Assessment Schedule – 2024

Physics, and Earth and Space Science: Demonstrate understanding of the effect on the Earth of interactions between the Sun and the Earth-Moon system (92046)

Evidence

Part One	Achievement	Achievement with Merit	Achievement with Excellence
As the Earth spins on its axis, the Sun shines from different angles during the day. The Sun is lowest in the sky in the morning and evening, which means that the shadows are longer. As the Sun appears to move through the sky, it gets higher, making the shadows shorter. At midday the Sun is at its highest in the sky, causing shortest shadows. There is no shadow if the Sun is below the horizon, e.g. before sunrise or after sunset. The Sun rises in the east in New Zealand, due to the Earth spinning west to east on its axis. This means morning shadows will fall towards the (south) west, while in the afternoon they are towards the (south) east. The eastward spin also increases the observed height of the Sun until it is at its maximum when a place on Earth is pointed directly at it at noon. Then height reduces again until the Sun disappears below the horizon in the west. Shadows are longer in Invercargill than in Auckland because the Sun is lower in the sky at midday, meaning that the shadow is longer. This is because Invercargill is further south than Auckland, and the Sun does not rise as high above the horizon.	• Identifies that the Earth spins on its axis. • Describes the apparent changing height of the Sun's path each day. • Describes how shadow length changes with Sun height. • States that there is no shadow when the Sun is below the horizon / night. • Describes shadow directions throughout the day. • Describes difference in shadow length between Invercargill and Auckland due to height of Sun.	• Explains how the spin of the Earth causes the Sun to change its height during the day. • Explains why the length of shadow changes throughout the day. • Explains how the direction of shadow changes throughout the day (links change of direction with changing location of Sun) • Explains the effect of latitude on the shadow length at either Invercargill or Auckland. (Could be implied by relative distance to Equator or South Pole.)	• Fully discusses how length AND direction of shadows changes throughout the day due to changing height of the Sun. • Fully discusses why Invercargill has longer shadows than Auckland.

N0	N1	N2	A3	A4	M5	M6	E7	E8
No real answer	1 Achievement point	2 Achievement points	3 Achievement points	4 Achievement points	2 Merit point	3 Merit points	1 Excellence point	Both Excellence points

Part Two	Achieved	Merit	Excellence
When the Southern Hemisphere is tilted towards the Sun, the solar radiation is on a more direct angle and is more concentrated, which makes it warmer. However, in winter, the Southern Hemisphere is tilted away and so is receiving less radiation on a less direct angle which makes it less concentrated. Christchurch is closer to the Equator than Scott Base, so it will receive solar radiation at a more direct angle which makes it warmer. Scott Base is either tilted towards or away from the Sun, and it is facing it at a lower angle, so it receives less solar radiation The summer solstice is when the Sun appears to be at the northern-most point in the sky. The winter solstice is when the Sun appears to be at the southernmost point in the sky. Equinox is when the Earth is neither facing towards nor away from the Sun, resulting in equal amounts of daylight. During a summer solstice, the Sun is higher in the sky because New Zealand (Southern Hemisphere) is tilted towards the Sun. The daylength at Scott Base is 24, hours because it is further south than Christchurch, and Scott Base is constantly tilted towards the Sun at this time. During a winter solstice, the Sun is lower in the sky because the Southern Hemisphere is tilted away from the Sun. This means that the Sun does not rise at Scott Base, because the Sun is at its northern-most point and Christchurch is further north than Scott Base. During an equinox, because the Earth (Southern Hemisphere) is neither tilted towards or away from the Sun, it appears to be between the height of winter and summer solstice paths. This results in Scott Base and Christchurch having a similar amount of daylight.	• Describes Earth's orbit and tilt. • Describe differences between summer and winter. • Describes the height of the Sun for summer and winter. • Defines equinox OR solstice. • States that Earth's tilt influences day length / the Sun's path. • Describes changes in day length between Christchurch and Scott Base.	• Explains seasons due to angle of insolation. • Explains how the Sun's path appears to change throughout the year. • Explains the difference between equinox and solstice. • Explains the differences in day length for Christchurch and Scott Base for either the equinox OR solstices, with a reason (i.e., difference in latitude/closer to Equator / further from poles).	• Discusses why there are seasonal changes between Christchurch and Scott Base (can include Sun's path, angle of insolation, linking to differences in temperature). • Discusses why the day length is different between Christchurch and Scott Base, linking to tilt.

