Year 11 Science: Moon phases and eclipses, seen from New Zealand

Name: _____ Date: _____

Try these without your notes first, then check the answer key.

Practice

1. In the orbit diagram, which phase is seen from Earth at position 7?

2. Why does it take 29.5 days, not 27.3, to go from one new moon to the next?

3. On 3 March 2026 (Universal Time) there was a total lunar eclipse. What phase was the Moon in?

4. A full moon happens about every 29.5 days. Explain why there is not a lunar eclipse every month.

5. In New Zealand, a crescent Moon is seen in the western sky just after sunset. Which side of it is lit, and is it waxing or waning?

Exam-style question: the Christmas Eve super full moon

On 24 December 2026 a full moon happens 7 hours before the Moon reaches perigee, its closest point to Earth, 356 650 km away. Two weeks earlier, at apogee, it was 406 421 km away. Use the orbit diagram and the tables in this lesson.

6. Describe where the Sun, Earth and Moon are at full moon, and how often a full moon comes round.

7. Explain why viewers in New Zealand see the Moon go through phases over a month, and how a waxing Moon looks different here from in the Northern Hemisphere.

8. Discuss why a super full moon is seen only one to three times a year, rather than every month.

Fix the mistake

9. Correct this statement: "The phases happen because Earth's shadow covers part of the Moon."

10. Correct this statement: "A solar eclipse happens at full moon."

11. Correct this statement: "There should be an eclipse every month because there is a new moon every month."

12. Correct this statement: "The waxing crescent in New Zealand is lit on the right, like the pictures in most books."

Answer key (for parents and tutors)

1. In the orbit diagram, which phase is seen from Earth at position 7?
   Last quarter: the half of the disc on the right is lit, as seen from New Zealand.
2. Why does it take 29.5 days, not 27.3, to go from one new moon to the next?
   While the Moon orbits Earth, Earth also moves along its orbit round the Sun, so the Moon must go about 2 extra days of orbit to line up with the Sun again.
3. On 3 March 2026 (Universal Time) there was a total lunar eclipse. What phase was the Moon in?
   Full moon: Earth was between the Sun and the Moon.
4. A full moon happens about every 29.5 days. Explain why there is not a lunar eclipse every month.
   The Moon's orbit is tilted about 5° to Earth's orbit, so at most full moons the Moon passes above or below Earth's shadow; an eclipse needs a full moon near where the two orbits cross.
5. In New Zealand, a crescent Moon is seen in the western sky just after sunset. Which side of it is lit, and is it waxing or waning?
   Lit on the left (the side towards the set Sun), and it is waxing.
6. Describe where the Sun, Earth and Moon are at full moon, and how often a full moon comes round.
   A full moon happens when Earth is between the Sun and the Moon, so the whole sunlit half of the Moon faces Earth. It happens about every 29.5 days (Achieved).
7. Explain why viewers in New Zealand see the Moon go through phases over a month, and how a waxing Moon looks different here from in the Northern Hemisphere.
   The Moon reflects sunlight and the Sun always lights half of it. As the Moon orbits Earth, its position compared with the Sun changes, so we see a different fraction of the lit half: none at new moon, half the disc at the quarters, all of it at full moon. From New Zealand we look north at the Moon, so a waxing Moon is lit on the left; northern viewers face south and see it lit on the right, the image flipped (Merit).
8. Discuss why a super full moon is seen only one to three times a year, rather than every month.
   Excellence links the two cycles: the Moon's orbit is an ellipse, so its distance varies, and at perigee it looks about 14% wider than at apogee (33.51 against 29.40 arc minutes). Perigee comes round every 27.5 days but full moon every 29.5 days, because Earth's orbit round the Sun means the Moon must travel further to line up opposite the Sun. Each month the full moon slips about 2 days later in the perigee cycle, so the two coincide only for a run of one to three months about every 14 months, as on 24 December 2026, when the full moon and perigee were just 7 hours apart.
9. Correct this statement: "The phases happen because Earth's shadow covers part of the Moon."
   Earth's shadow only reaches the Moon during a lunar eclipse; phases come from how much of the Moon's sunlit half faces us.
10. Correct this statement: "A solar eclipse happens at full moon."
    The Moon must be between the Sun and Earth for a solar eclipse, which is new moon; a lunar eclipse is at full moon.
11. Correct this statement: "There should be an eclipse every month because there is a new moon every month."
    The Moon's orbit is tilted about 5°, so most new and full moons pass above or below the Sun–Earth line.
12. Correct this statement: "The waxing crescent in New Zealand is lit on the right, like the pictures in most books."
    Most books show the northern view; from New Zealand a waxing Moon is lit on the left.