

# Coasts Quiz

1. What is a sediment cell?

- a) A closed system in terms of sediment
- b) A section of the ocean floor
- c) A type of coastal vegetation

2. How many sediment cells are there in England and Wales? a) 5 b) 9 c) 11

3. What are the three components of a sediment cell?

- a) Sources, overflows, and sinks
- b) Sources, through flows, and sinks
- c) Sources, underflows, and sinks

4. What is dynamic equilibrium in a sediment cell?

- a) The input and output of sediment are in constant change but remain in balance
- b) The input and output of sediment are equal
- c) The input and output of sediment are in constant change and out of balance

5. How can physical and human action affect dynamic equilibrium in a sediment cell?

- a) They can only affect the equilibrium in a positive way
- b) They can only affect the equilibrium in a negative way
- c) They can affect the equilibrium in both positive and negative ways

6. What is a negative feedback loop in the coastal system?

- a) A mechanism that balances changes, taking the system back towards equilibrium
- b) A mechanism that enhances changes, taking the system away from equilibrium
- c) A mechanism that has no effect on the system

## Systems Quiz

7. Which of the following is an example of a negative feedback loop in the coastal system?

- a) People walking over sand dunes, causing erosion
- b) Storm waves depositing sediment as an offshore bar
- c) Roots from vegetation holding sand dunes together

8. What is a positive feedback loop in the coastal system?

- a) A mechanism that enhances changes, taking the system away from equilibrium
- b) A mechanism that balances changes, taking the system back towards equilibrium
- c) A mechanism that has no effect on the system

9. Which of the following is an example of a positive feedback loop in the coastal system?

- a) Storm waves depositing sediment as an offshore bar
- b) People planting more vegetation on sand dunes
- c) People walking over sand dunes, causing erosion

10. Is the coastal system considered a closed or open system?

- a) Always closed
- b) Always open
- c) Open under normal conditions, but can be considered closed under certain circumstances

Systems  
Quiz

# Answers:

1.a) A closed system in terms of sediment

2.c) 11

3.b) Sources, through flows, and sinks

4.a) The input and output of sediment are in constant change but remain in balance

5.c) They can affect the equilibrium in both positive and negative ways

6.a) A mechanism that balances changes, taking the system back towards equilibrium

7.b) Storm waves depositing sediment as an offshore bar

8.a) A mechanism that enhances changes, taking the system away from equilibrium

9.c) People walking over sand dunes, causing erosion

10.c) Open under normal conditions, but can be considered closed under certain circumstances

# Erosion

## 1. What are the main processes of erosion in a coastal environment, and how do they work?

- Corrasion involves the throwing of sediment against the cliffs by the sea, causing them to be eroded. The size, shape, weight, and quantity of sediment, as well as wave speed, impact the erosive power of this process.
- Abrasion is the process where sediment is moved along the shoreline, causing it to be worn down over time.
- Attrition occurs when rocks and pebbles hit against each other, becoming round and smaller over time.
- Hydraulic Action occurs when air is forced into cracks, joints, and faults within the rock, causing it to fracture over time.
- Corrosion (Solution) involves the mildly acidic seawater eroding alkaline rock such as limestone.
- Wave Quarrying is when breaking waves pull rocks away from the cliff face, weakening it and making it vulnerable to hydraulic action and abrasion.

## 2. What factors contribute to the vulnerability of a rock to erosion?

- The vulnerability of a rock to erosion is influenced by various factors, including:
- Whether the rock is clastic or crystalline. Sedimentary rocks like sandstone are clastic and more vulnerable to erosion, while igneous and metamorphic rocks made up of interlocking crystals are more resistant to erosion.
- The amount of cracks, fractures, and fissures in the rock. The more weaknesses there are in the rock, the more susceptible it is to erosion, especially hydraulic action.
- The lithology of the rock, including the type of rocks and the conditions of the rock's creation directly affects its vulnerability to erosion.

# Erosion

## 3. When are erosion rates at their highest in a coastal environment?

Erosion rates are at their highest when:

- Waves are high and have a long fetch (the distance the wind has travelled over the wave)
- Waves approach the coast perpendicular to the cliff.
- It is high tide, and waves travel higher up the cliff so a larger area of cliff face is vulnerable to erosion.
- Heavy rainfall occurs, as water percolates through permeable rock, weakening the cliff.
- It is winter, as destructive waves are the largest and most destructive during this season.

