



## Western Australian Certificate of Education Examination, 2015

### Question/Answer Booklet

# MARINE AND MARITIME STUDIES

## Stage 3

Please place your student identification label in this box

Student Number: In figures

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In words

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### Time allowed for this paper

Reading time before commencing work: ten minutes

Working time for paper: 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 the WACE examinations

### 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 notes or other items of a non-personal nature in the examination room. 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 exam
Section One: Multiple-choice	20	20	20	20	20
Section Two: Short answer	6	6	90	81	50
Section Three: Extended answer	4	2	70	50	30
				<b>Total</b>	100

## Instructions to candidates

1. The rules for the conduct of Western Australian external examinations are detailed in the *Year 12 Information Handbook 2015*. 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 and Three: Write your answers in this Question/Answer Booklet.

3. You must be careful to confine your responses to the specific questions asked and to follow any instructions that are specific to a particular question.
4. Spare pages are included at the end of this booklet. They can be used for planning your responses and/or as additional space if required to continue an answer.
  - Planning: If you use the spare pages for planning, indicate this clearly at the top of the page.
  - Continuing an answer: If you need to use the space to continue an answer, indicate in the original answer space where the answer is continued, i.e. give the page number. Fill in the number of the question that you are continuing to answer at the top of the 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.

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Questions 1 and 2 refer to the information below.

In an experiment to determine the effect of light on a species of zooplankton, *Pleuromamma gracilis*, a scientist placed a group of them into a container and measured their response as the intensity of light directed at the sample was changed. The scientist then repeated the procedure using a second group of the species.

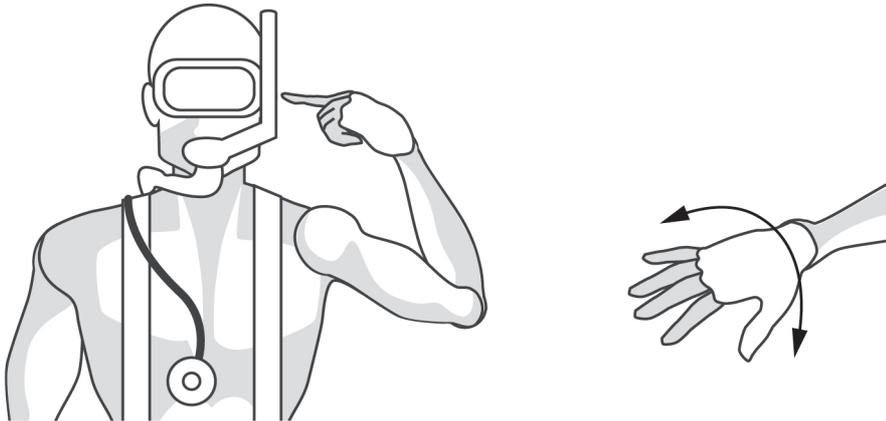
1. In this experiment, the independent variable was the
  - (a) intensity of light.
  - (b) species of zooplankton.
  - (c) response of the zooplankton.
  - (d) number of zooplankton in the sample.
  
2. The **most** correctly-worded hypothesis for this experiment would be that
  - (a) *Pleuromamma gracilis* respond to light.
  - (b) *Pleuromamma gracilis* are affected by changes in light intensity.
  - (c) a decrease in light intensity on *Pleuromamma gracilis* will cause vertical migration.
  - (d) increasing light intensity causes vertical migration in zooplankton.
  
3. The characteristic that **most** easily distinguishes holoplankton from meroplankton is
  - (a) their migration patterns.
  - (b) the size limits of the plankton.
  - (c) the length of time spent in life cycle stages.
  - (d) their geographical locations.
  
4. Imported marine aquarium fish usually need to be placed into quarantine. This is **most** likely because of the need to
  - (a) reduce the spread of disease in native populations.
  - (b) increase the number of fish in marine aquariums.
  - (c) control the numbers of fish being taken from protected areas around the world.
  - (d) control the number of people selling marine aquarium fish.

