

Year 12 MMS Semester 2 Sample Exam Marking key

Section A: Multiple Choice

| | | | | | | | |
|---|---|----|---|----|---|----|---|
| 1 | B | 6 | C | 11 | C | 16 | A |
| 2 | D | 7 | A | 12 | B | 17 | A |
| 3 | A | 8 | A | 13 | D | 18 | D |
| 4 | B | 9 | D | 14 | C | 19 | B |
| 5 | C | 10 | D | 15 | D | 20 | A |

Section B: Short Answer

Qu21 (11 marks)

a. (6 marks)

- enhanced greenhouse effect is due to ↑ CO₂ levels in lower atmosphere
- trap more heat/prevent heat from re-radiating back to space
- ↑ global atmosphere temperature
- more heat energy is transferred to water
- ↑ temp of water

b. i (7 marks)

- ↑ nutrients leads to eutrophication (N & P are limiting nutrients in water)
- ↑ in N & P will ↑ PHS rate of producers
- can cause ↑ in algal blooms (toxic cyanobacteria)
- this bloom prevents light from passing to lower levels (benthic producers)
- cause their death via ↓ light ↓ PHS
- ↑ decomposers to breakdown dead organisms
- ↓ O₂ available ↑ BOD of habitat causing ↑ death of higher trophic levels.

ii (6 marks)

- ↑ flushing via allowing ocean to enter estuary eg. Dawesville Cut
- oceanic water moves excess nutrients to where they are dispersed by currents
- educate users of adjacent land (catchment area) to ↓ fertiliser usage
- via altering farming practices
- such as crop rotation, when to apply fertilisers etc.

Qu22 (6 marks)

a. i (1 mark)

- erosion scarp

ii (3 marks)

- high energy waves hit beach face
- was water retreats, it removes sand and deposits sand offshore (offshore sand bar)
- cutting away at berm, leaving a steep scarp face.

iii (2 marks)

- storms are associated with winter months
- ↑ wind, ↑ waves, ↑ swell ↑ energy of water interacting with the beach

Qu 23 (16 marks)

a. i (1 mark)

- as CO₂ concentration in the atmosphere ↑ the conc of CO₂ in seawater also ↑

ii (3 marks)

- human activities eg. burning fossil fuels
- are ↑ CO₂ present in the atmosphere
- thus ↑ CO₂ that dissolves into seawater

b. i (1 mark)

- ↑ conc of CO₂ in seawater ↓ pH of seawater

ii (3 marks)

- as CO₂ dissolves in seawater, it forms carbonic acid
- this dissociates to form H⁺ ions
- ↑ H⁺ ions will ↓ pH and therefore ↑ acidity (ocean acidification)

c. i (4 marks)

- ↑ CO₂ levels = ocean acidification (↑ H⁺ ions in water).
- H⁺ have a stronger affinity for carbonate ions
- Therefore instead of being used to make calcium carbonate (skeletons of coral)
- Coral growth rate/reef building rate ↓ because there are not enough carbonate ions to make skeleton.

ii (2 marks)

- ↓ food available as less biomass is available (less growth)
- ↑ erosion as ↓ coral reefs protecting coastal areas.

Qu 24 (12 marks)

a. (2 marks)

- areas of low productivity
- as less chlorophyll present thus ↓ phytoplankton

b. (2 marks)

- areas of higher productivity
- as ↑ chlorophyll present thus ↑ phytoplankton present.

c. (3 marks)

- Leeuwin current is a warm, nutrient poor current
- That extends along WA coast (NW shelf towards Sth Australia)

- ↓ nutrients will ↓ PHS and thus ↓ phytoplankton present

d. (3 marks)

- eddies are clockwise and anticlockwise vortices that mix surface water with deeper water

- ↑ mixing might ↑ nutrients available
- in photic zone and thus ↑ productivity

e. (2 marks)

- species diversity
- species abundance
- species distribution

Qu 25 (18 marks)

a. i (2 marks)

- concretion = impermeable layer of sediment that covers artefacts.

- Layer forms due to precipitation/reaction of minerals within the spaces of the sediments.

ii (4 marks)

- Remove concretions using tools (dental picks, tweezers, brush)
- Soak in deionised water (distilled water) to remove Cl⁻ ions
- Immerse object in a weak HCl
- Wash in distilled water to remove HCl and repeat the above steps as necessary

b. (4 marks)

- bronze is a less reactive metal than iron
- therefore the metal is not decayed to the same extent
- iron reacts with seawater to form iron oxide
- this forms a layer of corroded products and semi-intact metal that needs to be treated/preserved.

c. i (4 marks)

- shallow water of wreck site
- easier and safer to use crane as cannon is a heavy object

ii (6 marks)

- initially treat in situ with sacrificial anode
- to start removing Cl⁻ ions from cannon
- once raised, remove excess concretions using tools
- place in 2% NaOH solution and use electrolysis to remove further Cl⁻ ions
- prolonged washing to remove NaOH
- once dried, coat object in wax to prevent any further corrosion.

