91413

914130

NZQA
NEW ZEALAND QUALIFICATIONS AUTHORITY
MANA TOHU MĀTAURANGA O AOTEAROA

3

SUPERVISOR'S USE ONLY

Level 3 Earth and Space Science, 2014

91413 Demonstrate understanding of processes in the ocean system

2.00 pm Tuesday 2 December 2014
Credits: Four

Achievement	Achievement with Merit	Achievement with Excellence
Demonstrate understanding of processes in the ocean system.	Demonstrate in-depth understanding of processes in the ocean system.	Demonstrate comprehensive understanding of processes in the ocean system.

Check that the National Student Number (NSN) on your admission slip is the same as the number at the top of this page.

You should attempt ALL the questions in this booklet.

If you need more space for any answer, use the page(s) provided at the back of this booklet and clearly number the question.

Check that this booklet has pages 2–10 in the correct order and that none of these pages is blank.

YOU MUST HAND THIS BOOKLET TO THE SUPERVISOR AT THE END OF THE EXAMINATION.

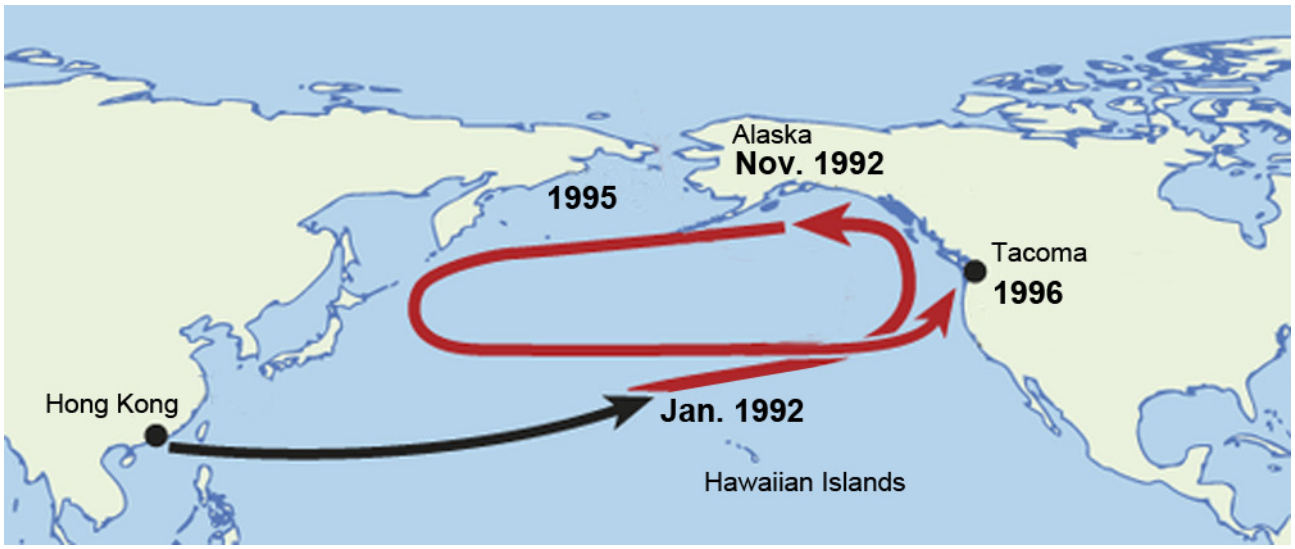
TOTAL

ASSESSOR'S USE ONLY

QUESTION ONE: OCEAN CIRCULATION

ASSESSOR'S USE ONLY

On 10 January 1992, a container full of floating bath toys fell off a ship in the North Pacific Ocean. By November 1992, some of the toys were found on beaches in Alaska (approximately 3 500 km away), and in 1996 at Tacoma (north-western America).



Map showing the movement of the bath toys in the North Pacific Ocean in red; the black arrow shows the journey of the ship before the container fell off.

Source (adapted): www.mnn.com/earth-matters/wilderness-resources/stories/what-can-28000-rubber-duckies-lost-at-sea-teach-us-about

Discuss how the surface ocean circulation transported some of the toys from the middle of the Pacific Ocean to Alaska and the west coast of North America (Tacoma), indicated by arrows on the map.

Your answer should include:

- a description of the direction of motion of the bath toys that were found at Tacoma and Alaska
- an explanation of how surface circulation forms
- an explanation of how oceans move matter (the toys)
- a discussion linking surface circulation in the oceans to the movement of the toys.

You may use a sketch to help develop your answers.

ASSESSOR'S USE ONLY

QUESTION TWO: THE BIOLOGICAL PUMP

ASSESSOR'S USE ONLY

Plankton are an important part of the biological pump in the carbon cycle. Plankton can be either phytoplankton (tiny marine plants) or zooplankton (tiny marine animals).

If ocean temperatures rise enough, the increased temperatures could lead to a decrease in the number of plankton, as there will be less upwelling (rising up of water) in the oceans, and therefore fewer nutrients will be available.

Discuss how a decrease in the number of plankton would affect the biological pump in the carbon cycle.

Your answer should include:

- completion of the diagram of the biological pump below by filling in the three labels
- a description of the biological pump
- an explanation of how the biological pump removes and stores atmospheric carbon
- a discussion linking the effect of a decrease in plankton to the carbon cycle.

