

START HERE

A year plan for all three Grade 7 units, plus one complete lesson to try.

What is inside

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Year at a glance

All three units, suggested months, outcome codes and 30 lesson titles.

p3-9

Lesson 4, Tides on Hudson Bay: Student Workbook

A Churchill tide hook, the Tide Detective investigation with Fisheries and Oceans Canada's real predictions, a graph to plot, questions and an exit ticket.

p10-17

Lesson 4: Accommodated Edition

The same lesson at a simpler reading level, larger print, checklist steps, word banks and sentence starters.

p18-20

Lesson 4: Teacher Guide

The lesson plan with minutes, the misconception move and a 30-minute version.

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Answers for Lesson 4 (teacher pages)

Every answer for Lesson 4: warm-up, records, data tables, the graph, questions, Go further and exit ticket.

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The full Grade 7 year

The three units, with links, and the full-year bundle.

ZIP

Slides: Lesson-04-Tides-on-Hudson-Bay.pptx

The lesson's teaching slides with speaker notes (separate file in the ZIP).

How to use it

Use the year plan to map your Grade 7 science year. Then teach Lesson 4, Tides on Hudson Bay: open the slides (speaker notes on every teaching slide), print the Student Workbook pages or the Accommodated Edition pages (question numbers match, so one set of answers marks both), and keep the Teacher Guide pages beside you. Materials: a ruler and a coloured pencil, a paper plate, an oval of tracing paper, a split pin and a small paper circle.

ABOUT THIS EXCERPT

- The lesson pages are reproduced exactly as they appear in the Gravity & Space unit, so their page numbers are the unit's.
- The warm-up reviews Lessons 1 to 3, which are not included; its answers are on the answer-key pages.
- The Teacher Guide and answer-key pages may also show the end or start of a neighbouring lesson, because that is where the unit's pages break.
- Where a lesson page points to the Credits page for sources, that page is in the full unit; this lesson's tide data are Fisheries and Oceans Canada predictions for Churchill.
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Questions or a problem with a file: admin@milestoneteachers.ca. For use by the downloading teacher with their own students.

The Grade 7 Science Year

Three units, 30 lessons: every Scientific Knowledge outcome, SCI.7.E.1 to E.23.

UNIT 1

Particles & Heat

September to November

SCI.7.E.1 to E.3, E.8 to E.11

- | | |
|--------------------------------------|---|
| 1 What Is Everything Made Of? | 6 Why Ice Melts but Iron Does Not |
| 2 Solids, Liquids and Gases | 7 Heat on the Move: Conduction |
| 3 Hotter Means Faster | 8 Convection, Radiation and Thermal Equilibrium |
| 4 Melting, Boiling and the Flat Line | 9 Design Challenge: Keep It Warm |
| 5 Where Did the Water Go? | 10 Energy Everywhere: Exchanges and Efficiency |

UNIT 2

Gravity & Space

December to February

SCI.7.E.4 to E.7, E.12 to E.16

- | | |
|-----------------------------------|---|
| 1 Gravity Pulls on Everything | 6 Moon Phases and Eclipses |
| 2 Mass, Weight and the Golden Boy | 7 The Sky Turns: Day, Night and Star Trails |
| 3 Why Doesn't the Moon Fall Down? | 8 Wandering Planets |
| 4 Tides on Hudson Bay | 9 Latitude, Longitude and the Seasons |
| 5 How Big Is the Solar System? | 10 Canada in Space |

UNIT 3

Ecosystems

March to June

SCI.7.E.17 to E.23

- | | |
|--|----------------------------------|
| 1 Manitoba's Living Systems | 6 Competing for What Is Scarce |
| 2 Plants Make Food from Light | 7 Matter Cycles, Energy Flows |
| 3 Who Eats Whom in Lake Winnipeg? | 8 Lake Winnipeg's Algae Blooms |
| 4 The Energy Pyramid | 9 Ice, Seals and Polar Bears |
| 5 Producers, Consumers and Decomposers | 10 Keeping the Land: Take Action |

Each unit: 10 lessons of about 60 minutes, a performance task and a unit assessment. Outcome codes are Manitoba's; titles are ours. Contains information from the Government of Manitoba, licensed under the OpenMB Information and Data Use License (Manitoba.ca/OpenMB).

LESSON 4

Tides on Hudson Bay

The Moon's gravity and the ocean tides

Name _____

BIG QUESTION

What makes the water at Churchill rise and fall twice a day?

LEARNING GOAL I can use real tide data from Churchill to explain how the Moon's gravity causes tides.

Curriculum: SCI.7.E.7, SCI.7.E.4, SCI.7.C.2, SCI.7.C.3, SCI.7.D.3, SCI.7.D.2 (Manitoba Grade 7 Science)

1 WONDER

2 INVESTIGATE

3 EVIDENCE

4 EXPLAIN

5 REFLECT

1 WONDER

Right here in Manitoba

3.1 m

rise in Hudson Bay at Churchill, 6 Nov 2026

2

high tides in one day

At Churchill, the water of Hudson Bay is predicted to rise from 1.14 m at 11:23 a.m. to 4.25 m at 5:51 p.m. on 6 November 2026, about 3.1 m in 6.5 hours (Fisheries and Oceans Canada). Then it falls again.

