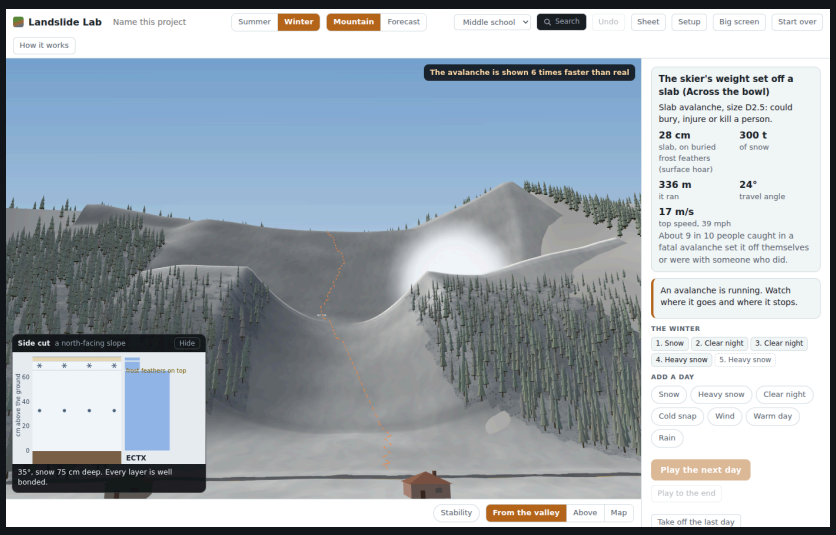
mytekDev

Landslide Lab: Reading the Snowpack

Grades 6-8 · 45 minutes

Earth science · Weather



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 snow pit drawing
- 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 science
- Standards: NGSS

Landslide Lab: Reading the Snowpack

Grades 6-8 · 45 minutes · Earth science, Weather

Students play a winter one day at a time and read the layers in a snow pit after each. Clear nights grow frost feathers on top of the snow, and heavy snow buries them. On day four nothing slides on its own, yet a skier crossing the bowl breaks the buried frost and sets off a slab. Students name the four things a slab avalanche needs, then build winters of their own to test them.

At a glance

ESSENTIAL QUESTION

What has to be true for a slab avalanche to happen?

OBJECTIVES

Students will be able to:

- name the four things a slab avalanche needs: a steep slope, a slab, a weak layer under it, and a trigger
- read the layers in a snow pit and find the weak one
- explain how weather on one day makes a weak layer that matters days later
- explain why most people caught in avalanches set them off themselves

VOCABULARY

Snowpack, Weak layer, Slab, Surface hoar, Trigger

STANDARDS

MS-ESS3-2

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/landslidelab?lesson=reading-the-snowpack&ref=tpt-landslidelab-3 once on a student computer: it opens on Granite Peak in winter with five days on the strip, Snow, Clear night, Clear night, Heavy snow, Heavy snow. Play it yourself, about ten minutes, and on day four send a skier up the trees, then across the bowl.

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: what happens to most people caught in avalanches? Write the answers on the board.	Answer the warm-up on the worksheet.
5 to 12	**Direct instruction (I do)** Model it	Project the app with the starter open. Play the first day and point at the snow pit in the corner: the layers, the outline, the column test. Show Reading a snow pit, then A slab avalanche needs four things. > **It's working when:** Ask what each kind of day leaves behind in the pit. A snowfall leaves a layer; a clear night leaves frost on top; a warm day leaves a crust.	Watch, and fill in the vocabulary on the worksheet.
12 to 22	**Guided practice (We do)** Four days together	Students open the link or scan the QR code. A short guide walks them through: three days, the heavy snow, a skier up the trees, a skier across the bowl, then the fifth day. Check that every screen shows the slab the skier set off on day four. > **Watch for:** Students who think the skier was unlucky. The pit showed the buried frost breaking before anyone went up; the danger was there to read.	Draw the pit on day four, with the weak layer marked, and record each skier.
22 to 38	**Independent practice (You do)** Your own winter	Students press Start the winter over, take days off the strip and add their own. Each tests one idea: a Warm day after the clear nights, Wind instead of the heavy snow, or a Cold snap. Walk the room with the What to look for questions. > **If they ask:** "The skier up the trees was safe on the same day. What was different about that route?" Up the trees	Record each winter's days, the weak layer in the pit, and what each skier did.
38 to 45	**Closure** Showcase and exit ticket	Show the Showcase slide. Two students name the missing piece on day four. Go back to the warm-up answers. Hand out the exit ticket.	Answer the exit ticket.

