

91193



NEW ZEALAND QUALIFICATIONS AUTHORITY
MANA TOHU MĀTAURANGA O AOTEAROA

QUALIFY FOR THE FUTURE WORLD
KIA NOHO TAKATŪ KI TŌ ĀMUA AO!

2

SUPERVISOR'S USE ONLY

Level 2 Earth and Space Science, 2019

91193 Demonstrate understanding of physical principles related to the Earth System

9.30 a.m. Wednesday 27 November 2019
Credits: Four

Achievement	Achievement with Merit	Achievement with Excellence
Demonstrate understanding of physical principles related to the Earth System.	Demonstrate in-depth understanding of physical principles related to the Earth System.	Demonstrate comprehensive understanding of physical principles related to the Earth 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

ASSESSOR'S USE ONLY

QUESTION ONE: THE COLOUR OF CLOUDSASSESSOR'S
USE ONLY

www.thoughtco.com/types-of-clouds-recognize-in-the-sky-4025569

Clouds reduce the amount of sunlight reaching the surface of the Earth, but they do allow some light through.

Explain, in detail, why clouds often appear white.

In your answer, you should consider:

- how light travels through space to reach the Earth
- how colours of the light spectrum differ from each other
- what happens to the light as it travels through the clouds
- why the bases of clouds often look darker.

A diagram may assist your answer.

QUESTION TWO: CLOUD EFFECTS ON EARTH'S RADIATION

ASSESSOR'S
USE ONLY

Cloud Effects on Earth's Radiation



https://eoimages.gsfc.nasa.gov/images/imagerecords/54000/54219/Clouds_effects.jpg

A NASA satellite is used to measure radiant energy from both the Sun and the Earth at the top of the atmosphere. This has helped scientists to understand the effects clouds have on the temperature of the Earth.

Use the diagram to help you explain in detail the different effects clouds may have on the movement of energy to and from the Earth.

In your answer, you should consider:

- where clouds may form and the effect the different locations may have on energy transfer to and from the Earth
- the difference between the energy from the Sun and the Earth
- whether the clouds may have a warming or cooling effect on the Earth at different times of day.

A diagram may assist your answer; there is space for this on the following page.

More space for this answer is available on the following pages.

QUESTION THREE: OCEAN CIRCULATION

ASSESSOR'S
USE ONLY



www.jpl.nasa.gov/images/earth/20100325/atlantic20100325-full.jpg

The global ocean conveyor belt is a series of ocean currents that transfer heat around the globe, driven by cold, dense water sinking at the poles. It has a major effect on the Earth's climate, accounting for a quarter of the Earth's heat transport.

Explain in detail the energy transfer processes involved in the global ocean conveyor belt.

In your answer, you should:

- label the diagram below, showing heat transfers taking place at different latitudes
- explain the reason for the temperature difference between the poles and the Equator
- explain, in detail, the energy transfers taking place
- explain the role of these heat transfer processes in the Earth's climate.