See next page

5. A small waterplane area twin hull (SWATH) boat has the advantage of

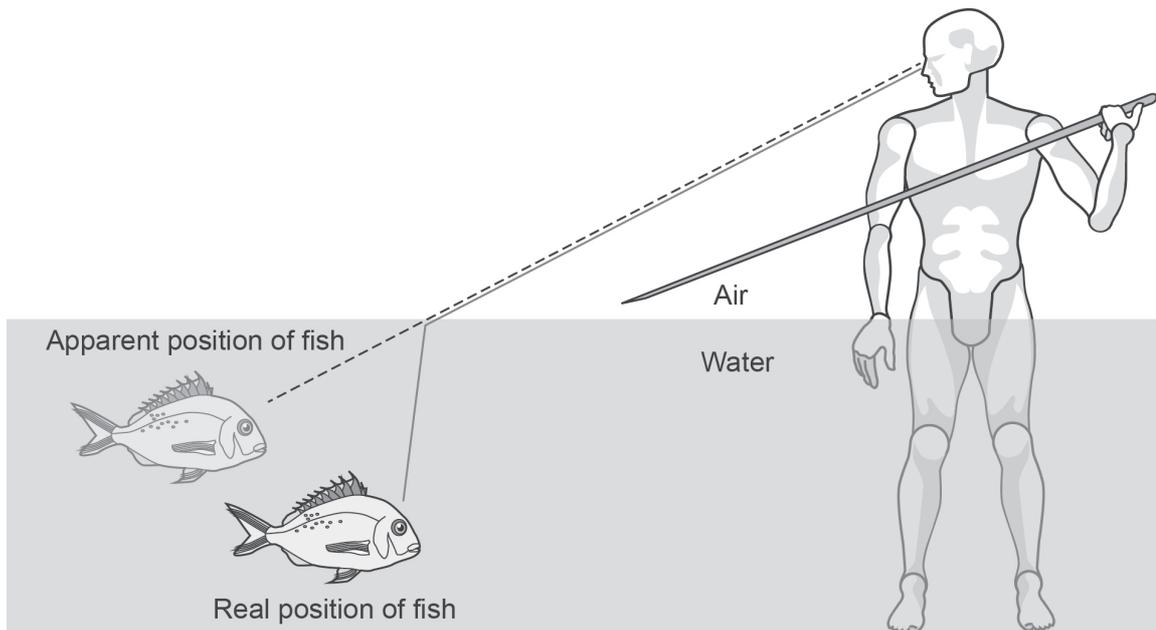
- (a) being stable in a range of sea conditions.
- (b) being cheaper than similar alternatives.
- (c) being less complex for boat builders to build.
- (d) having faster speeds than a similar catamaran-style hull.

6. A combination of the following hand signals would indicate which of the following?



- (a) Something is wrong with my ears.
  - (b) I am low on air and need to share.
  - (c) My ears won't clear because I am low on air.
  - (d) Something is wrong with my breathing.
7. An object with a measured weight in air of 10 N is hung on a string and placed in a container of pure fresh water, and is found to displace water with a weight of 3 N. The force that the object in the water now exerts on the string is **closest** to
- (a) 10 N.
  - (b) 7 N.
  - (c) 3 N.
  - (d) 13 N.
8. Which of the following would be **first** to show the effects of increasing the depth of water?
- (a) a sealed solid container of air
  - (b) a sealed flexible container of air
  - (c) a sealed solid container of water
  - (d) a sealed flexible container of water

9. In the image shown, the apparent and real positions of a fish are different.

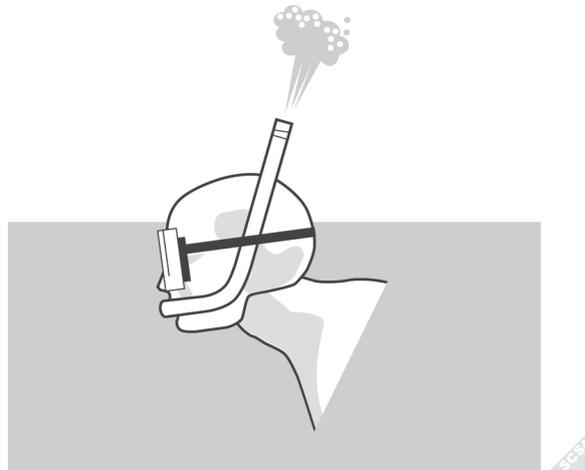


- The process that **best** explains this phenomenon is
- translation.
  - rarefaction.
  - reflection.
  - refraction.
10. The designated skipper of the VOC (Dutch East India Company) ship *Batavia*, which was wrecked off the Western Australian coast, was
- Francisco Pelsaert.
  - Jeronimus Cornelisz.
  - Ariaen Jacobsz.
  - Wiebbe Hayes.
11. Several underwater photographic techniques were used to record the *Batavia* wreck site. Which process was carried out **first** in order to add to the site plan?
- stereophotography
  - timber photomosaic
  - site photomosaic
  - super macro photography
12. What is the **first** technique used in mitigating oil spills?
- scare tactics to remove birds and animals from the spill area
  - physical methods to clean up shorelines
  - chemical dispersants to remove the oil and prevent it from reaching land
  - mechanical containment methods, such as booms, to contain the oil spill