Qu 26 (21 marks)

a. (3 marks)

- Mask – apply defogging & check straps for cracking & signs of weathering
- Snorkel – check attachment strap for signs of decay
- Fins – check for cracks & signs of decay

b. (1 mark)

- 10

c. (4 marks)

- yes, as it is the safest procedure
- by sticking with another person of a similar ability
- in the event of an emergency
- help can be given or distress signal be relayed.

d. (4 marks)

- take a big breath in
- raise the bottom of the mask up and let water in to rinse the glass
- tilt head backwards
- exhale bubbles out of mouth to displace the water out of the mask whilst lowering the mask back on to your face.

e. i (2 marks)

- selfy-stick
- swimming/diving under the whale shark

ii (3 marks)

- rolling of eyes
- rapid dive/descent out of area
- banking
- changing speed/direction

f. (4 marks)

- not much is known about the biology of whale sharks.
- Population sizes are presumed to be ↓
- Stressed whale sharks will have ↓ reproductive rates thus further ↓ population
- Might not return to known areas if feeling threatened (loss of habitat).

Section 3: Extended Answer

Qu 27 (25 marks)

a. (6 marks)

Definition (1-2 marks)

- Introduced marine pest is an organism that is not native to the environment
- Usually introduced via human activity

Explanation of harm (4-5 marks)

Introduced marine pests cause harm via

- Outcompete native species for food/habitat etc.
- Predate on native species (thus reducing their populations)
- the life processes of marine pests may cause damage to the marine environment thus causing habitat loss for native species
- may contain toxic substances that upon ingestion by native species, cause their death
- all of these reduce the population sizes of the native species in the area

b. (4 marks)

- ballast waters of vessels visiting Fremantle Harbour
- planktonic stage of mussel found in seawater that is taken on board (in Asia) to increase the vessel's stability.

- Aquaculture/Fishing gear or Fish products (aquaculture food/bait)
- eggs/juvenile stage found on gear (or in fish products) that has been used in Asian countries.

- Hulls of vessels visiting Fremantle Harbour containing biofouling agents
- Juveniles settle on substrate forming bio foul which is carried from Asia to Perth.

c. (10 marks)

Any 2 of:

Ballast waters (5 marks)

- Do not dispose of ballast water in Fremantle Harbour
- Must dispose of ballast water (if necessary) into water tight containers in Fremantle Harbour for later treatment/disposal
- Or empty ballast tanks at sea (open ocean)
- As open ocean is not a suitable habitat for developing mussel larvae and much will be consumed by pelagic predators
- Thus reducing the likelihood of Asian date mussel entering Australian waters

OR Aquaculture/fishing gear (5 marks)

- Clean aquaculture/fishing gear that has been used previously in Asian countries

- As the equipment may contain eggs or juvenile phases of mussel
- If cleaning the equipment, makes sure that the excess material does not enter the water way
- Or only use new equipment in these facilities
- This will reduce the likelihood of Asian date mussel entering Australian waters

OR Remove biofoul from hull (5 marks)

- Vessels need to have their hulls cleaned for biofoul annually as a build up will reduce fuel efficiency.
- Fremantle Ports could inspect the hulls of visiting vessels to assess the level of biofoul present.
- If levels are too high they could perhaps request that vessel does not enter Fremantle Harbour
- Research is currently being completed to develop technology that would enable the hull of a vessel to be cleaned without removing it from the water ('boat condoms')
- This would reduce the likelihood of Asian date mussel entering Australian waters

Question 28

a. (5 marks)

- Marine protected areas (MPAs) are sections of the coastline that are set aside and offered a level of protection to the marine life as needed.
- Protection includes – complete ban on any activity (sanctuary), allowable activities eg. snorkelling and recreational fishing (recreation and special purpose) and then a mixture of uses provided that they do not compromise diversity (general use).
- These areas are chosen based on research and anecdotal evidence and then declared by the State or Federal government.
- They provide areas of protection for marine life so that they can feed/exist/reproduce and maintain (or increase) their population levels
- This assists with maintaining biodiversity as stable populations maintain stable communities within an ecosystem.

b. (6 marks)

- Send us your skeletons programme for recreational (and commercial) fishermen
- Fish frames provide information such as size, age (using otoliths) and sex of fish species, combined with locations of capture from fishermen.
- Which can be used by Fisheries scientists to estimate the size of a fish population of a species in a given area.
- This information can then be used to estimate the reproductive rate of the populations which can then be used to make management decisions such as the fishing effort for a species.
- If estimated replenishment rates are low, then fishing restrictions can be put into place to protect the broodstock and prevent overfishing.
- If estimated replenishment rate are fine, then no fishing restrictions need to be put into place.

c. (9 marks)

Mechanical (3 marks)

- Containment booms
- Temporary floating barrier that is extended around an oil spill
- Can quickly contain and oil spill into a confined area before it spreads to sensitive marine areas.