Data: Fisheries and Oceans Canada. Full titles: Credits page.

What could lift a whole bay of water, twice a day?

My prediction:

RETRIEVAL WARM-UP Three quick questions from earlier lessons. No looking back!**W1** What is an orbit?**W2** What would a satellite do without gravity?**W3** How long does the ISS take to orbit Earth?**Words to know**

Word	Meaning
tide	the regular rise and fall of the ocean's water level
high tide	the time when the water reaches its highest level
low tide	the time when the water reaches its lowest level
tidal range	the difference in height between a high tide and the next low tide
bulge	a place where water piles up higher than the surrounding ocean

2 INVESTIGATE **Investigation 4: Tide Detective****Question:** What pattern does the water level at Churchill follow in one day, and what explains it? **Time:** about 30 minutes**You need**

- the Churchill water-level table and the graph grid in your workbook
- a ruler and a coloured pencil
- a paper plate (Earth) and an oval of tracing paper slightly bigger than the plate (the ocean bulges)
- a paper fastener (split pin) and a small paper circle labelled Moon

SAFETY

- Point split pins away from fingers when you push them through.

What to do

1. Plot the water level every two hours on the graph grid. Join the points with a smooth curve.
2. Mark the two high tides and the two low tides. Read their times and heights from the table.
3. Pin the oval over the plate at the centre. Point the oval's long axis at the paper Moon.
4. Mark Churchill on the plate's edge. Turn the plate slowly one full turn (one day) under the oval.
5. Count how many times Churchill passes under a bulge (high tide) and between bulges (low tide).

Record

Turning the model once	My count
Times Churchill passed under a bulge (high tide)	
Times Churchill passed between bulges (low tide)	

3 EVIDENCE**Churchill's Tides, 6 November 2026**

Tide	Time (CST)	Height (m)
High tide	5:27 a.m.	4.05
Low tide	11:23 a.m.	1.14
High tide	5:51 p.m.	4.25
Low tide	11:55 p.m.	1.02

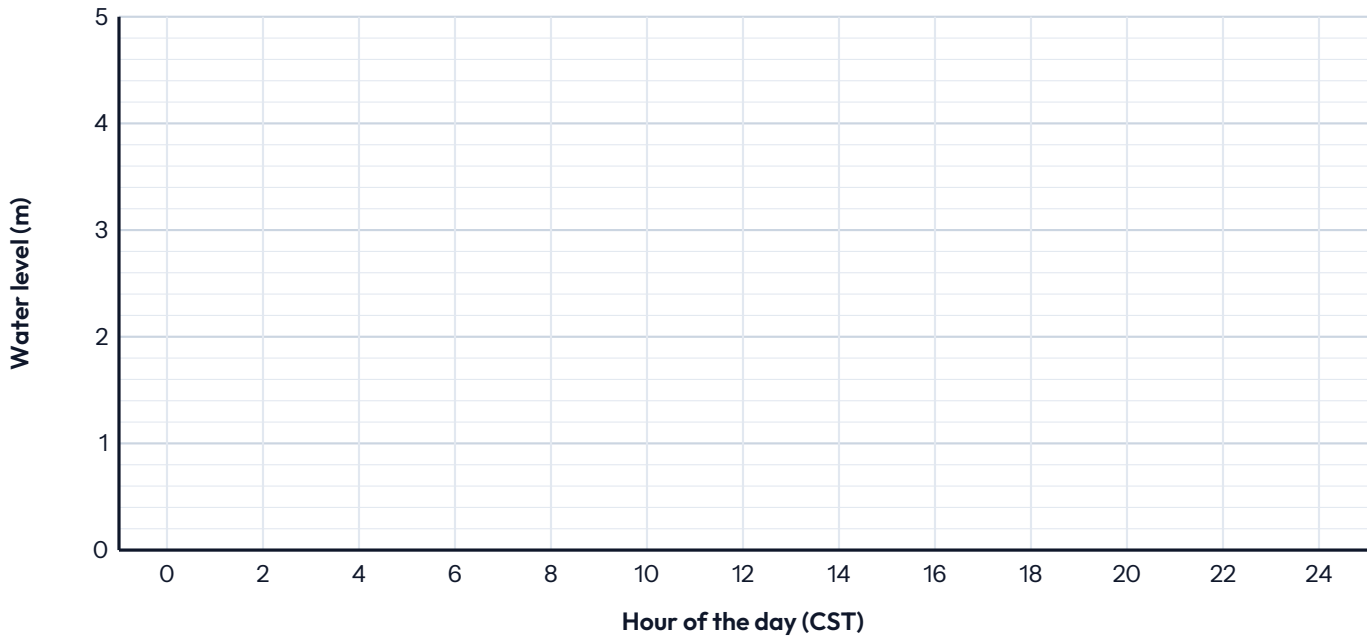
Predicted high and low tides at Churchill (station 05010), Fisheries and Oceans Canada (Canadian Hydrographic Service), shown in Central Standard Time. Heights in metres above the station's chart datum, a reference level near the lowest tides.

