



Western Australian Certificate of Education ATAR course examination, 2016

Question/Answer booklet

MARINE AND MARITIME STUDIES

Please place your student identification label in this box

Student number: In figures

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In words

Time allowed for this paper

Reading time before commencing work: ten minutes

Working time: three hours

Materials required/recommended for this paper

To be provided by the supervisor

This Question/Answer booklet

Multiple-choice answer sheet

Number of additional
answer booklets used
(if applicable):

To be provided by the candidate

Standard items: pens (blue/black preferred), pencils (including coloured), sharpener,
correction fluid/tape, eraser, ruler, highlighters

Special items: non-programmable calculators approved for use in this examination

Important note to candidates

No other items may be taken into the examination room. It is **your** responsibility to ensure that you do not have any unauthorised material. If you have any unauthorised material with you, hand it to the supervisor **before** reading any further.

Structure of this paper

Section	Number of questions available	Number of questions to be answered	Suggested working time (minutes)	Marks available	Percentage of examination
Section One Multiple-choice	20	20	20	20	20
Section Two Short answer	6	6	90	90	50
Section Three Extended answer	4	2	70	40	30
Total					100

Instructions to candidates

1. The rules for the conduct of the Western Australian Certificate of Education ATAR course examinations are detailed in the *Year 12 Information Handbook 2016*. Sitting this examination implies that you agree to abide by these rules.

2. Answer the questions according to the following instructions.

Section One: Answer all questions on the separate Multiple-choice answer sheet provided. For each question, shade the box to indicate your answer. Use only a blue or black pen to shade the boxes. If you make a mistake, place a cross through that square, then shade your new answer. Do not erase or use correction fluid/tape. Marks will not be deducted for incorrect answers. No marks will be given if more than one answer is completed for any question.

Sections Two: Write your answers in this Question/Answer booklet. Wherever possible, confine your answers to the line spaces provided.

Section Three: Consists of four questions. You must answer two questions. Write your answers in this Question/Answer booklet.

3. You must be careful to confine your answers to the specific questions asked and to follow any instructions that are specific to a particular question.
4. Additional working space pages at the end of this Question/Answer booklet are for planning or continuing an answer. If you use these pages, indicate at the original answer, the page number it is planned/continued on and write the question number being planned/continued on the additional working space page.

Section One: Multiple-choice**20% (20 Marks)**

This section has **20** questions. Answer **all** questions on the separate Multiple-choice answer sheet provided. For each question, shade the box to indicate your answer. Use only a blue or black pen to shade the boxes. If you make a mistake, place a cross through that square, then shade your new answer. Do not erase or use correction fluid/tape. Marks will not be deducted for incorrect answers. No marks will be given if more than one answer is completed for any question.

Suggested working time: 20 minutes.

1. During the voyage of the ship *Batavia*, which was wrecked in 1628, who served as the *commandeur* (commander)?
 - (a) Ariaen Jacobsz
 - (b) Francisco Pelsaert
 - (c) Jeronimus Cornelisz
 - (d) Wiebbe Hayes

2. The Western Rock Lobster (*Panulirus cygnus*) spends part of its life in a planktonic form. Organisms that are planktonic for only part of their lives are known as
 - (a) holoplankton.
 - (b) phytoplankton.
 - (c) meroplankton.
 - (d) zooplankton.

