storm conditions.

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Question(s)

Describe what is meant by beach replenishment and give one advantage and one disadvantage



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Answer(s)



Beach replenishment is the addition of sand taken from somewhere else (often offshore).

Advantage – looks natural / quite cheap and beaches best form of natural defence

Disadvantage – gets eroded by sea (has to be replaced frequently)

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Question(s)

What is meant by managed retreat? Give one disadvantage



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Answer(s)



Moving people and activities back from the vulnerable areas of the coast. Disadvantage – compensation has to be paid to homeowners and there is disruption and upset for those that have moved.

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Question(s)

Give 3 examples of coastal management used at Lyme Regis



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Answer(s)



- 4 phase project
- New sea wall and promenade built to east of River Lim and £1.4 million emergency project to stabilise the cliffs
- Wide sand /shingle beach created to absorb wave energy
- Rock armour at the Cobb to absorb wave energy / anchor the new beach
- 2013-2015 – new 390m sea wall created and extensive nailing, piling and drainage to stabilise cliffs & protect 480 homes.

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