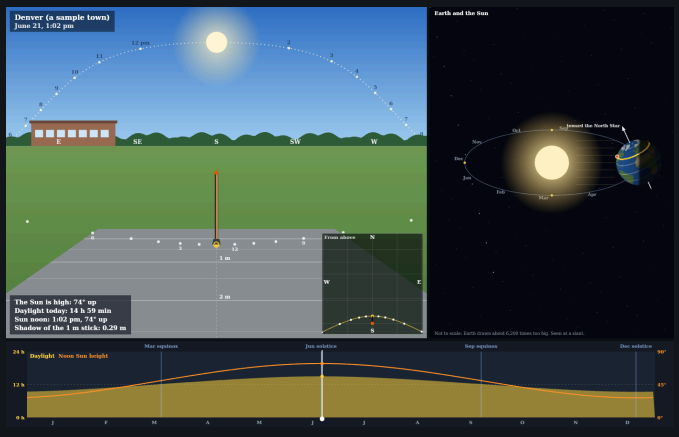
mytekDev

Sun and Seasons Lab: Your Town's Sun Through the Year

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 four-day table for Denver and their own town
- 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: NGSS and Texas TEKS

Sun and Seasons Lab: Your Town's Sun Through the Year

Grades 6-8 · 45 minutes · Earth and space science, Astronomy

Students read the Sun's year in Denver: sun noon at 1:02 pm in June and 11:58 am in December, the noon Sun 74 degrees up against 27, and a day of 14 hours 59 minutes against 9 hours 21. They visit both equinoxes, where the day is a little over 12 hours, then find their own town and fill in the same four days for it. The year graph along the bottom holds every day at once.

At a glance

ESSENTIAL QUESTION

How does the Sun's path over your town change through the year?

OBJECTIVES

Students will be able to:

- read the year graph to find the longest and shortest days and the noon Sun's height on a date
- describe the Sun's path, the noon shadow and the day length on the solstices and equinoxes
- explain why sun noon is rarely 12:00 on the clock
- compare their own town's year with Denver's and say what the difference comes from

VOCABULARY

Solstice, Equinox, Day length, Sun noon, Latitude

STANDARDS

MS-ESS1-1, 112.26(b)(9)(A)

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/sunseasonslab?lesson=your-towns-sun-through-the-year&ref=tpt-sunseasonslab-2 once on a student computer: it opens on Denver on June 21 at 10 in the morning, with every control showing. Press `Find my town`, type your town's name and pick it, then press `Sun noon`, and note the numbers for your town on the four days, about ten minutes. If your town has fewer than 15,000 people, pick the nearest bigger one.

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. The app never reads where a device is: a town is picked from a list or a map.

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: when is the Sun highest? Take a vote: before 12:00, at 12:00, after 12:00.	Answer the warm-up on the worksheet.
5 to 12	**Direct instruction (I do)** Model it	Project the app. Point at the year graph along the bottom: the yellow band is the day length, the orange line the noon Sun's height, and the four marks are the solstices and equinoxes. Show The March equinox in Denver, then December in Denver. > **It's working when:** Click on the year graph to move the date. Drag along it slowly from June to December and let the class watch the Sun's path sink.	Fill in the vocabulary.
12 to 22	**Guided practice (We do)** Four days in Denver together	Students open the link or scan the QR code. The guide asks them to press Sun noon, go to the December solstice, then the March and September equinoxes, and find their own town. > **Watch for:** Students who read the clock in the corner instead of the Sun noon line. The card under Town and the readout on the ground both give sun noon.	Follow the guide and fill in the Denver row of the table for each day.
22 to 38	**Independent practice (You do)** My town's year	Students fill in the same four days for their own town: day length, the noon Sun's height and the clock time of sun noon. Then they compare with Denver. Walk the room with the What to look for questions. > **If they ask:** "In Denver sun noon jumps from 12:44 pm to 11:43 am at the start of November. What happened on the clock?" Sun noon	Fill in the table for their town and answer the questions.
38 to 45	**Closure** Showcase and exit ticket	Show the Showcase slide and take answers. Go back to the warm-up vote. Hand out the exit ticket.	Answer the exit ticket.

Before you teach: a ten-minute walkthrough

Open mytekdev.com/try/sunseasonslab?lesson=your-towns-sun-through-the-year&ref=tpt-sunseasonslab-2. Denver on June 21 at 10 in the morning, with every control showing and no guide inside the app; the lesson's guide runs along the bottom of the page.