Source: Fisheries and Oceans Canada (Canadian Hydrographic Service), tide predictions: Churchill, station 05010, high and low tides, 1 to 8 Nov 2026; Fisheries and Oceans Canada (Canadian Hydrographic Service), tide predictions: Churchill, station 05010, hourly water levels, 6 Nov 2026.

Graph it: Water level at Churchill on 6 November 2026.

Plot these hourly predictions from Fisheries and Oceans Canada (rounded to 0.1 m), then join the points with a smooth curve.

Hour (CST)	0	2	4	6	8	10	12	14	16	18	20	22	24
Level (m)	1.4	2.6	3.7	4.0	2.9	1.5	1.2	2.3	3.7	4.3	3.4	1.7	1.0

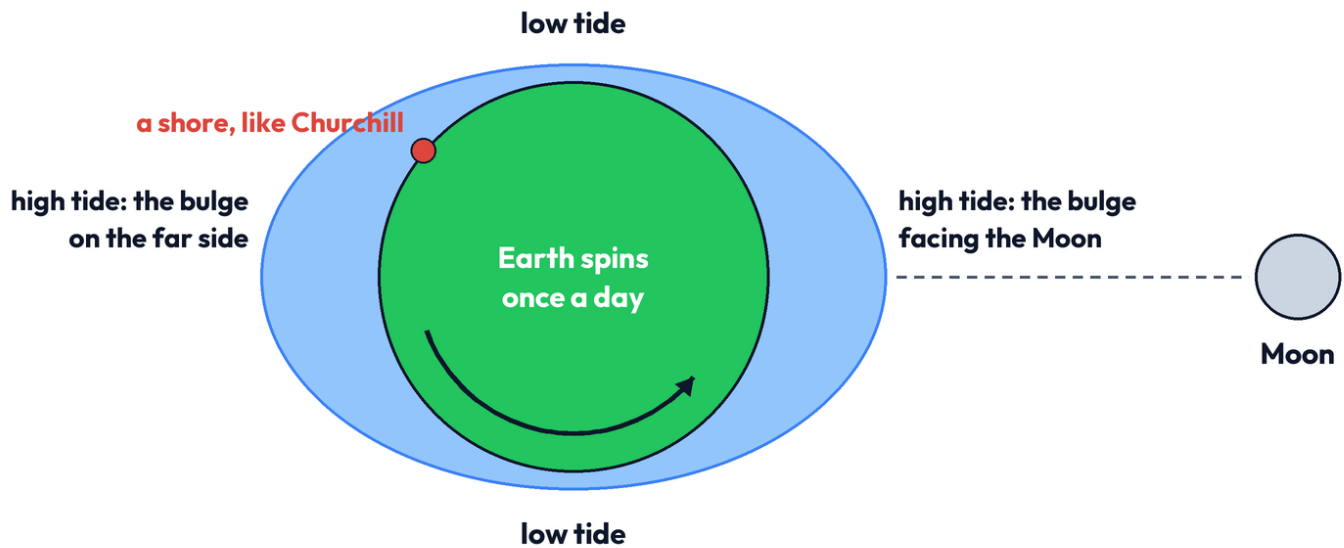


4 EXPLAIN Read, model and explain

- 1** Churchill, on the shore of Hudson Bay, has ocean tides. The water rises for about six hours, then falls for about six hours, over and over. Fisheries and Oceans Canada predicts the tides there. On 6 November 2026 its forecast shows two high tides and two low tides in one day.
- 2** What could move a whole bay of water? NOAA, the United States ocean agency, says gravity is one major force that creates tides. In 1687, Isaac Newton explained that ocean tides result from the gravitational attraction of the Sun and the Moon on the oceans of Earth.
- 3** NASA puts it simply: the gravitational pull of the Moon pulls the seas towards it, causing the ocean tides. NOAA adds that the Sun’s tide-generating force is about half that of the Moon, so the Moon is the main force affecting Earth’s tides, even though the Sun is far more massive. The Moon is much closer.
- 4** Why twice a day? NOAA explains that gravity and inertia together make two bulges of water: one where Earth and the Moon are closest and one where they are farthest apart. The bulges stay lined up with the Moon as Earth rotates, so a place like Churchill passes through two of them each day. Manitoba’s curriculum describes tides as the result of the gravitational interaction between the Moon and large bodies of water.

KEY FACTS

- Gravity is a major force that creates tides.
- The Moon's pull on the seas causes the ocean tides.
- The Sun's tide-generating force is about half the Moon's.



NOAA: gravity and inertia make two bulges. A simplified model; bulges exaggerated; not to scale.

NOAA: gravity and inertia make two bulges of water, one facing the Moon and one on the far side; they stay lined up with the Moon as Earth rotates. Bulges greatly exaggerated; not to scale.

Show what you know

1 FIND IT According to NOAA, which body is the main force affecting Earth's tides?

2 DATA What is the tidal range between the first high tide and the first low tide? Show your work.

3 DATA How much time passes between the two high tides?

4 GRAPH Describe the shape of your graph in one sentence.

5 EXPLAIN The Sun has far more mass than the Moon. Why is the Moon the main cause of tides?

6 NATURE OF SCIENCE These numbers are predictions made months ahead. How could scientists check them?

7 WHAT IF Winnipeg is on the Red River, far from the ocean. Would you expect a twice-a-day tide at The Forks? Explain.

GO FURTHER For scientists ready for more.