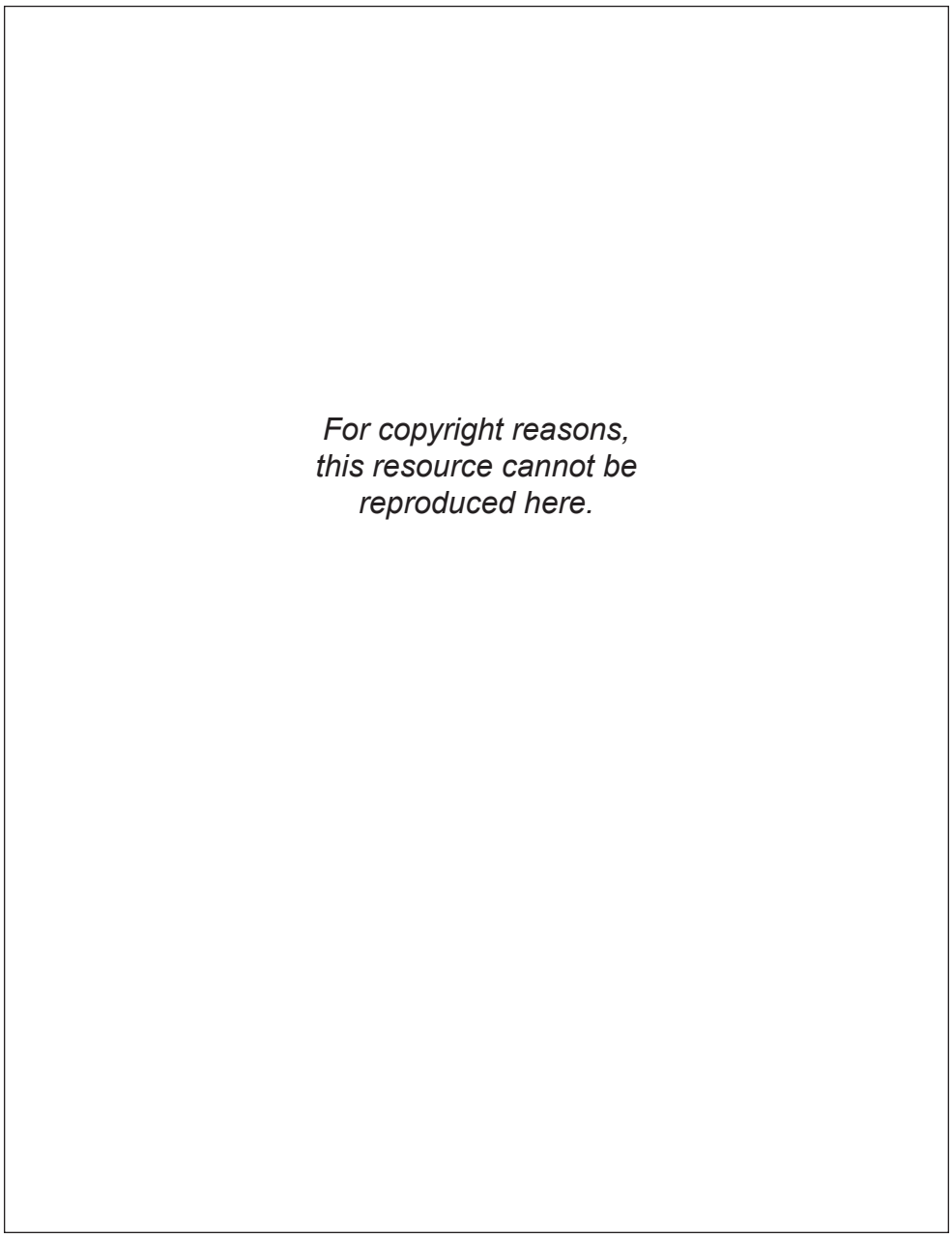
For copyright reasons, this resource cannot be reproduced here.

Source: http://www.teara.govt.nz/files/di-5932-enz.jpg

ASSESSOR'S USE ONLY

QUESTION THREE: EL NIÑO

During El Niño conditions, the ocean undergoes great changes around the Pacific Ocean. This has a great impact on the fisheries along the west coast of South America, which in a normal (neutral) year are very productive.



Note: The colours on the diagrams indicate different temperatures.

Source (adapted): http://pmel.noaa.gov/pubs/outstand/mcph1720/images/fig01.gif

Discuss how El Niño conditions affect the thermocline and the transport of energy (heat) and matter (nutrients), and why this affects the fisheries along the South American coast.

Your answer should include:

- a description of a thermocline
- an explanation of how El Niño conditions form in the Pacific Ocean
- an explanation of how the El Niño conditions affect the thermocline
- a discussion of how the changes in the thermocline and the transport of heat and nutrients link together to affect the fisheries.

You may use a sketch to help develop your answers.

ASSESSOR'S USE ONLY

There is more space for your answer to this question on the following page.

ASSESSOR'S USE ONLY

Extra paper if required.
Write the question number(s) if applicable.

QUESTION NUMBER

ASSESSOR'S USE ONLY

Extra paper if required.
Write the question number(s) if applicable.

QUESTION NUMBER

ASSESSOR'S USE ONLY

91413