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 2025 onwards.

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92046R

Mana Tohu Mātauranga o Aotearoa
New Zealand Qualifications Authority

Level 1 Physics, Earth and Space Science 2024

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

Credits: Five

RESOURCE BOOKLET

Refer to this booklet to answer the questions for Physics, Earth and Space Science 92046.

Check that this booklet has pages 2–5 in the correct order and that none of these pages is blank.

DO NOT TAKE THESE ASSESSMENT MATERIALS OUT OF THE ASSESSMENT ROOM.

PART ONE: CHANGES IN SHADOW LENGTH IN A DAY

Figure 1: Daily path of the Sun

Figure 2: Changing direction of a shadow during a winter day

Table 1: Length of shadow for a 20 m tōtara tree during a winter day

Time	Length of shadow (m)
6 a.m.	no shadow
9 a.m.	80
Midday	36
3 p.m.	80
6 p.m.	no shadow

Table 2: Length of shadow for a 20 m tōtara tree on the same winter day in two different locations

Location	Length of shadow (m)
Auckland	36
Invercargill	55

PART TWO: SEASONAL CHANGES BETWEEN CHRISTCHURCH AND SCOTT BASE

Figure 1: Earth's orbit around the Sun

Figure 2: Changing height of the Sun's path during different times of the year

Figure 3: Map showing Christchurch and Scott Base

Table 1: Day length times for Christchurch and Scott Base at different times of the year

	Christchurch, New Zealand	Scott Base
Equinox	12 hours	12 hours
Summer Solstice	15 hours 25 mins	24 hours
Winter Solstice	8 hours 56 mins	0 hours

PART THREE: ECLIPSES

Figure 1: Solar and lunar eclipses

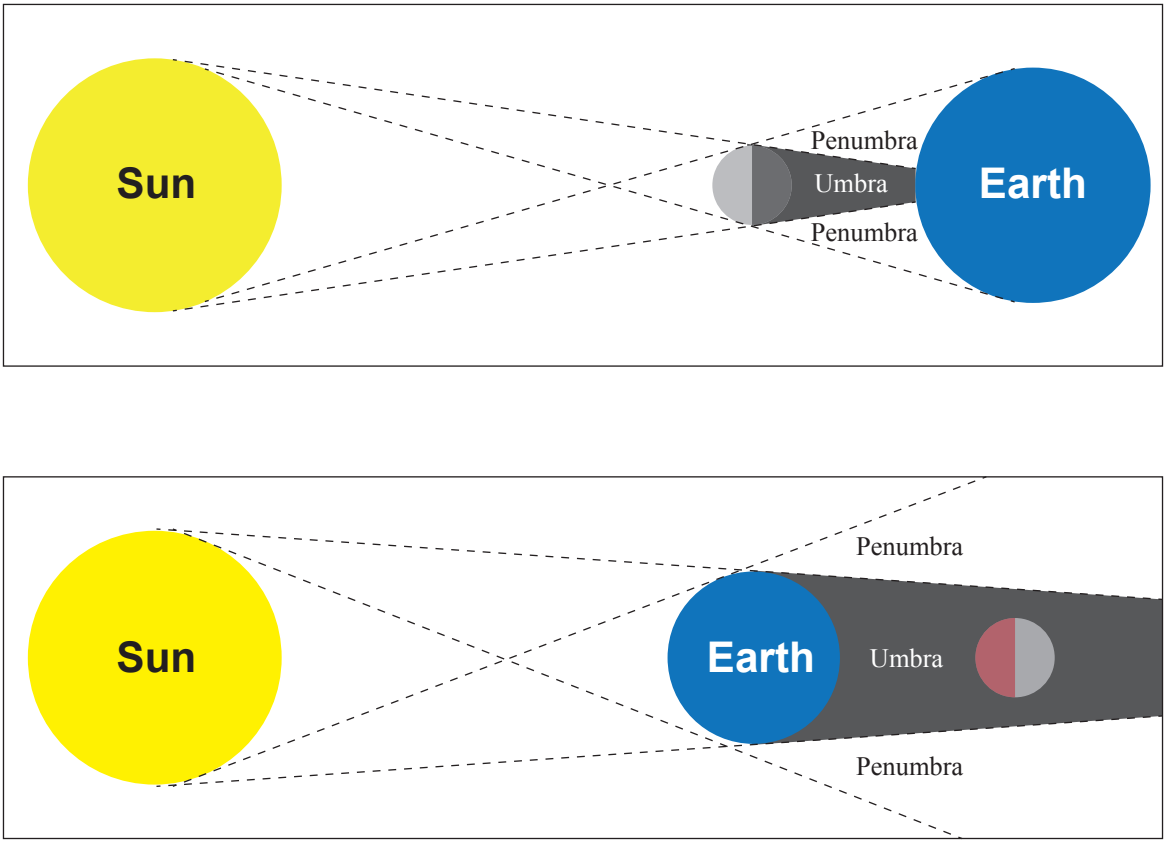

Table 1: Duration of solar and lunar eclipses

Type of eclipse	Total duration
Total solar eclipse	4 minutes
Total lunar eclipse	3 hours

Figure 2: Orbit of the Moon around the Earth, and the Earth around the Sun

REFERENCES

Part One

Figure 1: Adapted from: www.researchgate.net/publication/332878349_Design_of_Knowledge_Base_for_Efficient_Solar_Tracking/figures?lo=1

Figure 2: Adapted from: www.quora.com/What-s-the-science-behind-shadow-color-For-example-why-does-the-back-of-my-shadow-have-a-blue-glow-and-the-front-a-yellow-glow-when-I-go-on-a-walk-outside

Part Two

Figure 1: Source: www.timeanddate.com/astronomy/seasons-causes.html

Figure 2: Source: https://blog.metservice.com/wp-content/uploads/2013/06/Sun-path2.png

Figure 3: Adapted from: https://huey.colorado.edu/77DegreesSouth/maps.html

Part Three

Figure 2: Source: https://letstalkscience.ca/educational-resources/backgrounders/earth-moon-system/