## 4. How does erosion relate to the carbon cycle and global warming?

- Corrosion (Solution), which involves the mildly acidic seawater eroding alkaline rock such as limestone, has a potential link to the carbon cycle, global warming, and coasts. It is similar to the process of carbonation weathering. Increases in rainwater and ocean acidity could potentially increase coastal erosion, but the effect may be negligible.

# Transport

1. What is longshore drift, and what are the key factors that influence its effectiveness in transporting sediment?

- Answer: Longshore drift is the process of sediment transportation along the coast, moving sediment along the beach and between sediment cells. The effectiveness of longshore drift in transporting sediment is influenced by several factors. Firstly, the direction of the prevailing wind determines the angle at which waves hit the beach. Waves push sediment in this direction and up the beach in the swash. Secondly, the force of gravity carries sediment back down the beach in the backwash, moving sediment along the beach over time. Lastly, the severity of the angle that waves travel onto land also determines the effectiveness of longshore drift in transporting sediment.

2. What are the different processes of sediment transportation, and how do they differ from one another?

- Answer: The different processes of sediment transportation include traction, saltation, suspension, and solution. Traction occurs when large and heavy sediment rolls along the sea bed and is pushed by currents. Saltation is when smaller sediment bounces along the sea bed and is pushed by currents. Suspension occurs when small sediment is carried within the water column, and solution refers to dissolved material that is carried within the water. These processes differ from one another in terms of the size of the sediment being transported and the way in which the sediment moves.

## Transport

### 3. What is deposition, and what are the two main processes that contribute to it?

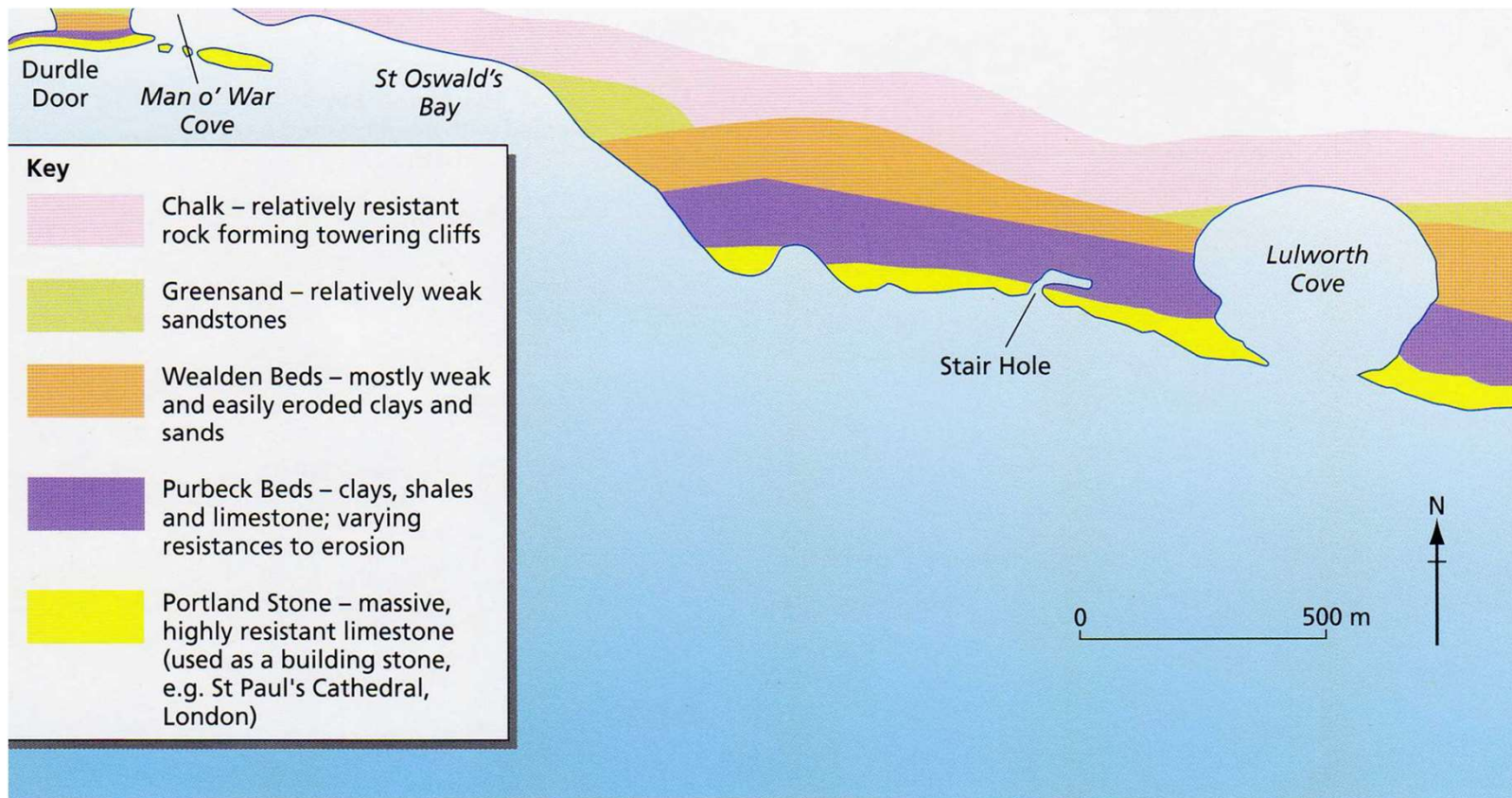
- Answer: Deposition is the process by which sediment is deposited when a wave loses energy, meaning the sediment becomes too heavy to carry. Deposition is a gradual and continuous process and does not occur all at once. The two main processes that contribute to deposition are gravity settling and flocculation. Gravity settling occurs when the wave's energy becomes very low, and heavy rocks and boulders are deposited followed by the next heaviest sediment. Flocculation occurs when clay particles clump together due to chemical attraction and then sink due to their high density.

