Year 11 Science: Tides: the Moon, the Sun and real New Zealand tide data

Name: _____ Date: _____

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

Practice

1. Auckland had a high tide at 08:55 on 10 November 2026. Using the average of 12 h 25 min, predict the time of the next high tide.

2. At which two Moon phases do spring tides happen?

3. On 18 November 2026 Auckland's highest high tide was 2.8 m and its lowest low tide 1.1 m. Calculate the tidal range.

4. Explain why there is also a high tide on the far side of Earth, opposite the Moon.

5. On 27 November 2026 Nelson's tidal range was 3.8 m and Wellington's was 1.4 m. Explain why the ranges differ when both feel the same Moon and Sun.

Exam-style question: November tides in Auckland

Use the LINZ data in this lesson for Auckland in November 2026: high tides about 12 h 25 min apart, a range of 1.7 m on 18 November (first quarter) and 3.2 m on 26 to 28 November (full moon on 25 November, perigee on 26 November).

6. Describe what causes high and low tides.

7. Explain why Auckland has two high tides most days, and why they come about 50 minutes later each day.

8. Discuss why the tidal range changes over the month, and why the spring tides of 26 to 28 November were bigger than those of 9 to 11 November (range 2.6 m, new moon on 9 November, apogee on 14 November).

Fix the mistake

9. Correct this statement: "There is one high tide a day, when the Moon is overhead."

10. Correct this statement: "Spring tides happen in spring."

11. Correct this statement: "Neap tides happen when the Moon is furthest away."

12. Correct this statement: "The Sun is much bigger, so it causes bigger tides than the Moon."

Answer key (for parents and tutors)

1. Auckland had a high tide at 08:55 on 10 November 2026. Using the average of 12 h 25 min, predict the time of the next high tide.
   08:55 + 12 h 25 min = 21:20 (the LINZ prediction is 21:06, as single days vary).
2. At which two Moon phases do spring tides happen?
   New moon and full moon, when the Sun, Earth and Moon are in a line.
3. On 18 November 2026 Auckland's highest high tide was 2.8 m and its lowest low tide 1.1 m. Calculate the tidal range.
   2.8 – 1.1 = 1.7 m.
4. Explain why there is also a high tide on the far side of Earth, opposite the Moon.
   The Moon pulls Earth more strongly than the water on the far side, so that water is left behind as a second bulge.
5. On 27 November 2026 Nelson's tidal range was 3.8 m and Wellington's was 1.4 m. Explain why the ranges differ when both feel the same Moon and Sun.
   The size of the tide depends on the local shape of the coast, harbour and seabed, which channels and amplifies the tide more in Tasman Bay than in Wellington.
6. Describe what causes high and low tides.
   The Moon's gravity, and to a lesser extent the Sun's, pulls on Earth's oceans, making bulges of water. Places in a bulge have high tide; places between the bulges have low tide (Achieved).
7. Explain why Auckland has two high tides most days, and why they come about 50 minutes later each day.
   The Moon pulls the near-side ocean more than Earth's centre, and Earth's centre more than the far-side ocean, so there are two bulges on opposite sides of Earth. Earth spins through both, giving two highs and two lows. The Moon moves about 13° along its orbit each day in the direction Earth spins, so Earth needs about 50 extra minutes to bring Auckland back under the Moon: the cycle is 24 h 50 min, highs are 12 h 25 min apart, and each day's tides are about 50 minutes later (Merit).
8. Discuss why the tidal range changes over the month, and why the spring tides of 26 to 28 November were bigger than those of 9 to 11 November (range 2.6 m, new moon on 9 November, apogee on 14 November).
   Excellence links positions, timing and data: at new and full moon the Sun, Earth and Moon line up, the Sun's smaller bulges add to the Moon's, and the range is largest (spring tides, 3.2 m after the 25 November full moon). At first quarter the Moon is at 90° to the Sun, the Sun's bulges fall where the Moon's lows are, and the range is smallest (neap tide, 1.7 m on 18 November). This repeats about every 14 to 15 days. The late-November springs were bigger because the full moon came within a day of perigee, when the Moon is closest and its tidal effect strongest, a perigean spring or king tide; the 9 November new moon came near apogee, when the Moon is furthest away, so that spring range was only 2.6 m. Because perigee repeats every 27.5 days but full and new moons every 29.5 days, king tides happen only at irregular intervals.
9. Correct this statement: "There is one high tide a day, when the Moon is overhead."
   There are two bulges, one facing the Moon and one on the far side, so most places get two high tides a day.
10. Correct this statement: "Spring tides happen in spring."
    Spring tides come at every new and full moon, about every two weeks all year; the name is not about the season.
11. Correct this statement: "Neap tides happen when the Moon is furthest away."
    Neap tides come at first and last quarter, when the Moon is at right angles to the Sun; distance changes the size of king tides.
12. Correct this statement: "The Sun is much bigger, so it causes bigger tides than the Moon."
    The Sun is about 390 times further away, so its tide-raising effect is only about half the Moon's.