N0	N1	N2	A3	A4	M5	M6	E7	E8
No real answer	1 Achievement point	2 Achievement points	3 Achievement points	4 Achievement points	2 Merit points	3 Merit points	1 Excellence point	Both Excellence points

Part Three	Achieved	Merit	Excellence
Lunar and solar eclipses depend on the relative positions between the Sun, Moon, and Earth. Solar eclipses happen during a new moon, when the Moon is between the Earth and Sun. In some places on Earth, the Moon blocks sunlight, creating a shadow on the Earth's surface, which is seen as an eclipse. Because the Moon is so much smaller than the Sun, it only partially blocks the sunlight. Lunar eclipses happen during a full moon, when the Earth is between the Sun and Moon. These are visible from the half of Earth that is facing the Moon, as the Moon is much smaller than Earth and covered by its shadow. The Moon's orbit is on a tilt, which means that it can pass above and below Earth's shadow. This means that even if the Moon is in a full moon, it might not be in the Earth's umbra or penumbra, so no lunar eclipse will occur. Same with a solar eclipse; during a New Moon, the Moon might be above or below the Earth's orbital plane of the Sun, which means that no solar eclipse will occur. The shadow of the Moon on the Earth during a solar eclipse is smaller, so it means that it is not easily seen on Earth. Because the Moon orbits around the Earth, this shadow also moves quickly. However, the Earth's shadow is larger and it takes longer for the Moon to move through it, meaning that a lunar eclipse will take longer to finish.	Describes: • Solar eclipse happens during new moon. • Solar eclipse when the Moon is between the Earth and the Sun. • Lunar eclipse when the Earth is between the Moon and the Sun. • Lunar eclipse during full moon. • Observable effect of Sun, Earth, Moon position for solar eclipse (casts a small shadow on Earth) • Describes observable effect of Moon in Earth's shadow, i.e.: Moon turning red.	Explains: • How solar eclipse occurs with regard to shadow and relevant Moon phases. • How lunar eclipse occurs with regard to shadow and relevant Moon phase • How the tilt of Moon's orbit affects the solar or lunar eclipse. • Requirements to observe either eclipse and their differences.	Analyses: • Why solar and lunar eclipses last differing lengths of time. • Why lunar and solar eclipses don't occur every month.

N0	N1	N2	A3	A4	M5	M6	E7	E8
No real answer	1 Achievement point	2 Achievement points	3 Achievement points	4 Achievement points	2 Merit point	3 Merit points	1 Excellence point	Both Excellence points

Cut Scores

Not Achieved	Achievement	Achievement with Merit	Achievement with Excellence
0 – 07	08– 13	14– 18	19 – 24

Appendix: Marker determination of validity of evidence

Professional judgement
The marker will determine a grade using their professional judgement based on a holistic examination of the evidence provided.

Demonstration of understanding
A response must use information to **demonstrate understanding**. The marker must exercise professional judgement to decide if it does so. The following guidance is provided to assist in making this professional judgement.

- A response **demonstrates understanding** if it can be described wholly or substantially by one or more of the statements in the **left-hand column**.
- A response **does not demonstrate understanding** if it can be described wholly or substantially by one or more of the statements in the **right-hand column**.
- If a response is comprised of both used and reproduced information, the marker must decide if it meets the standard **when the reproduced information is ignored**.

Evidence of <u>use</u> of information	**Evidence of <u>reproduction</u> of information**
Prompts and / or questions have been provided and the candidate has responded to these.	Information is presented that does not relate to the prompts.
The response uses information relating to the standard, the prompts, or questions.	
Information from the candidate's practice, performance, research, the practice of others, and or teaching, is related to the candidate's experiences.	Information is presented in isolation from the candidate's experiences.
The response shows understanding that could be expected to come from a course of instruction derived from Level 6 of *The New Zealand Curriculum*.	Little or nothing is offered to suggest the information is related to a course of instruction at Level 6 of *The New Zealand Curriculum*.
Information is presented in the candidate's own voice.	Information is not in the candidate's voice. The word choice, sentence structure, sentence length, punctuation etc. are not what a candidate could be expected to produce.
Referenced complex research information unchanged by paraphrase is related to other information in a manner that constructs meaning.	**Unreferenced** complex information is presented as though it is the candidate's own work.

In general, the marker will exercise the following judgement:

N1	**N2**
The response does not include enough evidence to show understanding, and / or is substantially reproduced with little mediation by candidate.	The response is substantially produced by the candidate, but demonstrates little understanding. One part of the required response may be completely missing, or several parts may be weak.

Where doubt exists as to whether evidence has been produced, mediated, or used by the candidate, the doubt must be exercised to the benefit of the candidate.

Appendix: Authenticity of candidate work.

To assess whether a candidate's evidence is genuine, the marker uses their professional judgement, considering all the evidence provided. Where the marker believes there is a possibility the work is inauthentic, they must raise a ‘malpractice exception’, flagging the issue for further review.

Evidence might be considered inauthentic if:

- large portions of the text are identical to other candidates’ work
- the evidence does not match the assessment prompt or task
- the response shows evidence of someone else’s input other than the candidate’s (e.g., teacher feedback)
- the style or voice of the writing is inconsistent with the rest of the candidate's work
- complex pieces of evidence are copied from other sources but are presented as the candidate's own work, or the evidence is deemed significantly unnatural.

Properly referenced, relevant, and integrated information is acceptable. Uncertainty about the authenticity of evidence should be resolved in favour of the candidate.