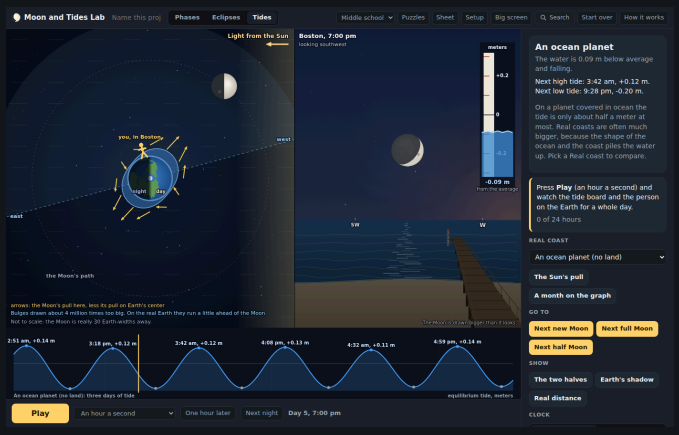
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Moon and Tides Lab: Why Are There Two High Tides a Day?

Grades 6-8 · 45 minutes

Earth and space science · Astronomy



Slides, rubric and answer key **Print and go** **No student accounts**

Chromebook friendly

What's included

- A one-page overview: objectives, essential question, vocabulary, standards and assessment
- A 45-minute lesson sequence: warm-up, direct instruction, guided practice, independent practice, closure
- Slides for the board: a PowerPoint file that also opens in Google Slides
- A student worksheet with a QR code and a tide table for three coasts
- A 3-question exit ticket, two to a page, with an answer key
- A rubric: 3 criteria, 4 levels, scored out of 12
- Differentiation for English learners, students with IEPs or 504 plans, and students who need more support or more challenge
- Cross-curricular extensions, and notes for teaching it in grades 4 and 5 and in high school Earth and space science
- Standards: Texas TEKS (tides are not in NGSS)

Moon and Tides Lab: Why Are There Two High Tides a Day?

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Most students expect one high tide a day, under the Moon. On an ocean planet the Moon stretches the sea into two bulges, one under the Moon and one on the far side, and a beach turning through a day gets two high tides. Adding the Sun's smaller stretch shows spring and neap tides. Then real coasts from NOAA: Boston's two tides, Eastport's five meters, Pensacola's one a day.

At a glance

ESSENTIAL QUESTION

Why does a beach get two high tides a day when there is only one Moon?

OBJECTIVES

Students will be able to:

- explain that the Moon's pull stretches the ocean into two bulges, one on each side of the Earth
- describe how the Earth's turning carries a beach through two high tides and two low tides a day
- explain spring and neap tides from where the Sun and Moon are
- compare the model with real tides and say why a real coast can differ

VOCABULARY

Tide, Bulge, Spring tide, Neap tide, Tidal range

STANDARDS

112.26(b)(9)(B)

TIME AND MATERIALS

45 minutes, grades 6-8.

- One computer or Chromebook per student
- A projector
- The worksheet and exit ticket, one copy each per student
- The rubric, one copy per student if you grade the work

PREP

Make copies of the worksheet and exit ticket. Before class, open mytekdev.com/try/moontideslab?lesson=why-are-there-two-high-tides-a-day&ref=tpt-moontideslab-3 once on a student computer: it opens on the Tides chapter, an ocean planet with no land. Pick an answer, press `Play` for a whole day, turn on `The Sun's pull` and `A month on the graph`, then pick a Real coast, about five minutes.

ASSESSMENT

- Formative: the questions under What to look for, asked while students work, and the exit ticket (answer key included).
- Summative: the worksheet, scored with the rubric.

TECHNOLOGY AND PRIVACY

Runs in any browser, Chromebooks included, with nothing to install. Students need no account and no email: the link works signed out, and nothing they do is stored on our server unless they choose to save.