Fisheries and Oceans Canada's week of predictions (Teacher Guide) shows the tidal range changing. Does it grow or shrink across the week? Suggest why.

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5 REFLECT · EXIT TICKET · LESSON 4 Name _____**R** How does Churchill's tide connect what happens in space to what happens on a Manitoba shore?

E1 How many high tides did Churchill have on 6 November 2026?

E2 Explain in one or two sentences what causes those tides.

LESSON 4

Tides on Hudson Bay

The Moon's gravity and the ocean tides

Name _____

BIG QUESTION

What makes the water at Churchill rise and fall twice a day?

LEARNING GOAL I can use tide data to explain how the Moon causes tides.

Curriculum: SCI.7.E.7, SCI.7.E.4, SCI.7.C.2, SCI.7.C.3, SCI.7.D.3, SCI.7.D.2 (Manitoba Grade 7 Science)

1 WONDER

2 INVESTIGATE

3 EVIDENCE

4 EXPLAIN

5 REFLECT

1 WONDER

Right here in Manitoba

3.1 m

rise in Hudson Bay at Churchill, 6 Nov 2026

2

high tides in one day

At Churchill, Hudson Bay rises about 3 m in about six and a half hours. Then it falls again. This happens twice a day.

What could lift a whole bay of water?

I notice ... I think ...

RETRIEVAL WARM-UP Three quick questions from earlier lessons. No looking back!**W1** What is an orbit?

W2 What would a satellite do without gravity?

W3 How long does the ISS take to orbit Earth?

Words to know

Word	Meaning
tide	the regular rise and fall of the ocean's water level
high tide	the time when the water reaches its highest level
low tide	the time when the water reaches its lowest level
tidal range	the difference in height between a high tide and the next low tide
bulge	a place where water piles up higher than the surrounding ocean

2 INVESTIGATE**Investigation 4: Tide Detective**

Question: What pattern does the water level at Churchill follow in one day, and what explains it? **Time:** about 30 minutes

You need

- the Churchill water-level table and the graph grid in your workbook
- a ruler and a coloured pencil
- a paper plate (Earth) and an oval of tracing paper slightly bigger than the plate (the ocean bulges)
- a paper fastener (split pin) and a small paper circle labelled Moon

SAFETY

- Point split pins away from fingers when you push them through.

What to do (tick each step when it is done)

- ☐ **1.** Plot the water level every two hours. Join the dots.
- ☐ **2.** Circle the two high tides and the two low tides.
- ☐ **3.** Pin the oval on the plate. Point it at the Moon.
- ☐ **4.** Turn the plate once. Count the high tides.

Record

Turning the model once	My count
Times Churchill passed under a bulge (high tide)	Example: 2
Times Churchill passed between bulges (low tide)	

3 EVIDENCE

Churchill's Tides, 6 November 2026

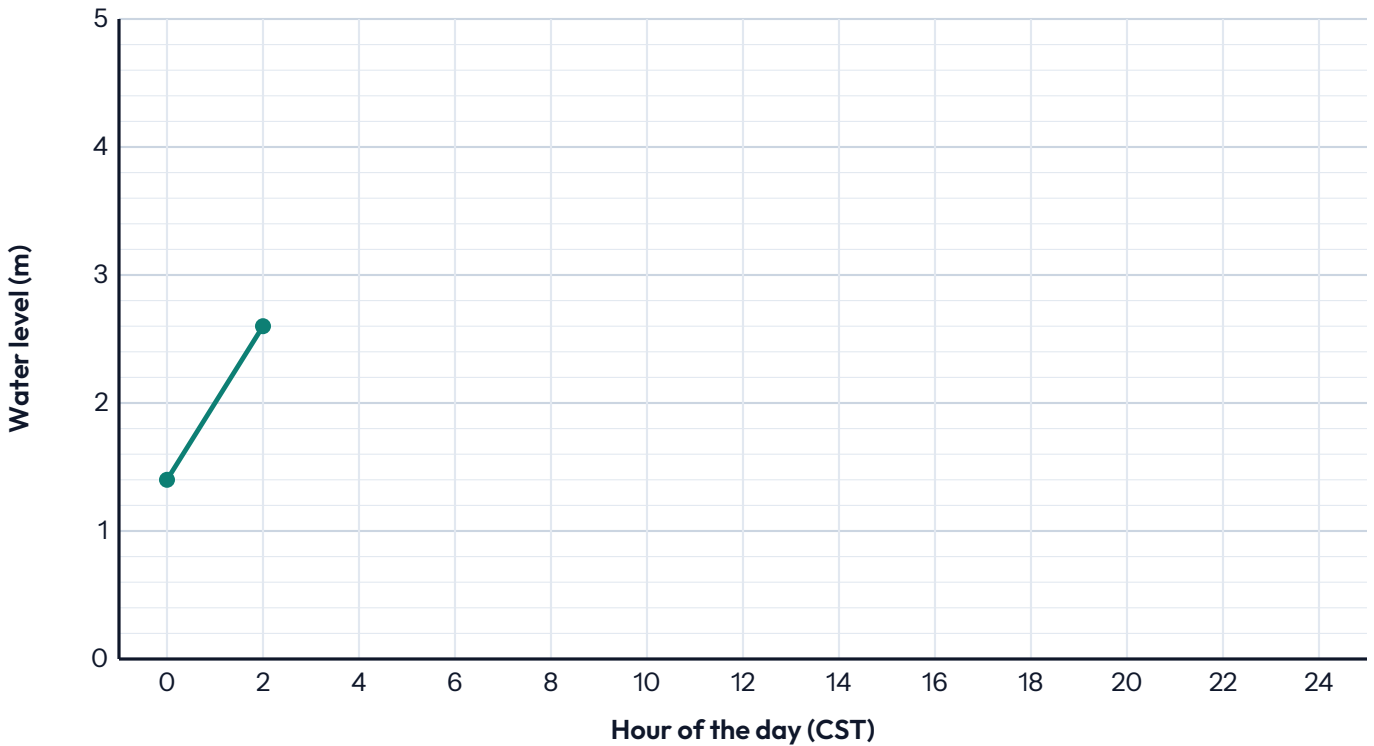
Tide	Time (CST)	Height (m)
High tide	5:27 a.m.	4.05
Low tide	11:23 a.m.	1.14
High tide	5:51 p.m.	4.25
Low tide	11:55 p.m.	1.02

