This assessment is based on a now-expired version of the achievement standard and may not accurately reflect the content and practice of external assessments developed for 2024 onwards. No part of the candidate's evidence in this exemplar material may be presented in an external assessment for the purpose of gaining an NZQA qualification or award.

Mana Tohu Mātauranga o Aotearoa
New Zealand Qualifications Authority

Level 1 Physics, Earth and Space Science RAS 2023

92046 Demonstrate understanding of the effect on the Earth of interactions between the Sun and the Earth-Moon system

EXEMPLAR

Merit

TOTAL 15

PART ONE: LUNAR PHASES

The Moon has 8 different phases and they are caused because the Moon orbits around the Earth, and this causes different parts of the Moon to appear to be lit up by the Sun. There are two sides of the Moon and we can only see one of them (half). The near side which is the one we can see, and the far side which is the other half of the Moon you cannot see from Earth. The far side of the moon is only visible if you go to space. We only see one side of the Moon because the Moon rotates at the same speed it rotates around the Earth. There are four main Lunar Phases in the Southern Hemisphere starting with the New Moon, then it goes to the First quarter half Moon, Full Moon, Third Quarter Half Moon and it goes back to the New Moon, and the cycle restarts after every 29.5 days. The New Moon is fully dark, so it is not very visible from Earth because there isn't enough sunlight to light it up, however, sometimes you are able to see an outer line around the New Moon and that happens because the sunlight that is reflecting off Earth reflects on the Moon, different from the Full Moon that is fully lit by the sunlight. The first and the third quarter half Moon, as the name says, only half of the Moon is lit up. The lunar cycle takes 29.5 due to the Earth's orbit around the Sun. It takes 29.5 for the Sun to be aligned with the Moon and the sunlight to hit the Moon the same way it did on the first day of those 29.5 days. The Moon rises at different times each day because it depends on where the Moon is relative to the Earth and the Sun and that will determine when the Moon will rise everyday, and that is why sometimes the Moon rises earlier or later.

PART TWO: TIDES

Tides happen because of the gravitational pull of the Earth which causes the tides to either be high or low. There are two main different types of tides, Neap tide and Spring tide, and they both occur every 14-17 days. This occurs when the Moon's tidal bulge is aligned with the Sun's tidal bulge. Spring tides occur during a full moon or new moon, neap tides occur during a first quarter half moon or a third quarter half moon. Neap tide occurs when the Moon is 90 degrees to the Sun, which then causes the pull of the Moon and Sun to be weak causing the tides to be low, and they happen during a spring tide. Neap tides cause high tides to be lower than usual and low tides to be higher than usual. Spring tides occur when the Moon and the Sun are in the same direction. When spring tides occur, high and low tides become stronger or weaker than usual. High tides get higher and low tides get lower, and this causes a large tidal range. Everyday two low tides and two high tides occur, and this is because the Earth rotates through two tidal bulges in a lunar day. King tides is the other type of tide, New Zealand experiences king tides at irregular intervals of time because king tides only occur when the Moon is at its perigee phase (they only happen approximately between 7 months) which means that it is when it is closest to the Earth. When the Moon is closer to the Earth the tides tend to get higher, and that is what king tides are. King tides are stronger than spring tides, and this is because the Moon is closer to Earth during a king tide than it is during a spring tide.

PART THREE: SEASONS

There are four seasons, spring, summer, autumn and winter, and depending on where you are in the World you might experience them at different times of the year. This happens because of the Earth's tilted axis.
New Zealand experiences four different seasons because of the Earth's tilted axis, throughout the year New Zealand might experience these four seasons because of the Earth's orbit around the Sun. The Sun always hits different parts of the Earth, this means that if the Sun is hitting the Southern Hemisphere (where we are) it will be summer for us, meaning that the days will be longer. If the Sun is hitting away from the Southern Hemisphere, it will be winter for us, and the days will be shorter. And this cycle continues to happen every year.
In the Northern Hemisphere, the United Kingdom experiences the same four seasons however at different times of the year. This happens because of the Earth's tilted axis being tilted with respect to its orbital plane, so when the Southern Hemisphere is facing the Sun, the Northern Hemisphere is obviously facing away from the Sun, and as the Earth orbits around the Sun, the Northern Hemisphere will experience Summer, for example, at a different time of the year.
The Equator experiences little seasonal variation compared to New Zealand because of the angle of the Sun that is directly facing the Equator. This causes the areas around the Equator such as most of South America, to be hotter than most places around Earth.
In conclusion, seasons occur because of the tilt of Earth's axis.

Merit

Subject: Physics, Earth and Space Science RAS

Standard: 92046

Total score: 15

Q	Grade score	Marker commentary
One	A4	Good point about seeing one side of the moon, describes the phases, doesn't explain the positions of the Earth-Moon and Sun for the different phases of the moon.
Two	M6	Would have got Achievement with Excellence if they had explained high and low tide formation; candidate has explained why New Zealand experiences king tide, spring, and neap tide.
Three	M5	Candidate has explained why the two hemispheres have seasons at opposite times.