Lesson sequence

MINUTES	STAGE	WHAT YOU DO	WHAT STUDENTS DO
0 to 5	**Warm-up** Hook	Show the title, essential question and Today I can slides (about 1 minute). Then the warm-up vote: one, two or four high tides a day? Record the numbers.	Answer the warm-up on the worksheet.
5 to 12	**Direct instruction (I do)** Model it	Project the app. The ocean planet, with the Moon to one side. Show Two bulges: the arrows are the Moon's pull at each place less its pull on the Earth's middle, so they point out on both sides. Then Spring and neap. **It's working when:** The far bulge is the surprise. Three students in a line, pulled by a rope from one end, spread apart at both ends.	Fill in the vocabulary.
12 to 22	**Guided practice (We do)** A day on the beach together	Students open the link or scan the QR code. The guide asks them to pick an answer, play a whole day, add the Sun's pull and a month on the graph, then pick a real coast and answer again. **Watch for:** Students who count only the bulge under the Moon. Ask them to watch the small person pass the far side.	Follow the guide and count the high tides in a day.
22 to 38	**Independent practice (You do)** Three coasts	Students pick Boston, Eastport and Pensacola as the Real coast and fill in the tide table: how many high tides a day, and the biggest range. Walk the room with the What to look for questions. **If they ask:** "Pensacola has one high tide a day. Does that mean the bulges are wrong? What else could decide it?" Pensacola	Fill in the tide table and name the odd coast.
38 to 45	**Closure** Showcase and exit ticket	Show the Showcase slide. Go back to the warm-up vote. Point out that the bulge model explains why there are two tides, and the shape of each ocean decides how big and when. Hand out the exit ticket.	Answer the exit ticket.

Before you teach: a ten-minute walkthrough

Open mytekdev.com/try/moontideslab?lesson=why-are-there-two-high-tides-a-day&ref=tpt-moontideslab-3. The Tides chapter: an ocean planet with no land, the Moon to one side, a small person on a beach, and a tide board.

1. **Predict.** Pick one, two or four high tides a day.
2. **A day.** Press `Play` (an hour a second) and watch 24 hours. The person passes both bulges: two highs and two lows.

3. **The Sun.** Turn on `The Sun's pull` and `A month on the graph`. The biggest highs come near new and full Moon.
4. **A real coast.** Pick Boston from Real coast: about 3 meters from low to high. Eastport, Maine is over 5; Pensacola, Florida less than half a meter, once a day.

> The ocean-planet tide is about half a meter at most. Real coasts come from NOAA's measured numbers, not from the bulges, because the shape of each ocean decides the size and timing.

Background for the teacher

The Moon pulls the near side of the Earth a little more than the middle, and the middle a little more than the far side. Take away the pull on the middle and what is left stretches the ocean outward on both sides: two bulges. The Earth turns under them, so most beaches get two high tides, about 12 hours 25 minutes apart.

The Sun does the same with a stretch a little less than half the Moon's. In a line, at new and full Moon, they add: spring tides. At right angles, at the half Moons, they partly cancel: neap tides.

Real oceans do not have two smooth bulges. Tide waves move round each ocean basin, and the shape of the coast can make the tide huge, as in Maine, or once a day, as in the Gulf of Mexico.

What to look for

Ask these while students work. A student who has understood the lesson can answer them without help:

- Where is the far bulge, and why is it there?
- Why is the second high tide about 12 hours after the first?
- When in the month are the biggest tides?
- Why does Pensacola have one high tide a day?
- Does the wind make the tides? How do you know?

> The first question is the real test: a student who can explain the far bulge has more than the one-bulge picture.

Cross-curricular extensions

- Math: graph a day of real tide heights from NOAA for a beach near you and find the range.
- Geography: find the Bay of Fundy on a map and read why it has the biggest tides in the world.
- Life science: what lives in the zone between high and low tide, and how does it survive both?
- English: write a tide warning for beach visitors in plain words.

Vocabulary

Tide	The slow rise and fall of the sea, mostly caused by the Moon.
Bulge	A place where the ocean is stretched higher. There are two, on opposite sides of the Earth.
Spring tide	The biggest tides of the month, near new and full Moon. Nothing to do with the season.
Neap tide	The smallest tides of the month, near the half Moons.
Tidal range	How far the water rises from low tide to high tide.

Differentiation

ENGLISH LEARNERS

- Keep the vocabulary slide up, and point at the two bulges as you say "high tide" and between them as you say "low tide".
- Pair each learner with a partner; the tide table is numbers.
- Accept the explanation as a drawing of the Earth with two bulges and a beach.

STUDENTS WITH IEPS OR 504 PLANS

- Pair students, one choosing coasts and one recording.
- Zoom the browser to 150%.
- Allow two coasts instead of three where the IEP allows a modified assignment.