### 4. How does vulnerability to erosion vary based on the type of rock, and what are the key factors that influence it?

- Answer: The vulnerability of a rock to erosion depends on various factors. One of the most important factors is the type of rock, as sedimentary rocks like sandstone are clastic and made up of cemented sediment particles, making them vulnerable to erosion, whereas igneous and metamorphic rocks are made up of interlocking crystals, making them more resistant to erosion. The amount of cracks, fractures, and fissures in the rock also plays a role in its vulnerability to erosion, as the more weaknesses there are in the rock, the more open it is to erosional processes, especially hydraulic action. Lastly, the lithology of the rock and the conditions of the rock's creation also directly affect its vulnerability to erosion.

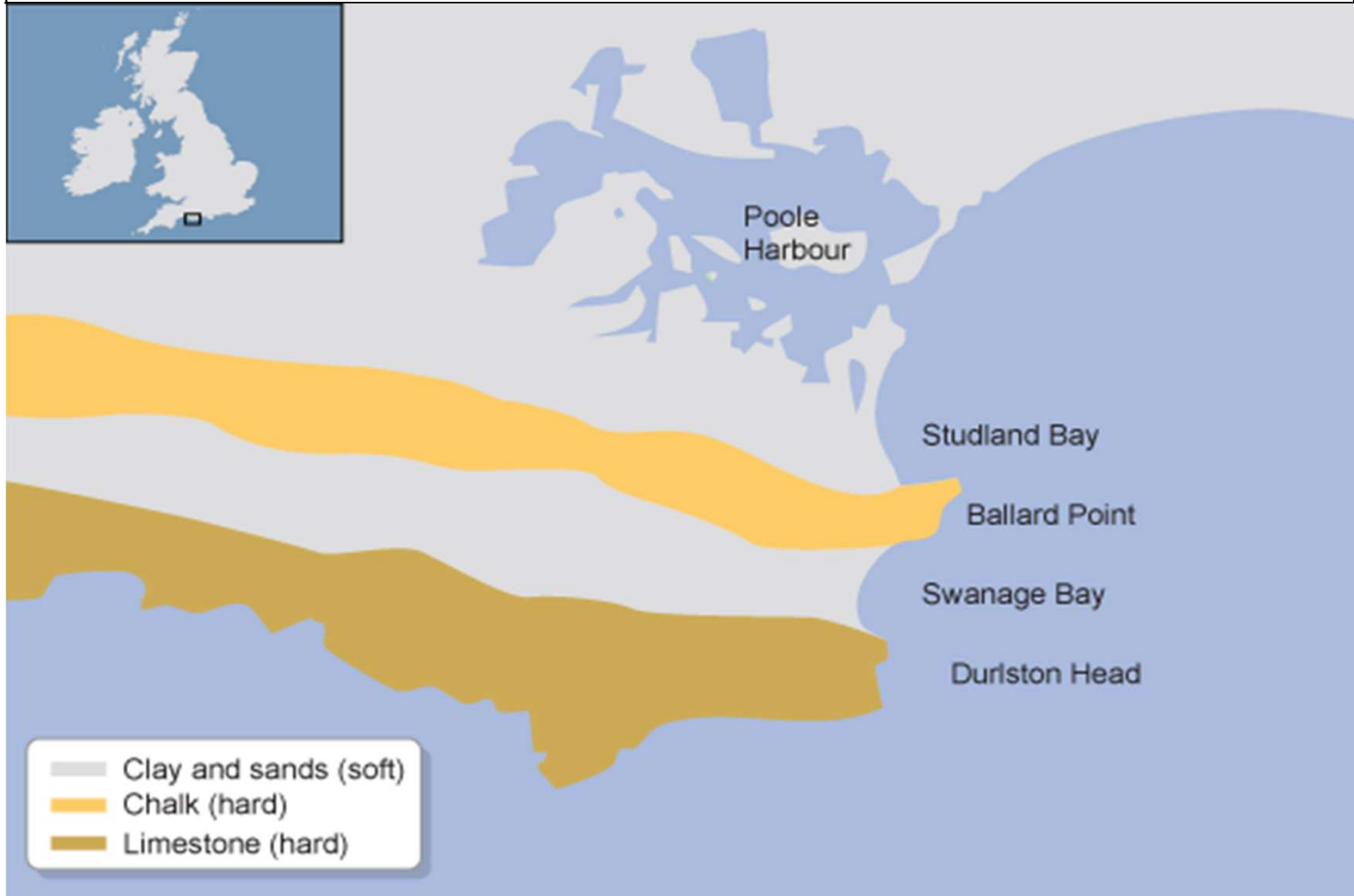


# Concordant Coast



Geology of the Lulworth Cove area

# Discordant Coast



# Sub-Aerial Processes - Weathering and Mass Movement

1. Which of the following is NOT an example of mechanical weathering?

A) Freeze-thaw (Frost-Shattering) B) Salt Crystallisation C) Carbonation D) Wetting and Drying

• Answer: C) Carbonation is an example of chemical weathering.

2. Which of the following is an example of chemical weathering?

A) Freeze-thaw (Frost-Shattering) B) Salt Crystallisation C) Oxidation D) Plant Roots

• Answer: C) Oxidation is an example of chemical weathering.

3. Which of the following is an example of biological weathering?

A) Freeze-thaw (Frost-Shattering) B) Salt Crystallisation C) Solution D) Plant Roots

• Answer: D) Plant Roots is an example of biological weathering.

4. What happens to rocks during freeze-thaw weathering?

A) Rocks expand and contract due to wetting and drying cycles. B) Rocks become oxidized when minerals are exposed to the air. C) Water enters cracks and then freezes, increasing pressure and causing cracks to develop. D) Rock minerals such as rock salt are dissolved.

• Answer: C) Water enters cracks and then freezes, increasing pressure and causing cracks to develop.

5. What is the process of carbonation?

A) Rainwater absorbs CO<sub>2</sub> from the air to create a weak carbonic acid which then reacts with calcium carbonate in rocks to form calcium bicarbonate.

B) Minerals become exposed to the air through cracks and fissures, causing the mineral to become oxidized and increase in volume, contributing to mechanical weathering.

C) Rock minerals such as rock salt are dissolved.

D) Roots of plants grow into the cracks of rocks, exerting pressure and eventually splitting the rocks.