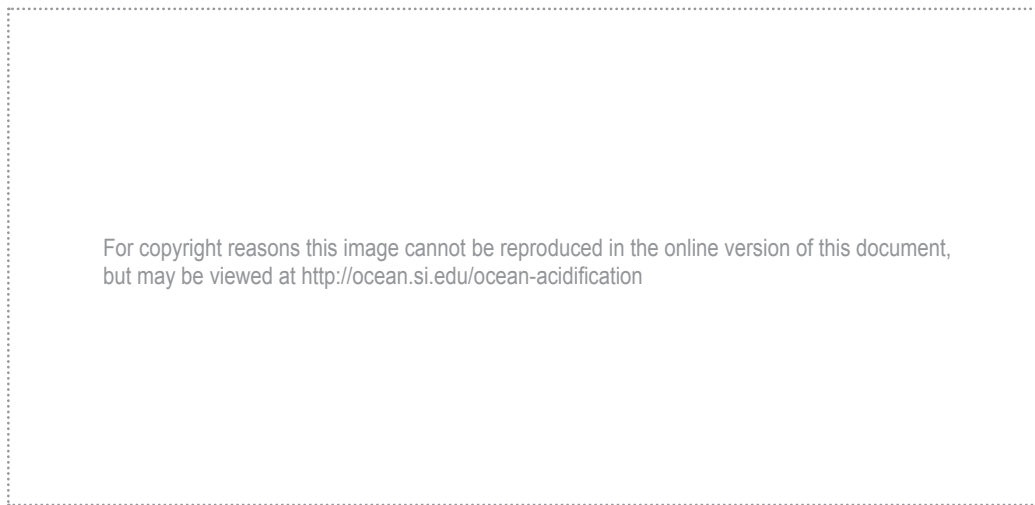
3. When fishing for demersal fish (such as dhufish) in Western Australia, fishers must have a release weight to return the fish to the water after it has suffered a barotrauma. Failing to do this would mean that the fish would **most** likely have which sort of buoyancy that would prevent it from swimming properly?
 - (a) positive buoyancy
 - (b) negative buoyancy
 - (c) moderate buoyancy
 - (d) neutral buoyancy

4. Which of the following currents is **best** described as a mostly northerly, cooler surface current that starts as the Southern Indian Ocean Current?
 - (a) Western Australian Current
 - (b) Leeuwin Current
 - (c) South Equatorial Current
 - (d) Southern Australian Countercurrent

See next page

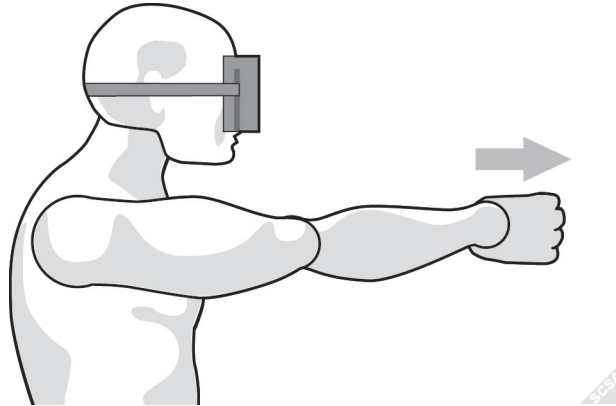
5. Humans will be allowed to interact with whales in a similar manner to whale sharks in the Ningaloo Marine Park. The effect that this has on the whales will be studied by scientists over a five-year period before the results are used to determine a long-term plan. This type of study would **best** be described as a
- (a) longitudinal study.
 - (b) cross-sectional study.
 - (c) micro-genetic study.
 - (d) sequential study.
6. In scientific studies, including those of the marine environment, the results may be provided with a statistical confidence interval. When results have a statistical confidence interval provided
- (a) they are more reliable than those without this figure.
 - (b) they are more statistically valid than those without this figure.
 - (c) they will have had more data observed to get the results.
 - (d) for any replicate, experimenters have a better idea of what to expect.

The X-ray images below show a shell and it changing as it gets older (1 youngest to 4 oldest).



7. The cause of the changes in the shell, made typically from calcium carbonate, is **most** likely from changes in
- (a) global warming.
 - (b) ocean pollution.
 - (c) ocean acidification.
 - (d) declining water quality.

8. An ocean current that is caused by swells approaching the beach at an angle and causing water to be pushed in one direction and parallel to the beach is **best** described as a/an
- (a) longshore current.
 - (b) rip current.
 - (c) oblique current.
 - (d) channel current.
9. Boyle's Law explains the relationship between which two factors?
- (a) pressure and temperature
 - (b) pressure and volume
 - (c) temperature and volume
 - (d) volume and number of particles
10. The hand signal below indicates which one of the following?