1. **Sun noon.** Press `Sun noon`. A note gives the time: 1:02 pm. The readout on the ground says the Sun is 74 degrees up and the shadow 0.29 m.

2. **December.** Press `December solstice`. The day is 9 hours 21 minutes; at sun noon, 11:58 am, the Sun is 27 degrees up and the shadow 1.97 m.
3. **The equinoxes.** Press `March equinox`: 12 hours 9 minutes, sun noon at 1:07 pm, 50 degrees. Then `September equinox`: 12 hours 9 minutes again, sun noon at 12:53 pm.
4. **My town.** Press `Find my town`, type a name, and pick it from the list. Or tap the world map; a spot on the map is kept to a whole degree, with no name.

> The numbers are for 2026 and match the US Naval Observatory to the minute. Sunrise and sunset are for flat ground, so real times can differ by a minute or so with hills and the air.

Background for the teacher

Earth's tilted axis keeps pointing the same way as Earth goes round the Sun. From March to September the north end leans toward the Sun, so in the northern half of Earth the Sun climbs higher and stays up longer. The June solstice is the peak, the December solstice the bottom, and on the equinoxes the Sun is over the equator.

Equinox days are not exactly 12 hours. Sunrise counts from the moment the top edge of the Sun appears, and the air bends its light up over the horizon, so most places get 12 hours and 7 to 15 minutes. Denver gets 12 hours 9 minutes.

Sun noon is when the Sun is highest. Clocks are set for a whole time zone and daylight saving moves them an hour, so sun noon wanders around the clock. In Denver, which sits almost on its time zone's middle line, it runs from 11:43 am in early November to 1:11 pm in early March. Miami sits west of its zone's middle line, so on March 20 its sun noon is at 1:28 pm. A third, smaller reason, Earth's speed and tilt changing through the year, is at the high school level.

What to look for

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

- Which day of the year is longest in your town? How long is it?
- Where on the year graph are the equinoxes, and how long are those days?
- Why is the noon shadow long in December?
- Your town's sun noon is not 12:00. Give one reason.
- Is your town's summer day longer or shorter than Denver's? What could cause that?

> The last question is the real test: a student who links a longer summer day to being farther north is reading latitude off the model.

Cross-curricular extensions

- Math: graph your town's day length on the first of every month and find the steepest part of the curve.
- Geography: find the middle line of your time zone on a map. Is your town east or west of it, and does that fit your sun noon?
- History: read how towns kept their own sun time before railroads brought time zones in 1883.
- Art: sketch the Sun's path over your school on the four days, using the dotted arcs in the app as a guide.

Vocabulary

Solstice	The day the Sun is farthest north or south, about June 21 and December 21: the longest and the shortest day.
Equinox	One of two days, about March 20 and September 22, when day and night are close to 12 hours each everywhere.
Day length	How long the Sun is up, from sunrise to sunset.
Sun noon	The moment the Sun is highest and a stick's shadow is shortest. It is rarely 12:00 on the clock.
Latitude	How far north or south of the equator a place is, in degrees. Denver is about 40 degrees north.

Differentiation

ENGLISH LEARNERS

- Keep the vocabulary slide up, and point at the yellow band and the orange line as you say "day length" and "noon height".
- Pair each learner with a partner; the table is numbers copied from the screen.
- Accept the comparison as two short lists, Denver and my town.

STUDENTS WITH IEPS OR 504 PLANS

- Pair students, one at the controls and one recording.
- Zoom the browser to 150%.
- Allow the two solstices only where the IEP allows a modified assignment.

STUDENTS WHO NEED MORE SUPPORT

- A sentence starter: "In my town the longest day is ___ long and the shortest is ___."
- Fill in the Denver June row together before the guide.
- Pick one town for the whole room in Setup (the town fixed) so every screen shows the same numbers.

STUDENTS READY FOR MORE

- Solve the puzzle When is noon? and explain why Anchorage's sun noon on June 21 is at 2:02 pm.
- Pick Tromso, Norway on the year graph and find the days the Sun never sets and never rises.
- Switch the level to High school and use the noon height formula, 90 minus the latitude plus the Sun's declination, to check one day.

Adapting for other grades

Younger students: In grades 4 and 5 (5-ESS1-2, shadows and day length), use Setup to turn off Tilt and Orbit and Sunlight, fill in Denver only, and compare the June and December noon shadows. Drop the third rubric row; total 8,

and 6 meets the objectives.