• Answer: A) Rainwater absorbs CO<sub>2</sub> from the air to create a weak carbonic acid which then reacts with calcium carbonate in rocks to form calcium bicarbonate.

# Sub-Aerial Processes - Weathering and Mass Movement

## 1. What determines the type of mass movement that occurs?

a) The type of sediment present b) The weight of the sediment and its ability to flow downhill c) The amount of vegetation on the slope d) The temperature of the surrounding area

- Answer: b) The weight of the sediment and its ability to flow downhill

## 2. What are the two categories of mass movement?

a) Slide and flow b) Weathering and erosion c) Lithology and geology d) Saturation and vegetation cover

- Answer: a) Slide and flow

## 3. Which of the following is a flow? a) Rock falls b) Rock slides c) Slumps d) Soil creep

- Answer: d) Soil creep

## 4. What is solifluction?

a) The movement of soil particles downhill b) The flow of mud and earth over bedrock c) The rotational movement of soft materials d) The flow of surface layers over frozen layers

- Answer: d) The flow of surface layers over frozen layers

## 5. What can reduce friction and cause mudflows to occur?

a) An increase in the water content of soil b) Exposure to mechanical weathering c) Water between joints and bedding planes d) A rotation movement of soft materials

- Answer: a) An increase in the water content of soil

## 6. What influences the prominent process of weathering?

a) The type of sediment present b) The amount of vegetation on the slope c) The temperature and climate d) The saturation of the ground

- Answer: c) The temperature and climate

# Landforms

# Coastal Vegetation

1. How does vegetation help stabilise coastal sediment? Provide three examples.

Answer: Vegetation stabilises coastal sediment in several ways. Firstly, the roots of plants bind soil together which helps to reduce erosion. Secondly, when completely submerged, plants provide a protective layer for the ground and so the ground is less easily eroded. Thirdly, plants reduce the wind speed at the surface and so less wind erosion occurs.

2. What are xerophytes and halophytes? How do they differ from each other?

Answer: Xerophytes are plants that are tolerant of dry conditions while halophytes (or brackish) are plants that are tolerant of salty conditions. Xerophytes differ from halophytes in that they are adapted to dry conditions whereas halophytes are adapted to salty conditions.

3. What is plant succession? Provide an example of how it occurs in coastal areas.

Answer: Plant succession is a long-term change in a plant community in an area. In coastal areas, plant succession occurs when pioneer plants begin to grow in bare mud and sand due to the supply of sediment and deposition. As more deposition occurs, and the vegetation dies and releases nutrients into the sand, this reduces the saltiness of the soil, which means different plants can start growing there. These processes continue over time allowing new species of plants to colonise.

4. What are the stages of salt marsh succession? Briefly describe each stage.

Answer: The stages of salt marsh succession are the Algal Stage, Pioneer Stage, Establishment Stage, Stabilisation, and Climax Vegetation. In the Algal Stage, gut weed and blue-green algae establish as they can grow on bare mud, which their roots help to bind together. In the Pioneer Stage, cord grass and glasswort grow, and their roots begin to stabilise the mud, allowing the estuarine to grow. In the Establishment Stage, salt marsh grass and sea asters grow, creating a carpet of vegetation and so the height of the salt marsh increases. In the Stabilisation stage, sea thrift, scurvy grass and sea lavender grow, and so salt rarely ever gets submerged beneath the marsh. In the Climax Vegetation stage, rush, sedge and red fescue grass grow since the salt marsh is only submerged one or twice a year.

5. Provide an example of a pioneer plant and explain why it is well-suited to grow in coastal environments.

Answer: Marram grass is a very good example of a pioneer plant. It is well-suited to grow in coastal environments because it is tough and flexible, so it can cope when being blasted with sand. It has adapted to reduce water loss through transpiration, and its roots grow up to 3 metres deep and can tolerate temperatures of up to 60C

