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Level 3 Earth and Space Science, 2017

91413 Demonstrate understanding of processes in the ocean system

2.00 p.m. Monday 27 November 2017
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 room for any answer, use the extra space provided at the back of this booklet and clearly number the question.

Check that this booklet has pages 2–12 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

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QUESTION ONE: BOUNDARY CURRENTS

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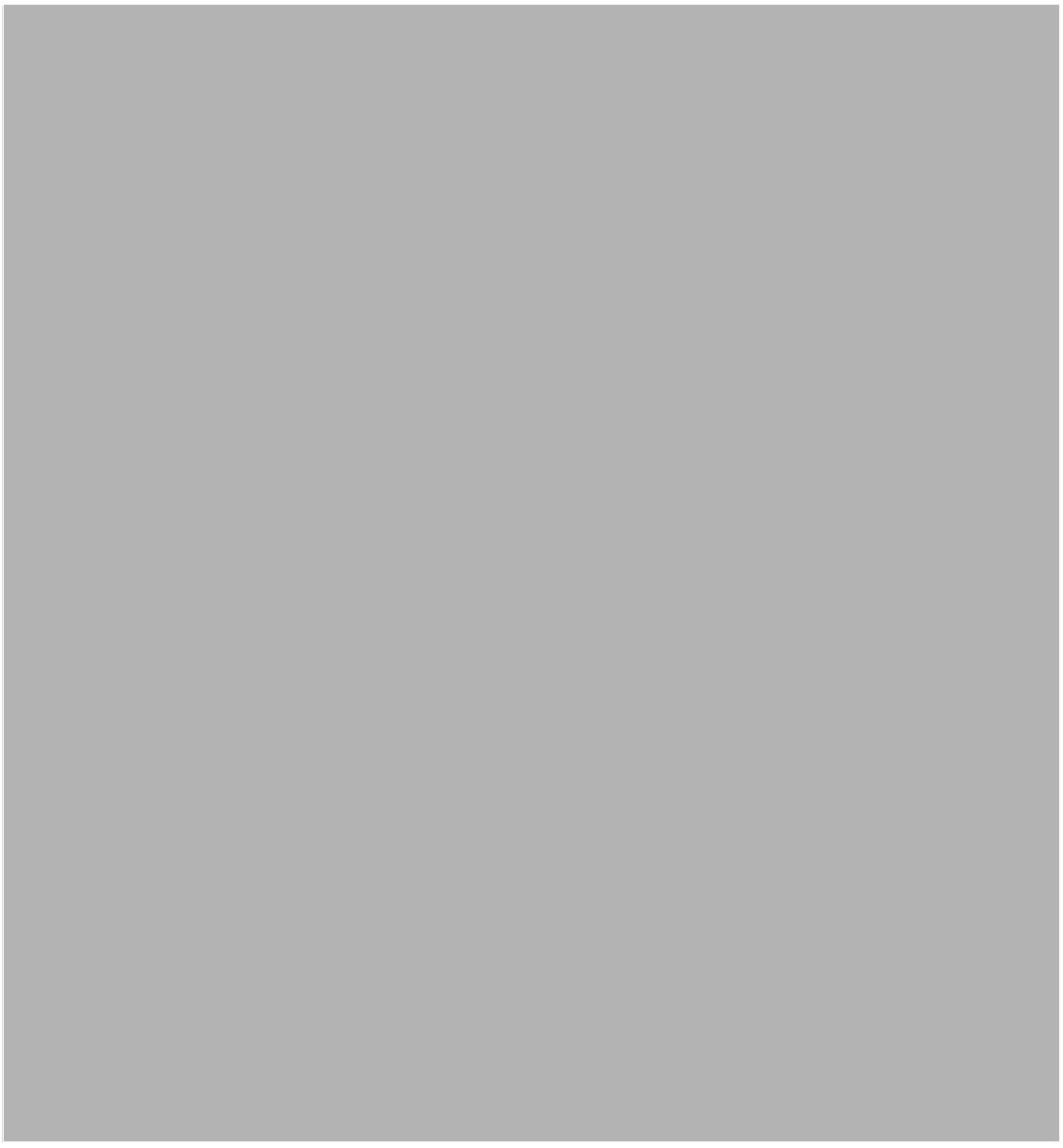
Coastal regions on the western side of an ocean tend to have warmer climates and poorer fishing than coastal regions of the same latitude on the eastern side of the same ocean.

An example is at latitude 33° South, Sydney, Australia on the **western side** of the Pacific Ocean, and Valparaiso, Chile, on the **eastern** side of the Pacific Ocean.

The diagram below shows the average ocean surface temperatures for the Pacific Ocean.



Adapted from: https://upload.wikimedia.org/wikipedia/commons/1/1e/Weeklysst.gif

Explain how processes in the Pacific Ocean cause these differences in climate and fishing at identical latitudes.

In your answer you should:

- refer to surface circulation patterns in the Pacific Ocean
- explain why the western side of the Pacific Ocean is warmer than the eastern side
- explain why fishing differs on the western and eastern sides of the Pacific Ocean.

You may annotate the above diagram to support your answer.

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

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QUESTION TWO: CARBON CYCLE

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The ocean plays a large role in the transport of matter, including nutrients such as carbon, around the Earth.

Explain the processes involved in the transport and storage of carbon in the ocean.

In your answer you should consider:

- the physical carbon pump
- the biological carbon pump
- the interactions between BOTH pumps and their relationship to carbon transport and storage.

You may include annotated diagrams to support your answer.

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

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QUESTION THREE: POLAR ICE CAPS

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The amount of sea ice at the poles has been decreasing in recent decades. The images below show the Arctic region in September 1979, and then in September 2007.

http://earthsweathernetwork.weebly.com/uploads/3/0/6/6/30661585/863949_orig.jpg

A decrease in sea ice could have significant effects on the thermohaline current.

Explain the effect of sea ice on the thermohaline current AND how the current will be affected if the sea ice continues to decrease.

In your answer you should consider:

- the roles of temperature and salinity in affecting the thermohaline current
- why the sea ice is decreasing.

You may include annotated diagrams to support your answer.

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

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

QUESTION NUMBER

ASSESSOR'S USE ONLY

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Write the question number(s) if applicable.

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