**See next page**

13. Which of the following is primarily responsible for managing marine protected areas (MPAs) from three nautical miles off the coast to the outer limit of Australia's Exclusive Economic Zone at 200 nautical miles?
- (a) the relevant local government
  - (b) the relevant State government
  - (c) the Australian Government
  - (d) international courts of law
14. Some maritime archaeologists have decided to rebury shipwrecks, in order to
- (a) halt corrosion of all metal parts.
  - (b) assist the de-concretion of relics.
  - (c) slow the wreck's decay process.
  - (d) provide safe retrieval of the wreck.
15. Which of the following direct results of the enhanced greenhouse effect is **most** responsible for mass coral bleaching?
- (a) ocean acidification
  - (b) thermal stress
  - (c) salinity changes
  - (d) elevated sea levels
16. The building of houses around artificial canals has affected nearby waterways. The **most** significant impact has been
- (a) a change in the salinity of the waterways.
  - (b) an increase in eutrophication of the waterway.
  - (c) an increase in the number of introduced foreign species in the waterways.
  - (d) a decrease in run-off to the waterways, as roofs now capture the rainfall.

17. The image below shows the snorkel clearing method known as the



- (a) displacement method.  
(b) blast method.  
(c) secondary blast method.  
(d) purge method.
18. The **most** effective method of reducing heat loss in water while snorkelling is
- (a) assuming a position that reduces surface area, such as the HELP position.  
(b) wearing an exposure suit, such as a wetsuit.  
(c) wearing multiple layers of material or clothes.  
(d) staying out of the Sun to reduce heat loss by evaporation.
19. The Biorock Project uses an electric current passed through a metal frame that has been placed on a reef. This results in the addition of calcium compounds to the frame. Coral has been shown to settle and grow faster on such frames. This process is **most** likely to be used to provide a response to changes in which of the following ocean parameters?
- (a) eutrophication  
(b) over fishing  
(c) habitat loss  
(d) declining water quality
20. Our ears are designed to hear sound in air. Sound travels differently in water and in air. Because of this, it is **most** difficult for a diver or snorkeller when underwater to tell
- (a) the volume of the noise being made.  
(b) what is making the noise.  
(c) the direction that the sound is coming from.  
(d) the frequency of the noise being made.

**End of Section One**

**See next page**

Section Two: Short answer

50% (81 Marks)

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

Spare pages are included at the end of this booklet. They can be used for planning your responses and/or as additional space if required to continue an answer.

- Planning: If you use the spare pages for planning, indicate this clearly at the top of the page.
- Continuing an answer: If you need to use the space to continue an answer, indicate in the original answer space where the answer is continued, i.e. give the page number. Fill in the number of the question that you are continuing to answer at the top of the page.

Suggested working time: 90 minutes.

Question 21

(16 marks)

The Toynbee manoeuvre is conducted by pinching the nose and swallowing. This is done as a diver is descending.

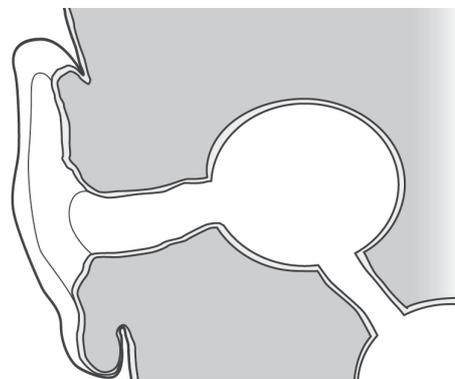
- (a) Name the tube associated with the ear that this would directly affect. (1 mark)

\_\_\_\_\_

- (b) On the diagrams below, draw and annotate the shape of the eardrum, and indicate the pressure on either side of the eardrum, before equalising. (4 marks)



At the surface.