# High energy and low energy coasts

1. What landforms are typically found in high-energy coastlines? A) Sandy beaches B) Rocky headlands C) Depositional landforms D) Low-frequency waves
  - Answer: B) Rocky headlands
2. What type of waves are associated with depositional landforms? A) Constructive waves B) Destructive waves C) Both constructive and destructive waves D) None of the above
  - Answer: A) Constructive waves
3. What causes short-term sea level change? A) Isostatic change B) Tectonic activity C) Eustatic rise D) Wind strength and direction
  - Answer: D) Wind strength and direction
4. What causes isostatic sea level change? A) Thermal expansion B) Post-glacial adjustment C) Human activity D) Volcanic eruptions
  - Answer: B) Post-glacial adjustment
5. What causes eustatic rise in sea level? A) Thermal expansion B) Atmospheric pressure C) Human activity D) Tectonic activity
  - Answer: A) Thermal expansion

# Management

## 1. Explain the two types of coastal management approaches and give an example of each.

- Hard and soft engineering are the two types of coastal management approaches. Hard engineering involves building physical structures such as sea walls or groynes to prevent erosion and protect against storm surges. An example of hard engineering would be the construction of a sea wall along a heavily populated coastline to protect homes and infrastructure. Soft engineering, on the other hand, involves using natural methods such as beach nourishment or dune restoration to manage the coast. An example of soft engineering would be the restoration of sand dunes to help stabilize the coastline and provide habitat for wildlife.

## 2. Describe the different approaches to managing coastal areas.

- There are four different approaches to managing coastal areas: hold the line, managed realignment, advance the line, and do nothing. Hold the line involves building defenses to try and keep the shore where it is. Managed realignment involves allowing the coastline to move inland naturally but managing it in a controlled way. Advance the line involves building defenses to try and move the shore seawards. Finally, do nothing involves no defenses being put in place and allowing the coast to erode.

## 3. What factors are looked at when deciding on which policy to use for coastal management?

- When deciding on which policy to use for coastal management, several factors are considered. These include the economic value of assets that could be protected, such as important infrastructure or natural resources. The technical feasibility of engineering solutions is also considered, as certain locations may not be suitable for certain types of defences. The ecological and cultural value of the land is also taken into account, as it may be desirable to protect historic sites or areas of special scientific interest.



# Management

## 4. What is cost-benefit analysis in relation to coastal management?

- Cost-benefit analysis is an analysis that is carried out before any form of coastal management takes place. The costs involved in construction, demolition, and maintenance are compared to the expected benefits, such as the value of land saved, homes and businesses protected. Costs and benefits include both tangible and intangible things. For a project to be given the go ahead, the expected benefits must outweigh the costs.

## 5. What is ICZM and what are its key principles?

- ICZM, or Integrated Coastal Zone Management, is a way of managing a coastal area as a whole. This often involves management between different political boundaries, such as different councils working together to manage the coast. The ICZM recognizes the importance of the coast for people's livelihoods and the need for sustainable coastal management, where economic development is important but should not come at the cost of the environment. The ICZM involves all stakeholders, plans for the long term, and tries to work with natural processes rather than against them.

## 6. What are shoreline management plans (SMPs) and why are they important?

- Shoreline management plans (SMPs) are plans created for each sediment cell in the UK to help with coastline management. Each SMP identifies all the activities, both natural and human, which occur within the coastline area of each sediment cell. SMPs are recommended for all sections of English and Welsh coastlines by DEFRA. They are important because they provide a comprehensive and coordinated approach to coastal management, taking into account all the factors that may affect the coastline. The plans also help to ensure that management decisions are made based on scientific evidence and stakeholder input.

### 1. What is hard engineering?

- A) A coastal management approach that involves working with natural processes.
- B) A coastal management approach that involves building structures to protect the coast.
- C) A coastal management approach that involves moving inland.
- D) A coastal management approach that involves doing nothing.

### 2. Which of the following is an example of hard engineering?

- A) Beach nourishment.
- B) Managed realignment.
- C) Dune restoration.
- D) Sea wall construction.

### 3. What is a sea wall?

- A) A wall built to separate the sea from the land.
- B) A wall built to protect the coast from erosion and flooding.
- C) A wall built to block the movement of sediment along the coast.
- D) A wall built to create new land.

# Hard Engineering Quiz

### 4. Which of the following is a disadvantage of sea walls?

- A) They are expensive to build and maintain.
- B) They can disrupt natural processes and habitats.
- C) They can create a false sense of security.
- D) All of the above.