Chemical (3 marks)

- Use of dispersants
- Emulsifies (or breaks up) the oil spill into very small droplets which can then undergo natural biodegradation
- Quick response that can reduce the effect that an oil spill has on surrounding environments. Good to use when weather conditions limit access to the spill.

Biological (3 marks)

- Introduction of oil degrading microorganisms
- Microorganisms (via their metabolic activity) break down oil spill into smaller particles and speed up biodegradation process
- Low cost and absence of toxic chemicals

Question 29

a. (6 marks)

Wreck site survey

- Establish the perimeter of the wreck site to determine the extent of the debris field.
- Set a baseline (transect) along the long axis of the wreck site
- Using a search technique, swim over the wreck site and flag all of the points of interest
- Use methods such as trilateration and triangulation to pinpoint the position of the artefacts relative to the baseline.
- Use this information to construct a map of the wreck site, indicating the position of the artefacts on this map
- Take photographs using a stereoscopic camera along a grid overlay of the area and then process these images through a software program to construct a photomosaic representation of the wreck site.

b. (6 marks)

Dive safety brief

Details need to be specific to *Batavia* wreck site on Morning reef, Abrolhos Island.

- Entry point
- Duration of dive
- Interesting features to notice on dive/intentions of dive
- Hazards of the dive
- Emergency procedure
- Exit point

c. (8 marks)

Lift bags

- Archimedes principle states that the upward buoyant force that is exerted on a body immersed in a fluid (whether fully or partially submerged) is equal to the weight of the fluid that the body displaces and it acts in the upward direction at the centre of mass of the displaced fluid.
- Gases displace a larger weight of fluid than their own mass (per unit volume) and thus water exerts an large upward buoyant force on gases when they are underwater (they rise to the surface as less dense)

- Boyle's Law states that the pressure of a given mass of a gas is inversely proportional to its volume at a constant temperature.
- As depth decreases, the volume of the gas will increase (as pressure decreases) thus provided a larger upward buoyant force.
- A 5L lift bag that is inflated at a depth of 10m will be experiencing atmospheric pressure of 2atm.
- As that lift bag ascends to 5m, the volume of gas will increase as the pressure is now 1.5atm and the lift bag will contain 6.6L of air.
- The lift bag now displaces a larger volume of water and therefore there is a larger upward force (upthrust) acting upon the object (increase in momentum).
- This will continue as the lift bag ascends to the surface and therefore the object has been raised from 10m

Question 30

a. (8 marks)

- Storm event caused high seas, strong swell and high winds
- resulting in destructive (high energy) waves hitting the coastline
- as the high energy waves recede, the water picks up the sand
- and moves it offshore (depositing it on an offshore sand bar)
- causing erosion of beach (transferring sand off the beach)
- due to the high intensity of the storm, large volume of sand was removed per unit time.
- as humans have built on the primary dune system
- all of the available sand has been removed by this catastrophic high energy storm event, exposing seawall retaining system

b. (12 marks)

Beach nourishment (4 marks)

- take sand from inland sandy area and place it on beach that needs nourishment (using trucks)
- the grain size needs to be slightly bigger than original sand so it takes longer to be removed from beach via waves (as heavier)
- quick process but expensive and potentially not long lasting

- will replace lost sand with new sand and thus be a source of sand for the sand budget in that particular area.

Sand bypassing (4 marks)

- pump sand from an accreting beach and deposit it on an eroding beach.
- can release pumped sand to a site where it can be shifted via longshore drift and placed naturally along coastline.
- it takes time to set up the equipment (build and establish) and is initially quite costly
- but once in place can be used on an 'as needs basis' to counteract storm events

Leave to natural processes (accretion via longshore drift) (4 marks)

- coastal environments are dynamic systems and sand is constantly being moved in and out of beaches
- a longshore drift will deposit sand onto a beach (and remove it)
- across the year, there will be periods of accretion and erosion
- it might takes years to build the beach up again, provided there is not a coastal engineering structure putting the sand budget out of balance.

Semester 2 Exam reflection

My greatest strengths in content knowledge were...

The style of question I still need to work on include...

Content areas I still need to work on are...

Aspects of exam technique that I used really well include...

The style of question I handled really well include...

Aspects of my exam technique I need to work on before my next exam are...