Predicted tides at Churchill, in Central Standard Time (Fisheries and Oceans Canada).

Graph it: Water level at Churchill on 6 November 2026. The first two points are plotted for you.

Plot these hourly predictions from Fisheries and Oceans Canada (rounded to 0.1 m), then join the points with a smooth curve.

Hour (CST)	0	2	4	6	8	10	12	14	16	18	20	22	24
Level (m)	1.4	2.6	3.7	4.0	2.9	1.5	1.2	2.3	3.7	4.3	3.4	1.7	1.0



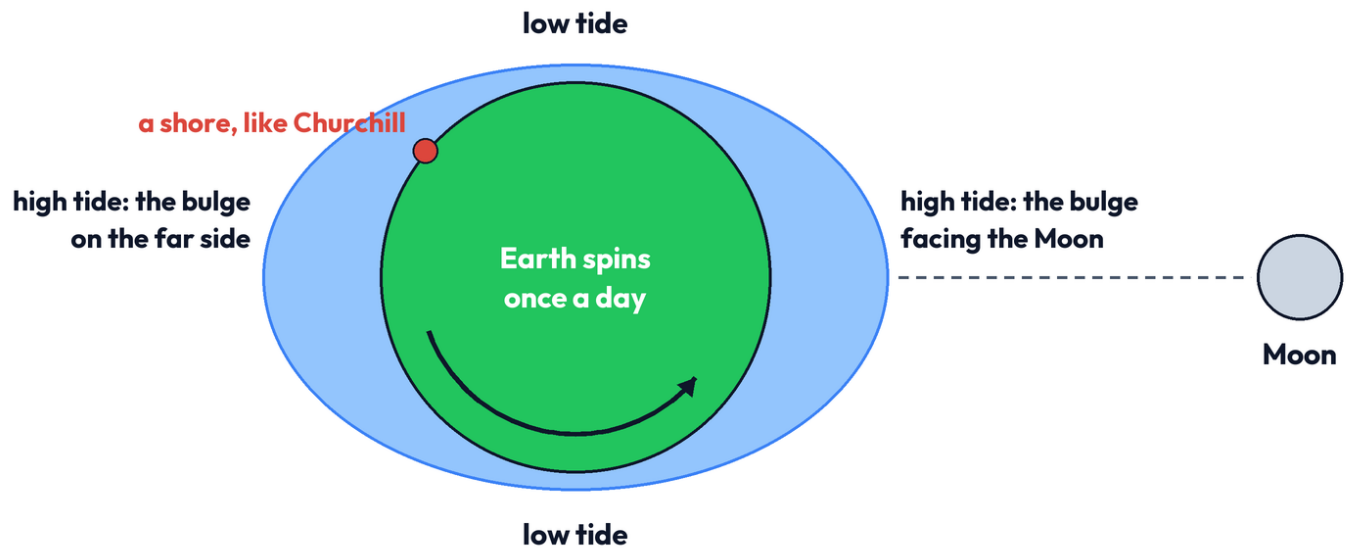
4 EXPLAIN**Read, model and explain****KEY IDEA**

The Moon's gravity pulls on the oceans. As Earth spins, the water at Churchill rises and falls.

- 1** Churchill is on Hudson Bay. The water there rises and falls. On 6 November 2026 there are two high tides and two low tides.
- 2** NOAA says gravity is a main cause of tides. Long ago, Isaac Newton said the Sun and Moon pull on the oceans.
- 3** NASA says the Moon's pull moves the seas. The Moon is closer than the Sun, so the Moon matters most.
- 4** There are two bulges of water: one facing the Moon and one on the far side. Earth spins, so Churchill passes through both each day.

KEY FACTS

- Gravity is a major force that creates tides.
- The Moon's pull on the seas causes the ocean tides.
- The Sun's tide-generating force is about half the Moon's.