### 5. What is beach nourishment?

- A) The removal of sand from a beach to use in construction.
- B) The addition of sand to a beach to widen it and protect it from erosion.
- C) The planting of vegetation on a beach to stabilize it.
- D) The removal of vegetation from a beach to prevent erosion.

# Hard Engineering Quiz

6. Which of the following is a disadvantage of beach nourishment?

- A) It can be expensive to implement.
- B) It can have negative impacts on marine life.
- C) The added sand may wash away quickly.
- D) All of the above.

7. What is groynes?

- A) A type of seaweed that grows on rocky coasts.
- B) A type of structure built perpendicular to the shoreline to trap sediment.
- C) A type of sea creature that burrows into the sand.
- D) A type of beach grass.

8. Which of the following is a disadvantage of groynes?

- A) They can disrupt natural processes and habitats.
- B) They can cause erosion downstream.
- C) They can be expensive to build and maintain.
- D) All of the above.

9. What is a revetment?

- A) A type of sea wall made of large rocks.
- B) A type of structure built parallel to the shoreline to absorb wave energy.
- C) A type of beach grass that stabilizes sand dunes.
- D) A type of beach nourishment.

10. Which of the following is an advantage of revetments?

- A) They can protect the coast from erosion and flooding.
- B) They can provide habitat for marine life.
- C) They can create recreational opportunities.
- D) They are inexpensive to build and maintain

# Answers

1.B

2.D

3.B

4.D

5.B

6.D

7.B

8.D

9.A

10.A

### 1. What is beach nourishment?

- a. The process of planting new vegetation on a beach to prevent erosion.
- b. The process of replenishing sand on a beach to widen the beach and protect against erosion.
- c. The process of building a seawall to protect against erosion.

### 2. What is dune stabilization?

- a. The process of planting new vegetation on a dune to prevent erosion.
- b. The process of building a seawall to protect against erosion.
- c. The process of reinforcing a dune with sandbags or other structures to protect against erosion.

### 3. What is cliff drainage?

- a. The process of creating a drainage system to prevent water from accumulating at the base of a cliff.
- b. The process of planting new vegetation on a cliff to prevent erosion.
- c. The process of stabilizing a cliff with steel cables or other structures.

### 4. What is marsh creation?

- a. The process of dredging sediment from the ocean floor to create new wetland habitat.
- b. The process of building a concrete wall to protect against coastal flooding.
- c. The process of planting new vegetation on an existing marsh to prevent erosion.

### 5. Which of the following is a benefit of beach nourishment?

- a. It can increase tourism by creating a wider beach.
- b. It can reduce the impact of storms by providing a natural barrier
- c. It can increase property values by creating a more attractive beach.

# Soft Engineering Quiz

6. Which of the following is a benefit of dune stabilization?

- a. It can protect against coastal flooding by providing a natural barrier.
- b. It can reduce erosion of the beach by stabilizing the sand dunes.
- c. It can provide habitat for shorebirds and other wildlife.
- d) All of the above

7. Which of the following is a benefit of cliff drainage?

- a. It can prevent rock falls and other hazards by stabilizing the cliff face.
- b. It can reduce erosion at the base of the cliff by diverting water away from the cliff.
- c. It can improve water quality by reducing runoff from the cliff.
- d) All of the above

8. Which of the following is a benefit of marsh creation?

- a. It can provide habitat for fish, birds, and other wildlife.
- b. It can protect against coastal flooding by absorbing excess water.
- c. It can reduce erosion by stabilizing the shoreline.
- d) All of the above

9. Which of the following is a potential drawback of beach nourishment?

- a. It can be expensive to perform.
- b. It can disrupt marine habitats by changing the beach profile.
- c. It can create an artificial beach that is less attractive to tourists.
- d) none of the above

10. Which of the following is a potential drawback of cliff drainage?

- a. It can be expensive to install and maintain.
- b. It can disrupt natural drainage patterns and create new erosion hazards.
- c. It can harm plant and animal species that rely on the cliff habitat.
- none of the above

# Soft Engineering Quiz

# Answers

1.b.

2.a.

3.a.

4.a.

5.b.

6.d

7.d

8.d

9.b.

10.b