Before you teach: a ten-minute walkthrough

Open mytekdev.com/try/landslidelab?lesson=reading-the-snowpack&ref=tpt-landslidelab-3. A short guide opens over the app. Granite Peak in early winter: a bowl near the top, a gully, and a forested spur. The strip on the right holds five days: Snow, Clear night, Clear night, Heavy snow, Heavy snow.

1. **Days one to three.** Press `Play the next day` three times. The pit in the corner gains a layer of new snow, then frost feathers on top from the clear nights.

2. **Day four.** The heavy snow buries the frost. Nothing slides on its own. By the app's rules the danger is Considerable in all three bands.
3. **Two skiers.** Send a skier `Up the trees`: nothing happens. Then `Across the bowl`: the skier's weight breaks the buried frost 28 cm down, and a size 2.5 slab runs about 336 m.
4. **Day five.** Play the second heavy snow. Six slopes let go on their own, and the danger is High above and near the trees.

> The moment that lands is day four: a quiet mountain where a skier sets off a slab. It answers the warm-up, and it is how most real avalanche accidents happen.

Background for the teacher

A snowpack is built in layers, one for each storm or change in the weather. A slab avalanche needs a slope steep enough, usually 30 to 45 degrees; a slab of snow that holds together; a weak layer under it; and a trigger. On clear, cold, calm nights frost feathers called surface hoar grow on the snow. Buried by the next storm, they make a weak layer that can last for weeks.

Most avalanche deaths in North America come from slides the victims or their party triggered. That is why avalanche forecasts describe where a person could set one off, not only where slides will run on their own. Thick trees anchor the snow, and the trees route in the app keeps to a gentle crest. Avalanches can still run through thin trees and down from the slopes above.

The app builds its snowpack from a few simple rules, the same on every slope facing one way at one height, and its danger ratings come from its own cutoffs. The app is a model of a made-up hill and mountain. It is not a tool for judging a real slope. To go into avalanche terrain, take an avalanche course, read the local avalanche forecast, and carry rescue gear with people trained to use it.

What to look for

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

- Point to the weak layer in the pit. Which day made it?
- Why did nothing slide on its own on day four?
- The skier up the trees was safe on the same day. Why?
- Name the four things a slab avalanche needs.
- Would a Warm day after the clear nights change anything? On which slopes?

> The second question is the real test: a student who says the snow was ready and only the trigger was missing has the idea.

Cross-curricular extensions

- Math: the skier's slab was 28 cm deep. If a cubic meter of that snow weighs 140 kilograms, how many kilograms of snow sat on each square meter of the weak layer?
- Weather: keep a two-week weather log for a mountain town and say which days would build a weak layer.
- English: write the avalanche forecast for day four in three sentences, for skiers who will read it on a phone.
- Health: read how avalanche rescue gear works, and why it only helps people trained to use it.

Vocabulary

Snowpack	All the layers of snow on the ground, one for each storm or change in the weather.
Weak layer	A layer that breaks more easily than the snow above and below it.
Slab	A layer of snow that holds together, so it breaks away in one piece.
Surface hoar	Frost feathers that grow on top of the snow on clear, cold, calm nights. Buried, they are a weak layer.
Trigger	What sets an avalanche off: new snow, warming, or the weight of a person.

Differentiation

ENGLISH LEARNERS

- Keep the vocabulary slide up, and point at the screen as you say each word: the side cut, the colors and the pit carry the meaning.
- Pair each learner with a partner; each day card has a name and a short line of weather.
- Accept the pit drawing with the weak layer circled, without sentences.

STUDENTS WITH IEPS OR 504 PLANS

- Pair students for their own winter, one choosing the days and one recording.
- Zoom the browser to 125%; the pit and its words stay readable.
- Allow the guided winter and one change of their own, where the IEP allows a modified assignment.

