How the tides work: activity sheet

Guernsey Tide Times · Ages 9 to 13 · Use with the “How the tides work” fact sheet

PUPIL SHEET

What you will learn

By the end, you will be able to:

- explain why the Moon causes two areas of higher water;
- tell the difference between spring and neap tides;
- calculate a tidal range and use the rule of twelfths carefully;
- explain why tide times and local advice matter at the coast.

1 Comprehension

1. The Moon’s pull is stronger on the side of Earth nearest to it and weaker on the far side. How does this **difference** create two areas of higher water?
2. Why are two high tides usually a little more than 12 hours apart, rather than exactly 12?
3. Which Moon phases are linked with **spring** tides? Which are linked with **neap** tides?
4. What does “tidal range” mean?
5. Why should you never use the rule of twelfths on its own to decide if a causeway is safe to cross?

2 Rule of twelfths: a calculation

Imagine a tide that rises from a low water of **1.5 m** to a high water of **9.5 m** over about six hours.

1. What is the tidal range?
2. What is one twelfth of that range?
3. Using the pattern 1, 2, 3, 3, 2, 1, how much does the level rise during the **third part**?
4. If low water to high water takes about six hours, roughly how long is each of the six time periods?

Activity sheet: investigate and stay safe

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3 Tide-table enquiry

Open the St Peter Port tide table at **guernseytidetimes.gg** for the next two weeks. Pick **five days spread across the fortnight**. For each, record the first high water and the next low water, work out the range, and look up that day's Moon phase.

Date	High water	Low water	Range	Moon phase

Which day had the **biggest** range? Which had the **smallest**?

What pattern do you notice between the Moon phase and the size of the tide?

4 Coastal safety

You have walked a long way out across a beach soon after low water. A friend says, "The tide has only just turned, so we have ages before we need to go back."

1. Give **two** reasons this could be unsafe.
2. What information should you check?
3. What should you do if you are not sure?

Teacher notes and answers

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TEACHER SHEET

1 Comprehension: answers

1. The Moon pulls the near-side water towards it, raising one area of higher water. It also pulls the solid Earth away from the more distant far-side water, leaving a second area of higher water. It is the **difference** in pull across the Earth that matters.
2. While the Earth spins, the Moon moves on along its orbit, so a point must turn a little further to line up with the Moon again. Half of that lunar day (about 24 h 50 min) is roughly 12 h 25 min.
3. Spring: **new Moon and full Moon** (Sun and Moon in line). Neap: **first and last quarter** (a half Moon; Sun and Moon at a right angle).
4. The difference in height between a high water and the next low water.
5. Because it only estimates the change in **water level**, not tidal streams, waves, wind or weather. A rising tide can cover ground quickly, so always use published tide times and local signs.

2 Rule of twelfths: answers

1. Range = 9.5 – 1.5 = **8 m**.
2. One twelfth = 8 ÷ 12 ≈ **0.67 m**.
3. Third part = 3 twelfths ≈ 3 × 0.67 ≈ **2 m**.
4. About **one hour** each (six hours shared between six parts).

Common misconceptions

Misconception	What is really going on
The Earth simply spins through two fixed bulges.	The two-bulge diagram is a simplified model; real tides move through ocean basins and are strongly shaped by land and seabed.
The far-side bulge is water flung outwards by the spinning Earth.	It comes from the difference in the Moon's gravitational pull across the Earth, not from spin.
Spring tides happen in spring.	They occur around new and full Moon all year; the name is about the sea "springing" up.

> **Marking the enquiry:** the biggest range can occur a day or two **after** the exact new or full Moon, because local tides do not respond instantly. Look for a broad pattern, not an exact same-day match.

SUGGESTED LEVEL

Best for ages 10 to 13 (upper KS2 and early KS3). About 45 to 60 minutes. Useful for geography, science and maths.

ABOUT THE DIAGRAMS

Simplified and not to scale. In the open ocean the tide is only about a metre; coastlines amplify it to the ranges we see.