- (a) Go in the direction I am pointing!
 - (b) Look over there!
 - (c) Which way should we go?
 - (d) Danger!
11. Which one of the following would **best** be described as a detrimental impact of artificial reefs?
- (a) They create complex spaces and habitats for all marine organisms.
 - (b) The reef structures can be artificially tailored to suit specific target species.
 - (c) They divert more nutrient-rich water up in the water column.
 - (d) They may change the ecosystems of nearby reef habitats.
12. The largest direct cause of sea level rise that is attributable to global warming comes from which of these?
- (a) melting glaciers
 - (b) melting floating sea ice
 - (c) increased flow from rivers
 - (d) thermal expansion of sea water

See next page

13. Symptoms of carbon dioxide poisoning include which one of the following?
- (a) reduced sweating
 - (b) decreased heart rate
 - (c) increased blood pressure
 - (d) lack of drowsiness
14. According to Archimedes Principle, a rock on the bottom of the ocean
- (a) will displace a mass of water more than the weight of the stone.
 - (b) will be easier to lift through the water than lifting it out of the water.
 - (c) will be subject to the water exerting an upward force that is less than the weight of the water displaced.
 - (d) can be considered positively buoyant.
15. An inner ear barotrauma has the biggest effect on which one of the following organs?
- (a) ear drum
 - (b) cochlea
 - (c) ossicles
 - (d) eustachian tube
16. Which one of the following is **true** for vision in water without a mask?
- (a) The image formed is smaller than the object seen.
 - (b) The image focuses in front of the retina.
 - (c) Refraction occurs in the eye's lens rather than the cornea.
 - (d) Colour vision is greatly enhanced.
17. To reduce the introduction of marine pests, boat owners are required to comply with certain regulations. Which one of the following would have the **least** effect on limiting marine pests from boats? The vessel
- (a) spends a majority of its time out of the water.
 - (b) frequently travels from freshwater to saltwater environments.
 - (c) has its hull frequently cleaned.
 - (d) flushes its bilge water when it arrives at a new destination.
18. In some estuaries, eutrophication may be considered a common occurrence. Observations of eutrophication would include
- (a) increased oxygen levels and decreases in phytoplankton.
 - (b) decreased turbidity and decreased phytoplankton biomass.
 - (c) colour change in water and less desirable fish species.
 - (d) increased phosphate levels in water and reduced incidences of fish disease.

19. Using underwater slates to record observations of a natural marine ecosystem would provide evidence of which one of the following?
- (a) the effect of abiotic factors on coral reefs
 - (b) the biodiversity along a length of reef
 - (c) competition between species
 - (d) the effect of a new species in a mangrove community
20. The use of excessive hyperventilating before descending when snorkelling can lead to which one of the following conditions?
- (a) shallow water blackout
 - (b) carbon dioxide poisoning
 - (c) barotraumas
 - (d) hypoxia

End of Section One

See next page

Section Two: Short answer

50% (90 Marks)

This section has **six (6)** questions. Answer **all** questions. Write your answers in the spaces provided.

Additional working space pages at the end of this Question/Answer booklet are for planning or continuing an answer. If you use these pages, indicate at the original answer, the page number it is planned/continued on and write the question number being planned/continued on the additional working space page.

Suggested working time: 90 minutes.

Question 21

(16 marks)

- (a) Describe the type of entry recommended from a jetty with deep water below it, and give the steps a diver would take to enter the water in this manner once all equipment was ready. (4 marks)

- (b) Describe the steps a snorkeller would take at the surface to ensure that they have neutral buoyancy. (4 marks)