STUDENTS WHO NEED MORE SUPPORT

- A sentence starter: "The skier set off the slab because ___."
- A check-in after the guide: every student has seen the day-four slab before building their own winter.
- Give the four things as a checklist to tick for each day.

STUDENTS READY FOR MORE

- Switch the level to high school and read the strength of each layer in the pit.
- Build a winter where the buried frost is still the weak layer a week later, and explain why it lasts.
- Explain why the forecast on day five is High above the trees and only Considerable below them.

Adapting for other grades

Younger students: In grades 4 and 5, pick Grades 2 to 5 in the level menu and play the guided winter together, talking about each layer as a layer of a sandwich. Skip the second rubric row; total 8, and 6 meets the objectives.

Older students: In high school, pick High school in the level menu: the pit gives each layer's strength in kilopascals, and the danger scale adds Extreme. Students explain the column test score from the strength of the weak layer and the weight above it.

Student worksheet

Name: _____ Date: _____

Open the app: scan the QR code, or go to mytekdev.com/try/landslidelab?lesson=reading-the-snowpack

Essential question: What has to be true for a slab avalanche to happen?

Warm-up: What do you think happens to most people caught in avalanches? _____

1. **Vocabulary.** Snowpack, weak layer, slab, surface hoar, trigger: write each in your own words.

2. **The pit on day four.** Draw the pit as a column of layers. Name each layer and the day it came from, and circle the weak layer.

3. **The skiers.** Up the trees: _____. Across the bowl: _____. How deep was the weak layer? ____ cm.

4. **Your own winter.** The days I played: _____. The weak layer: _____. What a skier across the bowl did: _____.

1. On day four nothing slid on its own. Which of the four things was missing until the skier came?

2. Why are buried frost feathers dangerous for days after the storm that buried them?

Exit ticket

Name: _____

1. Which is NOT one of the four things a slab avalanche needs? (A) a weak layer (B) a slope steep enough (C) a sunny day (D) a trigger

2. Frost feathers grow on top of the snow on (A) warm, windy days (B) clear, cold, calm nights (C) rainy nights

3. A mountain has had no avalanches for two days. Explain why it could still be dangerous to cross a steep slope.

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Exit ticket

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2. Frost feathers grow on top of the snow on (A) warm, windy days (B) clear, cold, calm nights (C) rainy nights

3. A mountain has had no avalanches for two days. Explain why it could still be dangerous to cross a steep slope.

Answer key: exit ticket

QUESTION	ANSWER	WHY
1	C	A slab avalanche needs a steep slope, a slab, a weak layer under it, and a trigger.
2	B	Surface hoar grows on clear, cold, calm nights and is buried by the next snowfall.
3	A weak layer can wait for a trigger	A buried weak layer can stay weak for days or weeks; the weight of a person can be the trigger. Saying only that it could be dangerous is half.

Rubric

Score each row from 1 to 4.

Name: _____

CRITERIA	4 EXCEEDS	3 MEETS	2 APPROACHING	1 BEGINNING
The four things	Names all four and shows each one in the day-four slab, with evidence from the pit and the route.	Names all four.	Names two or three.	Names one or none.
Reading the pit	The pit drawn with every layer named, the weak layer marked, and the day each layer came from.	The pit drawn with the weak layer marked.	Layers drawn with no weak layer marked.	No pit.
Your own winter	Two winters or more, each testing one change, with the result and a reason.	One winter of their own with the result and a reason.	A winter played with no result recorded.	No winter of their own.

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

Standards

The lesson is built for MS-ESS3-2. No NGSS standard names avalanches; they are a natural hazard students read from data, the same balance as a landslide with snow.

FRAMEWORK	CODE	GRADES	STANDARD	HOW THE LESSON MEETS IT
NGSS	**MS-ESS3-2**	6-8	Analyze and interpret data on natural hazards to forecast future catastrophic events and inform the development of technologies to mitigate their effects.	Students read layers and column tests in a model snowpack to judge when an avalanche is likely, and what people do that sets one off.

Checked November 2026 against: NGSS MS-ESS3-2, Earth and Human Activity.

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/landslide-lab/lessons/reading-the-snowpack/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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