STUDENTS WHO NEED MORE SUPPORT

- A sentence starter: "The beach gets two high tides because the Earth turns it through ___."
- Fill in Boston's row of the tide table together.
- Do the three-student rope demonstration again before the independent work.

STUDENTS READY FOR MORE

- Solve The tide clock and Spring or neap? in Puzzles.
- Compare San Francisco's two unequal high tides with Boston's two equal ones.
- Find out why high tide comes about 50 minutes later each day.

Adapting for other grades

Younger students: In grades 4 and 5, stop after the guide and compare Boston and Pensacola only; drop the third rubric row; total 8, and 6 meets the objectives.

Older students: In high school, switch the level to High school and show that the stretch falls off as one over the distance cubed, which is why the Moon beats the much bigger Sun.

Student worksheet

Name: _____ Date: _____

Open the app: scan the QR code, or go to mytekdev.com/try/moontideslab?lesson=why-are-there-two-high-tides-a-day

Essential question: Why does a beach get two high tides a day when there is only one Moon?

Warm-up: How many high tides does a beach get in one day? Why? _____

1. **Vocabulary.** Tide, bulge, spring tide, neap tide, tidal range: write each in your own words.

2. **The tide table.** For Boston, Eastport and Pensacola: high tides a day ____ and the biggest range ____ m. Which is the odd one out?

3. **Spring and neap.** The biggest tides came at _____ Moon. The smallest at _____ Moon.

1. Why does a beach get two high tides a day? Draw the Earth, the Moon and the bulges.

2. Why can a real coast be different from the model?

Exit ticket

Name: _____

1. Most beaches get (A) one high tide a day (B) two high tides a day (C) four high tides a day

2. The biggest tides of the month come at (A) the half Moons (B) new and full Moon (C) any time

3. Where is the second bulge, and why is it there?

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Exit ticket

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3. Where is the second bulge, and why is it there?

Answer key: exit ticket

QUESTION	ANSWER	WHY
1	B	The turning Earth carries a beach through both bulges.
2	B	The Sun and Moon are in a line, so their stretches add: spring tides.
3	On the far side from the Moon	The Moon pulls the far side less than the Earth's middle, so the ocean there is left behind. A full answer names the stretch.

Rubric

Score each row from 1 to 4.

Name: _____

CRITERIA	4 EXCEEDS	3 MEETS	2 APPROACHING	1 BEGINNING
Data	Three coasts with high tides a day and the range, and the odd coast named with a reason.	Three coasts with high tides a day and the range.	One or two coasts, or missing numbers.	No data.
Model	Draws the Earth with two bulges, the Moon, and a beach at high and low tide, with the Sun for spring tides.	Draws two bulges and the Moon.	Draws one bulge under the Moon.	No drawing.
Explanation	Explains the two bulges, the Earth turning a beach through both, and spring and neap from the Sun and Moon lining up.	Explains two bulges and the Earth turning.	Says the Moon makes tides with no reason for two.	No explanation, or says wind or waves make the tides.

Total: ____ / 12. A score of 9 or more meets the objectives.

Standards

Tides are not in NGSS. The lesson is built for Texas TEKS 112.26(b)(9)(B); it also serves Virginia, Florida and New York, which teach tides with the Moon.

FRAMEWORK	CODE	GRADES	STANDARD	HOW THE LESSON MEETS IT
Texas TEKS	**112.26(b)(9)(B)**	6	Describe and predict how the positions of the Earth, Sun, and Moon cause daily, spring, and neap cycles of ocean tides due to gravitational forces.	Students watch a beach pass two bulges a day and see spring and neap tides as the Sun and Moon line up and turn apart.

Checked November 2026 against: Texas Administrative Code, 19 TAC 112.26, Science, Grade 6, NOAA Tides and Currents, harmonic constituents.

Optional: save student work in a free class

The whole lesson runs at the link on the worksheet, with no accounts and no sign-up.

To keep students' work, and see it all in one place, make a free class. It takes about ten minutes, once, and covers every lesson in this series: mytekdev.com/tools/class-setup

Students in a class open mytekdev.com/tools/moon-and-tides-lab/lessons/why-are-there-two-high-tides-a-day/start instead of the worksheet link. Each one gets their own copy of the starter, and the same link reopens it next time.

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