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Level 3 Earth and Space Science, 2018

91413 Demonstrate understanding of processes in the ocean system

2.00 p.m. Thursday 22 November 2018
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: SURFACE SALINITY VARIATION BY LATITUDE

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The diagram below shows the average annual **surface** salinity and temperature of the ocean, and how it changes with latitude.

Average annual surface salinity and temperature variation by latitude

Source: http://slideplayer.com/slide/8417453/26/images/3/Surface+Salinity+Variation+by+Latitude.jpg

Explain why ocean surface **salinity** varies with latitude.

In your answer, you should consider:

- factors affecting ocean surface salinity
- why the surface salinity and temperature curves do not match.

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

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QUESTION TWO: UPWELLING AND DOWNWELLING

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Upwelling and downwelling are important processes that transport matter and energy around oceans. The map below shows some of the common regions of upwelling and downwelling.

Regions of upwelling and downwelling

Adapted from: http://1.bp.blogspot.com/-p_sRGUzhhQc/VhsboIyUREI/AAAAAAAA_Bg/JZM1mK6IQiQ/s1600/world%2Bmap.png

Explain how these processes transport energy and carbon dioxide, and help regulate the Earth's climate.

In your answer, you should

- explain how upwelling occurs
- explain how downwelling occurs.

You may include a fully annotated diagram to help answer this question.

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

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QUESTION THREE: THE SOUTHERN OSCILLATION

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The Southern Oscillation is an irregular pattern of variations in the sea surface temperature over the tropical Pacific Ocean, which includes the 'normal' condition and the two extremes, El Niño and La Niña.

Explain the formation of **El Niño** and **La Niña**, and the effects each has on the Pacific Ocean.

In your answer, you should consider:

- the Pacific Ocean thermocline
- climate / weather patterns of the western and eastern Pacific Ocean
- the fishing industry in Peru.

You may annotate the map below and / or draw your own diagrams to support your answer.

Adapted from: https://upload.wikimedia.org/wikipedia/commons/thumb/a/a4/World_location_map_%28W3_Western_Pacific%29.svg/2000px-World_location_map_%28W3_Western_Pacific%29.svg.png

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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

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