At depth.

- (c) Barotraumas are a result of the effect of pressure on the body. Explain how a barotrauma may occur in the ear, and how this can be prevented. (2 marks)

How it occurs: \_\_\_\_\_

\_\_\_\_\_

Prevention: \_\_\_\_\_

\_\_\_\_\_

(d) State how being under water affects the following:

(i) volume/loudness of sound (1 mark)

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(ii) interpreting the direction of a sound's origin (1 mark)

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(iii) speed of sound. (1 mark)

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(e) Being in water has an effect on the buoyancy of an object.

With the aid of diagrams explain the terms 'positive buoyancy', 'negative buoyancy' and 'neutral buoyancy'. (6 marks)

Positive: _____ _____ _____ _____
Negative: _____ _____ _____ _____
Neutral: _____ _____ _____ _____

Question 22

(11 marks)

- (a) Describe **three** correct steps that should be carried out in a buddy pre-dive safety check. (3 marks)

One: \_\_\_\_\_

\_\_\_\_\_

Two: \_\_\_\_\_

\_\_\_\_\_

Three: \_\_\_\_\_

\_\_\_\_\_

- (b) Explain how to prepare a mask correctly to reduce the chances of it fogging up under water. (2 marks)

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

- (c) Describe **two** steps taken when fitting and adjusting a weight system for snorkelling to provide the correct form of buoyancy. (2 marks)

One: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Two: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

- (d) Describe **two** steps in performing an efficient tow on a tired diver in the event of a surface emergency. (4 marks)

One: \_\_\_\_\_  
 \_\_\_\_\_

Two: \_\_\_\_\_  
 \_\_\_\_\_

**Question 23**

**(23 marks)**

The design of a boat affects where it can be used, and for what purposes. The designs of hulls have changed over the years, yet certain features to suit varying needs and conditions are still common.

- (a) Draw a labelled diagram and explain the characteristics, benefits and limitations of each of the following hull designs. (12 marks)

	Hard chine	Catamaran
<b>Labelled diagram</b>		
<b>Benefits</b>		
<b>Limitations</b>		

Question 23 (continued)

(b) Name and describe a hull design that would suit the following types of vessel. For each type of vessel, describe an advantage of the hull design.

(i) Cruising yacht (3 marks)

Hull: \_\_\_\_\_

Description: \_\_\_\_\_

\_\_\_\_\_

Advantage: \_\_\_\_\_

\_\_\_\_\_

(ii) Rigid inflatable boat (3 marks)

Hull: \_\_\_\_\_

Description: \_\_\_\_\_

\_\_\_\_\_

Advantage: \_\_\_\_\_

\_\_\_\_\_

(c) Care and consideration must be taken when snorkelling around boats. Describe the procedure for a safe descent and ascent when snorkelling if boats are in the dive area. (5 marks)

\_\_\_\_\_

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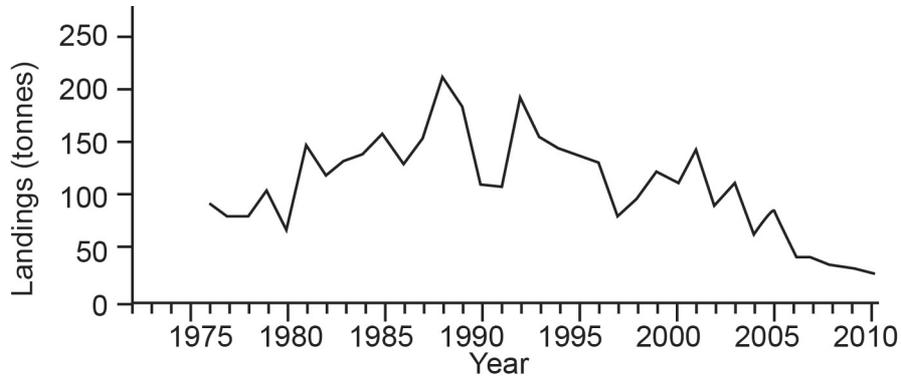
**See next page**