NOAA: gravity and inertia make two bulges. A simplified model; bulges exaggerated; not to scale.

Two bulges of water: one toward the Moon, one on the far side.

Show what you know

- 1 FIND IT** According to NOAA, which body is the main force affecting Earth's tides?

Word bank: Moon Sun

The main force is ...

- 2 DATA** What is the tidal range between the first high tide and the first low tide? Show your work.

$4.05 - 1.14 = \dots$

3 DATA How much time passes between the two high tides?

From ... to ... is ...

4 GRAPH Describe your graph in one sentence.

Word bank: rises falls twice

Not every word is used.

The water level ...

5 EXPLAIN The Sun is bigger. Why does the Moon cause more of the tide?

Word bank: closer distance half

The Moon is ...

GO FURTHER For scientists ready for more.

Fisheries and Oceans Canada's week of predictions (Teacher Guide) shows the tidal range changing. Does it grow or shrink across the week? Suggest why.

----- cut here -----

5 REFLECT · EXIT TICKET · LESSON 4 Name _____

R How does Churchill's tide connect what happens in space to what happens on a Manitoba shore?

E1 How many high tides did Churchill have on 6 November 2026?

E2 Explain in one or two sentences what causes those tides.

Lesson 3: background for the teacher

NASA's Grades 5–8 page defines an orbit and a satellite, explains that without gravity a satellite would travel in a straight line, describes balanced motion as always falling but moving sideways fast enough never to hit, gives about 90 minutes for one low Earth orbit, and states that all orbits are elliptical. Geostationary figures are ESA's (35,786 km altitude; 23 h 56 min, a sidereal day); NASA's Grades 5–8 page rounds them to about 23,000 miles and 24 hours. NASA's ISS page gives an average altitude of about 250 miles and a 90-minute orbit; the unit rounds 250 miles to about 400 km. The Moon's distance (0.384 million km) and orbital period (27.3 days) are NASA Planetary Fact Sheet values.

Sources: NASA; European Space Agency. Full titles: Credits page.

LESSON 4 Tides on Hudson Bay

Big question: What makes the water at Churchill rise and fall twice a day?

Learning goal (student-facing): I can use real tide data from Churchill to explain how the Moon's gravity causes tides.

Big idea: Tides are the rise and fall of large bodies of water caused mainly by the Moon's gravity; Earth's rotation carries each shore through two high tides and two low tides about every day.

Focus outcomes: SCI.7.E.7 **Supporting:** SCI.7.E.4, SCI.7.C.2, SCI.7.C.3, SCI.7.D.3, SCI.7.D.2 **Time:** 60 to 75 minutes

Prep: Print or project the tide table; paper plates, tracing-paper ovals and split pins.

Lesson flow (matches the slides and the inquiry path)

Slide	Activity	Time
title	Retrieval warm-up (3 questions, key on the answer-key pages)	4 min
1	Hudson Bay rises 3 metres	4 min
2	Learning goal and the wonder question	2 min
3	Key words (5)	4 min
4	One day of tides at Churchill	6 min
5	Two bulges, two high tides	6 min
6	Investigation 4: Tide Detective	30 min
7	Evidence: Churchill's Tides, 6 November 2026	8 min
8	Exit ticket	5 min
	Total guided time	about 69 min

Formative check: the misconception move

Likely misconception: Tides are caused by the wind.

Ask: What makes the water at Churchill rise and fall twice a day?

If students say: “The wind blows it in and out”

Then do: Show the tide graph: two smooth highs about 12 and a half hours apart, every day. Ask whether wind keeps a timetable that regular. Return to NOAA’s line on gravity.

Exit ticket check: sort the exit tickets into got it / nearly / not yet and open the next lesson with a two-minute reteach for the not yet group.

Other misconceptions to listen for

- There is one high tide a day, when the Moon is overhead.
- The Sun, being bigger, causes most of the tide.

Look for

- Students plot every two hours and join the points with a smooth curve, not straight zigzags.
- Students read heights to two decimal places from the table, not from the graph.

Differentiation

- Accommodated edition: the first two points on the tide graph are plotted for you.
- Challenge: use the week’s high and low tides (Teacher Guide) to see whether the tidal range grows or shrinks across the week, and connect it to the Moon’s phase.

Thinking routine

Data talk: ‘At ___ the water was ___ m. It was rising or falling because ___.’

30-minute version

Warm-up (3 min); tide graph slide (5); plot six points only (10); paper tide model as a demonstration (6); exit ticket (6).

Lesson 4: background for the teacher

Water levels are Fisheries and Oceans Canada (Canadian Hydrographic Service) predictions for Churchill, station 05010, saved 13 Oct 2026 from the Integrated Water Level System: high and low tides for 1 to 8 November and hourly levels for 6 November, converted from UTC to Central Standard Time (UTC-6, Manitoba’s Official Time Act). Heights are above the station’s chart datum. NOAA’s tutorial supplies the Newton (1687) history and the Sun-about-half-the-Moon comparison. The two-bulge picture is a simplified model; real tides are also shaped by coastlines and the depth of the bay (say so if students ask why the two highs differ).

Sources: Fisheries and Oceans Canada; NOAA; NASA; Manitoba Education. Full titles: Credits page.