Older students: In high school, switch the level to High school: the readout gives the Sun's declination, so students can check 90 minus latitude plus declination against the noon height, and read the equation of time in the clock time of sun noon.

Student worksheet

Name: _____ Date: _____

Open the app: scan the QR code, or go to mytekdev.com/try/sunseasonslab?lesson=your-towns-sun-through-the-year

Essential question: How does the Sun's path over your town change through the year?

Warm-up: When is the Sun highest in the sky? At 12:00? Why? _____

1. **Vocabulary.** Solstice, equinox, day length, sun noon, latitude: write each in your own words.

2. **Denver.** For March 20, June 21, September 22 and December 21, write the day length, the noon Sun's height and the clock time of sun noon.

3. **My town: _____.** The same four days: day length, noon height, sun noon.

1. Which is the longest day in your town, and which is the shortest? How do the noon heights compare?

2. Why is sun noon not at 12:00 on the clock in your town?

Exit ticket

Name: _____

1. In the northern half of Earth, the longest day of the year is near (A) March 20 (B) June 21 (C) December 21

2. In Denver on June 21, the Sun is highest at about (A) 12:00 pm (B) 1:02 pm (C) 3:00 pm

3. Why is a stick's noon shadow longer in December than in June?

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Exit ticket

Name: _____

1. In the northern half of Earth, the longest day of the year is near (A) March 20 (B) June 21 (C) December 21

2. In Denver on June 21, the Sun is highest at about (A) 12:00 pm (B) 1:02 pm (C) 3:00 pm

3. Why is a stick's noon shadow longer in December than in June?

Answer key: exit ticket

QUESTION	ANSWER	WHY
1	B	The June solstice: in Denver, 14 hours 59 minutes of daylight.
2	B	Daylight saving moves the clock an hour ahead, and Denver is almost on its time zone's middle line, so sun noon is about 1:00 pm.
3	The Sun is lower	The December noon Sun is low (27 degrees in Denver against 74 in June), so the shadow stretches farther: 1.97 m against 0.29 m for a 1 m stick.

Rubric

Score each row from 1 to 4.

Name: _____

CRITERIA	4 EXCEEDS	3 MEETS	2 APPROACHING	1 BEGINNING
Data	All four days for Denver and their own town, with the clock time of sun noon for each.	All four days for both towns.	Two or three days, or one town only.	No data.
Pattern	Names the longest and shortest days, says the equinoxes are a little over 12 hours, and says how the noon height follows the day length.	Names the longest and shortest days and the equinoxes.	Names one solstice.	No pattern named.
Explanation	Explains the longer noon shadow in December from the lower Sun, and sun noon away from 12:00 from the time zone and daylight saving, with numbers.	Explains the longer December shadow and why sun noon is not 12:00.	Explains one of the two.	No explanation.

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

Standards

The lesson is built for MS-ESS1-1, the seasons part: the pattern of the Sun's height and day length that the seasons follow. Texas TEKS 112.26(b)(9)(A) is the grade 6 standard for the seasons (2021 adoption).

FRAMEWORK	CODE	GRADES	STANDARD	HOW THE LESSON MEETS IT
NGSS	**MS-ESS1-1**	6-8	Develop and use a model of the Earth-sun-moon system to describe the cyclic patterns of lunar phases, eclipses of the sun and moon, and seasons.	Students use the model's graph of day length and noon Sun height to describe the yearly pattern behind the seasons, in Denver and in their own town.
Texas TEKS	**112.26(b)(9)(A)**	6	Model and illustrate how the tilted Earth revolves around the Sun, causing changes in seasons.	Students follow the tilted Earth round the Sun through the solstices and equinoxes and illustrate how the Sun's height and day length change with the seasons.

Checked November 2026 against: NGSS MS-ESS1-1, Earth's Place in the Universe, NGSS MS-ESS1-1 evidence statement (June 2015), Texas Administrative Code, 19 TAC 112.26, Science, Grade 6, NOAA Global Monitoring Laboratory, solar calculator and its equations, US Naval Observatory, rise, set and transit times (the app is checked against it).

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/sun-and-seasons-lab/lessons/your-towns-sun-through-the-year/start instead of the worksheet link. Each one gets their own copy of the starter, and the same link reopens it next time. The Sheet button in the app collects their predictions, readings, puzzles and written answers to hand in.

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