Question 24

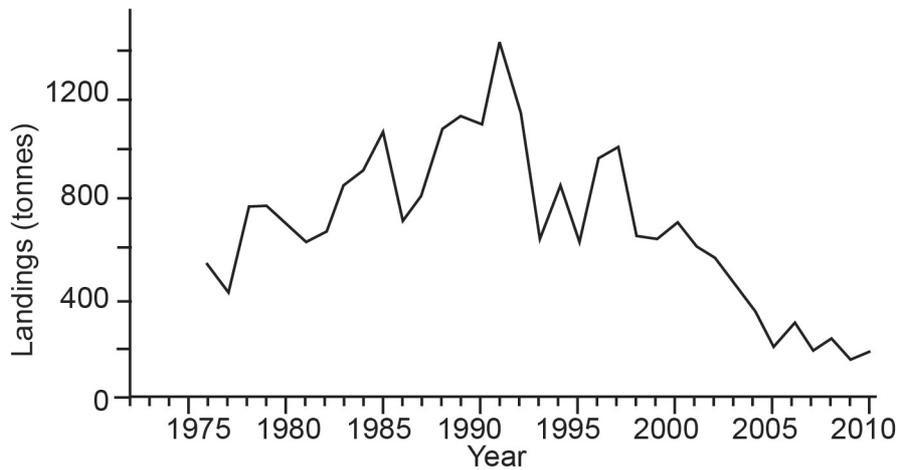
(11 marks)

The following graphs show the total commercial landings of herring in two major fishing areas.

**Western Australia west coast**



**Western Australia south coast**



- (a) Describe **two** general trends in the Western Australia south coast graph. (2 marks)

One: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Two: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

- (b) Give a reason for each of the trends that you described in part (a). (2 marks)

Trend One: \_\_\_\_\_

\_\_\_\_\_

Trend Two: \_\_\_\_\_

\_\_\_\_\_

- (c) Give a reason for the difference between the west coast and the south coast herring catches for the period from 1989 to 1992. (1 mark)

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

- (d) Describe and explain **three** ways in which these herring catch results might have been collected in order to minimise experimental error. (6 marks)

One: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Two: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Three: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Question 25

(12 marks)

In Western Australia, the Department for Parks and Wildlife manages interactions with whale sharks (*Rhincodon typus*).

- (a) Describe **three** methods designed to protect whale sharks when swimmers are interacting with them and explain how these methods reduce harmful or detrimental effects on the whale sharks. (6 marks)

Method required of swimmers when interacting with a whale shark	How the method reduces harm or detriment to a whale shark

- (b) Name **two** types of Marine Protected Area that can be found in Western Australia. (2 marks)

One: \_\_\_\_\_

Two: \_\_\_\_\_

Whales are protected in Australian waters but are also managed globally by the International Whaling Commission.

- (c) (i) What are the **two** main responsibilities of the International Whaling Commission? (2 marks)

One: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Two: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

- (ii) Australia has regulations covering interactions between people in boats and marine mammals. List **two** differences between the regulations involving interactions with whales and interactions with dolphins. (2 marks)

One: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Two: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_



- (b) Describe **three** points to consider when rigging and using a lift bag to retrieve such an object. (3 marks)

One: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Two: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Three: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

**End of Section Two**

**See next page**

**Section Three: Extended answer**

**30% (50 Marks)**

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

Spare pages are included at the end of this booklet. They can be used for planning your responses and/or as additional space if required to continue an answer.

- Planning: If you use the spare pages for planning, indicate this clearly at the top of the page.
- Continuing an answer: If you need to use the space to continue an answer, indicate in the original answer space where the answer is continued, i.e. give the page number. Fill in the number of the question that you are continuing to answer at the top of the page.

Suggested working time: 70 minutes.

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**Question 27**

**(25 marks)**

Among the functions of the International Convention for the Prevention of Pollution from Ships (MARPOL) is the regulation of oil spills and other waste from ships, both in normal operations and in the case of accidents.

These regulations do not necessarily cover all types of wastes.

- (a) Name and describe **two** wastes that are included in **each** of the following categories:
- human and domestic waste
  - heavy metals. (4 marks)
- (b) For each category of waste given above, describe the processes used to manage and control it, so that it does not pollute the marine environment. (8 marks)

Some pollutants increase levels of nutrients. These pollutants affect waterways and oceans, and in many cases originate on land rather than on ships.