Data for the Go further and the challenge: one week of tides at Churchill, 1 to 7 November 2026

Date	High tides	Low tides	Biggest range (m)
Nov 1	12:18 p.m. 4.17 m	5:29 a.m. 0.99 m; 5:58 p.m. 1.37 m	3.18
Nov 2	12:34 a.m. 4.02 m; 1:23 p.m. 4.04 m	6:34 a.m. 1.21 m; 7:12 p.m. 1.54 m	2.83
Nov 3	1:46 a.m. 3.86 m; 2:35 p.m. 3.98 m	7:50 a.m. 1.35 m; 8:36 p.m. 1.57 m	2.63
Nov 4	3:05 a.m. 3.82 m; 3:49 p.m. 4.03 m	9:10 a.m. 1.37 m; 9:56 p.m. 1.44 m	2.66
Nov 5	4:22 a.m. 3.91 m; 4:55 p.m. 4.14 m	10:22 a.m. 1.27 m; 11:02 p.m. 1.23 m	2.91
Nov 6	5:27 a.m. 4.05 m; 5:51 p.m. 4.25 m	11:23 a.m. 1.14 m; 11:55 p.m. 1.02 m	3.23
Nov 7	6:23 a.m. 4.20 m; 6:41 p.m. 4.34 m	12:14 p.m. 1.02 m	3.32

Predicted high and low tides, Central Standard Time, heights in metres above chart datum (Fisheries and Oceans Canada, station 05010). Biggest range = that day's highest high minus its lowest low (our calculation). Copy or project this table for students. Sources: Fisheries and Oceans Canada (Canadian Hydrographic Service), tide predictions: Churchill, station 05010, high and low tides, 1 to 8 Nov 2026; NASA Goddard (F. Espenak), Phases of the Moon: 2001 to 2100 (2026 table, Universal Time).

LESSON 5 How Big Is the Solar System?

Big question: How far apart and how different are the Sun and the eight planets?

Learning goal (student-facing): I can build a scale model of the Solar System and describe the three types of planets.

Big idea: The Sun, our only star, holds eight planets in orbit: four small terrestrial planets close in and four giants far apart; distances are so large that a model must shrink them enormously.

Focus outcomes: SCI.7.E.12 **Supporting:** SCI.7.C.2, SCI.7.D.3, SCI.7.D.4, SCI.7.C.3 **Time:** 60 minutes

Prep: Book a hallway or gym (at least 46 m); 50 m tape or string; nine labelled cards; masking tape.

Lesson flow (matches the slides and the inquiry path)

Slide	Activity	Time
title	Retrieval warm-up (3 questions, key on the answer-key pages)	4 min
1	Neptune in Churchill	4 min
2	Learning goal and the wonder question	2 min
3	Key words (6)	4 min
4	The planets' distances, to scale	6 min
5	Investigation 5: The Hallway Solar System	30 min
6	Evidence: The Eight Planets	8 min
7	Exit ticket	5 min
	Total guided time	about 63 min

Exit E1. Gravity pulling it toward the planet, and fast sideways motion that keeps it missing.

Exit E2. The Moon (27.3 days compared with about 90 minutes); it is much farther away.

Lesson 4: Tides on Hudson Bay

W1. A regular, repeating path that one object in space takes around another.

W2. Go off in a straight line.

W3. About 90 minutes.

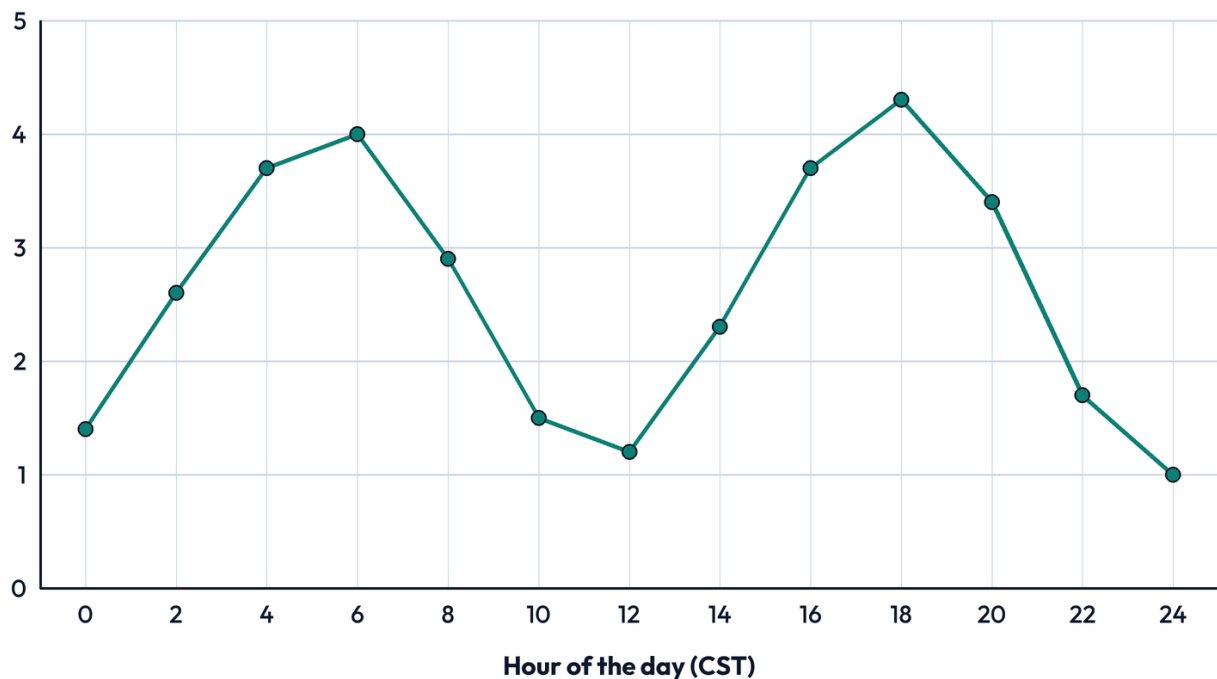
Investigation 4: Tide Detective (typical results)