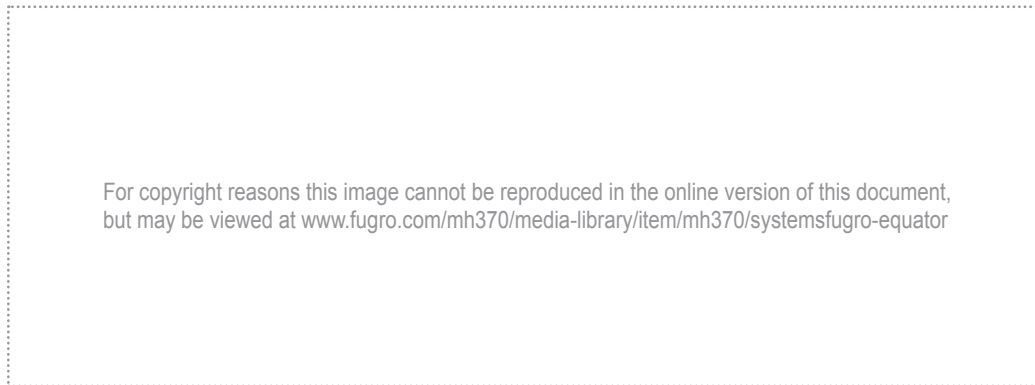
- (c) State **four** steps to consider when descending and ascending during a snorkel dive.
Write your answers in the table below. (8 marks)

Steps to follow when descending	Steps to follow when ascending

Question 22

(15 marks)

A company used the equipment shown in the diagram below, to search for a missing plane that was presumed to have sunk.



(a) In this search, describe how the following work and the role of each.

(i) Magnetometer (3 marks)

(ii) Sonar (3 marks)

- (b) Aircraft are predominantly made of aluminium. What might the wreck of the aircraft look like due to corrosion after a period of two years? Explain the process that would have occurred to the metal. (5 marks)

- (c) When the plane is found, it will be retrieved from the ocean floor. Explain the steps involved in its safe retrieval on site and its stabilisation in the laboratory. (4 marks)

Question 23

(20 marks)

Biodiversity can be described as ‘the variability among living organisms from all sources including terrestrial, marine and other aquatic *inter alia* ecosystems and the ecological complexes of which they are part; this includes diversity within species, between species and of ecosystems’. (de Fontaubert, et al. (1996)). Marine biodiversity is a subset of this. Humans are increasingly aware of the importance of this and are setting in place ways of managing and protecting it.

- (a) What is meant by a marine protected area and what is its purpose? (3 marks)

- (b) Describe **two** types of marine protected areas in Australia. In your description give an example and state where it can be found, who manages it and its benefits. (10 marks)

One: _____

Two: _____

Cetaceans, including whales, are considered an iconic part of the world’s marine biodiversity and there is much interest in their protection.

- (c) Explain the role of the International Whaling Commission (IWC), describe who can be a member and state its enforcement role. (7 marks)

Question 24

(10 marks)

'The black-striped mussel (*Mytilopsis sallei*) can quickly colonise hard surfaces, and spread over ship hulls and port infrastructure. It competes with and smothers native shellfish and alters ecosystem balance' (Department of Fisheries, Western Australia, 2016). It is considered an introduced species in Western Australia.

- (a) Distinguish between the terms 'native' and 'introduced'. (2 marks)

- (b) Describe **two** methods that may prevent an organism that attaches to ships' hulls, such as the black-striped mussel, from entering Australian waters. (4 marks)

- (c) Describe **two** methods that are being used to minimise the spread and impact of introduced marine species. (4 marks)

Question 25

(13 marks)

The whale shark (*Rhincodon typus*) is listed as being vulnerable to extinction. However, the sightings of whale sharks and their photographic identification on Western Australia's Ningaloo Reef shows year by year growth in the number of sightings. A citizen science program has been set up to assist in the whale shark conservation and to enhance the understanding of the species demographics. The demographics can serve as an indication of ocean health and bioproductivity.

(a) Define the following terms.