- (c) Name **two** pollutants that increase nutrient levels in a waterway or ocean. Explain how these pollutants enter the waterway or ocean, and how they affect both water quality and the organisms that live in the water. (13 marks)

**Question 28****(25 marks)**

The wreck of the *SS President Coolidge*, on the Pacific island of Espiritu Santo in Vanuatu, is recognised as one of the largest diveable shipwrecks in the world. It has been under water since 1942 and has recently begun to show significant signs of decay. It is predominantly made of iron, but has other materials incorporated in its structure.

- (a) Explain the decay processes of metal corrosion mostly responsible for the declining condition of the wreck. (7 marks)
- (b) (i) Name **two** materials other than metals that may have been on the wreck and have since decayed. (2 marks)
- (ii) Describe the processes involved in the decay of each of these materials. (4 marks)
- (c) If the local authorities of Vanuatu wished to conserve significant metallic relics of this wreck, describe the conservation techniques that would be used to perform the following:
- (i) retrieval (4 marks)
- (ii) de-concretion (4 marks)
- (iii) stabilisation. (4 marks)

**Question 29****(25 marks)**

Water movement and winds can cause significant changes to beach structure.

- (a) Explain, using diagrams where appropriate, the following terms and how each could affect beach structure.
- (i) longshore currents (5 marks)
- (ii) beach accretion and erosion (5 marks)
- (iii) sand deposition (5 marks)
- (b) Explain the features, role and impact of the following engineering methods that can be used to reduce the erosion of sandy beaches.
- (i) artificial reefs (5 marks)
- (ii) physical barriers (5 marks)

**Question 30**

**(25 marks)**

'The oceans of the world play a fundamental role in the climate system:

- They absorb much of the heat radiated by the Sun and transport this heat around the globe through currents, eddies and gyres.
- They are the main long-term sink for atmospheric carbon dioxide and play an important role in controlling the rate at which carbon dioxide is increasing in the atmosphere.
- They are the source of water in the hydrological cycle.

As our climate changes, so too do ocean conditions and processes. This is not only affecting life in the ocean but also life on the land, as the ocean changes then feed back into the climate system, causing further changes ...

As water in the ocean warms it expands, raising the sea level. This increase is being augmented by additions of water to the ocean from melting ice. In the 20th century, global average sea level rose by almost 20cm.'

- (a) Using the information above, design an experiment that would add to this information in showing the effects of global warming on ocean sea levels.

In your answer, include the following information:

- (i) the relevant background information that you would collect to assist in your experiment (3 marks)
- (ii) a correctly-formatted hypothesis (3 marks)
- (iii) the variables that would be involved in your experiment (5 marks)
- (iv) the method that you would use to conduct your experiment. (6 marks)

Global warming also affects oceanic thermohaline currents.

- (b) Explain, with a diagram, what a thermohaline current is, and how it can be affected by global warming. (8 marks)

**End of questions**



























## ACKNOWLEDGEMENTS

### Section One

**Question 6** Image 2 adapted from: Southwood, P. (2011). *File:Dive hand signal [...].png*. Retrieved June, 2015, from [https://commons.wikimedia.org/wiki/File:Dive\\_hand\\_signal\\_\[...\].png](https://commons.wikimedia.org/wiki/File:Dive_hand_signal_[...].png)  
Used under Creative Commons Attribution-ShareAlike 3.0 Unported licence.

**Question 9** Image adapted from: University of Waikato. (n.d.). *Science ideas and concepts*. Retrieved May, 2015, from <http://sciencelearn.org.nz/Contexts/Light-and-Sight/Science-Ideas-and-Concepts>

### Section Two

**Question 24** Graphs from: Smith, K., Brown, J., Lewis, P., Dowling, C., Howard, A., Lenanton, R., et al. (2013). *Status of nearshore finfish stocks in south-western Western Australia: Part 1: Australian herring: NRM Project 09003 final report* (Fisheries Research Report No. 246, 2013). North Beach, WA: Department of Fisheries, p. 50, fig. 3.3. Retrieved May, 2015, from [www.fish.wa.gov.au/About-Us/Publications/Pages/Fisheries-Research-Reports.aspx](http://www.fish.wa.gov.au/About-Us/Publications/Pages/Fisheries-Research-Reports.aspx)

### Section Three

**Question 30** Quotation from: CSIRO. (2015). *Oceans and climate change*. Retrieved May, 2015, from [www.csiro.au/en/Research/Environment/Oceans-and-coasts/Oceans-climate](http://www.csiro.au/en/Research/Environment/Oceans-and-coasts/Oceans-climate)

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