Turning the model once	My count
Times Churchill passed under a bulge (high tide)	2
Times Churchill passed between bulges (low tide)	2

Churchill's Tides, 6 November 2026 (completed)

Tide	Time (CST)	Height (m)
High tide	5:27 a.m.	4.05
Low tide	11:23 a.m.	1.14
High tide	5:51 p.m.	4.25
Low tide	11:55 p.m.	1.02

Water level (m)



Answer key graph: Water level at Churchill on 6 November 2026

[A]1. The Moon. The Sun's tide-generating force is about half the Moon's.

[A]2. $4.05 - 1.14 = 2.91$ m, about 2.9 m.

[A]3. From 5:27 a.m. to 5:51 p.m.: 12 h 24 min, about twelve and a half hours.

[A] 4. A wave: the water rises to a high near 5 to 6 a.m., falls to a low near 11 a.m., rises to a second high near 6 p.m. and falls again before midnight.

[A] 5. Gravity depends on distance as well as mass. The Moon is much closer to Earth, so its tide-raising pull is bigger; NOAA says the Sun's is about half the Moon's.

6. Measure the real water level at Churchill on that day with a tide gauge and compare it with the prediction (Fisheries and Oceans Canada also publishes measured levels).

7. No noticeable tide. Tides show up in large bodies of water like oceans and Hudson Bay; a river far inland has too little water spread over too small an area for the effect to show.

Go further. In the Teacher Guide's table (Lesson 4 plan) the biggest daily range shrinks from 3.18 m on 1 November to 2.63 m on 3 November, then grows to 3.32 m on 7 November. Accept any pattern supported by the numbers; ask what else changes over the week: NASA lists a last quarter Moon on 1 November and a new Moon on 9 November (Universal Time).

Exit E1. Two.

Exit E2. Mainly the Moon's gravity pulling on the ocean, with the Sun adding about half as much; Earth's spin carries Churchill through the high water twice a day.

Lesson 5: How Big Is the Solar System?

W1. The Moon's gravity.

W2. Two.

W3. It is much closer.

Investigation 5: The Hallway Solar System (typical results)

Walk	My steps	What I noticed
Sun to Earth	about 2 steps (1.50 m)	Very close to the Sun.
Earth to Mars	about 1 step (0.78 m)	The inner planets are crowded together.
Uranus to Neptune	about 20 steps (16.5 m)	The outer planets are very far apart.

The Eight Planets (completed)

Planet	Type	Distance from Sun (million km)	Diameter (km)	Scaled (m), you calculate
Mercury	terrestrial	57.9	4,879	0.58
Venus	terrestrial	108.2	12,104	1.08
Earth	terrestrial	149.6	12,756	1.50
Mars	terrestrial	228.0	6,792	2.28
Jupiter	gas giant	778.5	142,984	7.79
Saturn	gas giant	1,432.0	120,536	14.32
Uranus	ice giant	2,867.0	51,118	28.67
Neptune	ice giant	4,515.0	49,528	45.15

[A] 1. Mercury, Venus, Earth and Mars; they have solid surfaces (NASA).

[A] 2. Earth: $149.6 / 100 = 1.50$ m. Neptune: $4,515 / 100 = 45.15$ m.

[A] 3. Jupiter: $142,984 \text{ km} / 12,756 \text{ km} = \text{about } 11$ Earths across.

Keep going

This lesson comes from Gravity & Space, one of three Manitoba Grade 7 Science units.

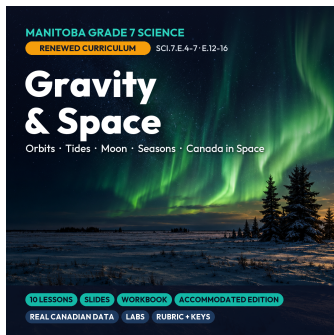


Particles & Heat

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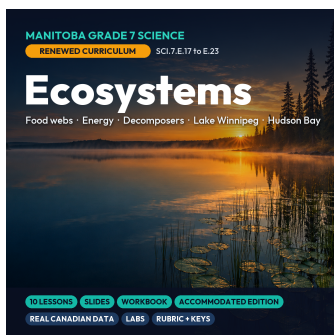


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