(i) citizen scientist (1 mark)

(ii) demographics (1 mark)

(iii) conservation (1 mark)

(iv) bioproductivity (1 mark)

- (b) Describe how the worldwide sighting and photo-identification system used in the whale shark program mentioned on page 16 works. (5 marks)

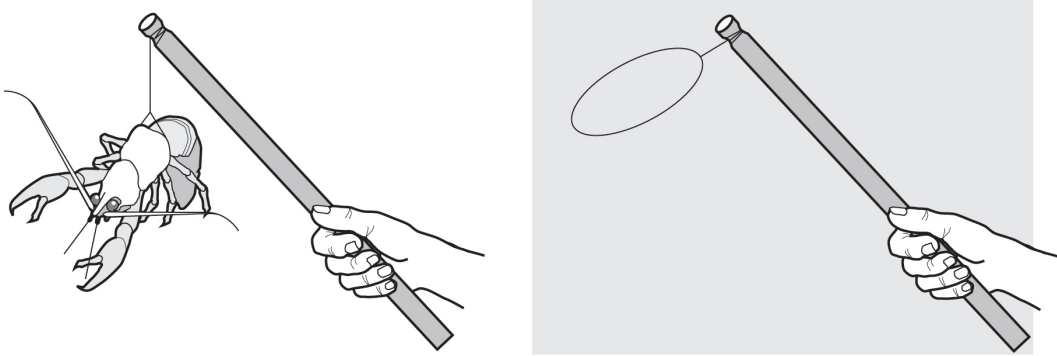
- (c) State another animal species on which the sighting and photographic identification technique may be used and outline how it would work for that species. (4 marks)

Question 26

(16 marks)

Marron are an iconic Western Australian freshwater crayfish. They are an integral part of Western Australia’s natural waterway ecologies as both scavengers and prey for native mammals and birds, and form a part of the fishery for people. Commercial fishing has been banned since the 1950s and fishing for them from the wild is now wholly recreational.

Recreational fishers can use a number of methods to catch these crayfish. They include drop nets, scoop nets and snares (also known as the bushman’s pole). The snare looks like this:



In some areas, the Department of Fisheries, Western Australia has restricted fishing to ‘snare only’ areas, with all other methods being illegal.

To determine the result of introducing ‘snare only’ areas, scientists could conduct research to compare the effect on amounts of Marron caught.

- (a) State a possible hypothesis for this research. (2 marks)

- (b) In this investigation state, the following:

- (i) the independent variable (1 mark)

- (ii) the dependent variable (1 mark)

- (iii) **two** possible controlled variables. (2 marks)

Unlike Marron, Western Rock Lobster are a marine species whose numbers have fluctuated in recent times.

- (c) Explain how loss of habitat and overfishing might affect the numbers of Western Rock Lobster in the wild.

- (i) loss of habitat (3 marks)

- (ii) overfishing (3 marks)

- (d) Describe the Leeuwin Current and explain its influence on the Western Rock Lobster life cycle. (4 marks)

End of Section Two

See next page

Section Three: Extended answer**30% (40 Marks)**

This section contains **four (4)** questions. You must answer **two (2)** questions. Write your answers on the lined pages provided following Question 30.

Additional working space pages at the end of this Question/Answer booklet are for planning or continuing an answer. If you use these pages, indicate at the original answer, the page number it is planned/continued on and write the question number being planned/continued on the additional working space page.

Suggested working time: 70 minutes.

Question 27**(20 marks)**

Coral reefs are often called 'rain forests of the sea'. They are found in waters that are often nutrient poor, but despite this they still flourish. They are considered currently to be vulnerable to damage as the environment changes.

- (a) Discuss the importance of coral reefs in terms of their role in ocean ecosystems and significance for humans. (10 marks)
- (b) Describe the process of coral bleaching and explain how this can be attributed to the enhanced greenhouse effect. (6 marks)
- (c) Describe **two** other consequences of global warming on marine habitats and coastal communities. (4 marks)

Question 28**(20 marks)**

Snorkelling is a popular recreational activity, with thousands of Australians undertaking the activity every year. Use of the correct equipment to ensure the sport is safe for those participants is important.

- (a) For **three** pieces of snorkelling equipment you name, explain why each piece is used for snorkelling, how each piece is prepared for use and how its correct fitting can be ensured. (9 marks)

When snorkelling or scuba diving, people should be in buddy pairs and should concentrate on duck diving and safe descending.

- (b) Explain why snorkelling or scuba diving in a buddy pair is advisable and explain the technique to complete a duck dive and safe descent. (8 marks)
- (c) Following a snorkelling session, equipment should be cared for. Identify **three** steps that should be taken to ensure equipment is maintained after a dive. (3 marks)

See next page

Question 29**(20 marks)**

The diagram below shows a beach that has sand accumulating on one side of a groyne and sand eroding on the other side.



- (a) Explain, with the aid of diagrams, the two processes listed below related to coastal erosion problems.
- (i) accreting and eroding beaches (5 marks)
 - (ii) sand budgets (4 marks)
- (b) Explain, with the aid of diagrams, the features, roles and impacts of sand bypass systems in solving this problem. (6 marks)
- (c) Explain, with the aid of diagrams, the features, roles and impacts of physical barriers in solving this problem. (5 marks)

Question 30

(20 marks)

The Abrolhos Islands, which lie off Western Australia's coast, were the site of the wreck of the Dutch East India Company (VOC) ship, *Batavia*. The site of this wreck is shown below on the chart image.

For copyright reasons this image cannot be reproduced in the online version of this document.

- (a) Describe the historical context of the Dutch East India Company (VOC) ship *Batavia*. Include the purpose of the journey, **three** significant people involved in the final leg of its journey and details of it being wrecked. (8 marks)

The wreck was discovered in the 1960s, with the first dive being conducted in 1963. The wreck site contained many artefacts, including the anchor seen in the image below.



See next page

- (b) Explain the methods that were used to locate the wreck. (4 marks)
- (c) Describe a method that was used to survey the wreck. (2 marks)
- (d) Describe a method used to recover artefacts from the wreck. (2 marks)
- (e) Describe a method used to preserve
- (i) wooden parts of the ship; and (2 marks)
 - (ii) metal parts of the ship. (2 marks)

End of questions

ACKNOWLEDGEMENTS

- Question 7** Images: Littschwager, D. (n.d.). [...]. Retrieved June, 2016, from <http://ocean.si.edu/>[...]
- Question 22** Diagram: Fugro, N.V. (n.d.) *Systems Fugro equator*. Retrieved June, 2016, from www.fugro.com/mh370/media-library/item/mh370/systems-fugro-equator
- Question 23** Quote: De Fontaubert, A. C., Downes, D. R., & Agardy, T. S. (1996). Convention on biological diversity. *Biodiversity in the seas: Implementing the Convention on Biological Diversity in Marine and Coastal Habitats* (IUCN Environmental Policy and Law Paper No.32, p. 2). Gland, Switzerland, & Cambridge, UK: IUCN.
- Question 24** Quote: Department of Fisheries. (2016, January). *Introduced marine species: Species spotlight* (Fisheries fact sheet). Retrieved June, 2016 from www.fish.wa.gov.au/Documents/recreational_fishing/fact_sheets/fact_sheet_introduced_marine_species.pdf
- Question 26** Diagram: Department of Fisheries. (2015, September). *Recreational fishing for marron guide 2016* (p .2: Snare). Retrieved June, 2016, from www.fish.wa.gov.au/Documents/recreational_fishing/licences/rec_licence_marron.pdf
- Question 29** Image: Morris, M. (2013, March 5). *Beach groins*. Retrieved June, 2016, from www.plumislanderosion.com/media/k2/items/cache/8b6e33345ac8d5ffd9cf0d107a7d9e9d_XL.jpg
- Question 30** Chart: Penn, J.W. (Ed.). (1999). Abrolhos Island fish habitat. *State of the Fisheries Report 1998–1999*. Perth, WA: Department of Fisheries, (n.p.).
- Dive image: Western Australian Museum. (n.d.). *VOC ships and other visitors to the west coast* (Batavia: Diver inspecting Batavia anchor). Retrieved June, 2016, from <http://museum.wa.gov.au/explore/dirk-hartog/ships>

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