Family edition

Landslide Lab: How Steep Can It Stand?

Ages 11-14 · about 45 minutes, in one sitting

Your child tilts a tray of sand in Landslide Lab until it slides, dry, damp and soaked, and finds out why a sandcastle needs damp sand but a soaked hillside lets go.

What you need

- A computer or Chromebook with a current browser.
- The lesson link: mytekdev.com/try/landslidelab?lesson=how-steep-can-it-stand&ref=fam-landslidelab-2. No account, no email and nothing to install.
- If you can: a baking dish of sand, a protractor and a spray bottle, to try it for real.

Before you start: try it once yourself

Open mytekdev.com/try/landslidelab?lesson=how-steep-can-it-stand&ref=fam-landslidelab-2. A short guide opens over the app on the tilt tray: a clear tray of sand on a hinge, with a protractor at the hinge.

1. **Dry sand.** Press `Raise the tray`. A few grains roll at 31 degrees (the yellow line) and all of it slides at 34 (the red line), spilling onto the bench.
2. **Damp sand.** Pick `Damp` and raise it. It stands to about 45 degrees.
3. **Soaked sand.** Pick `Soaked` and raise it. It flows at about 19 degrees.
4. **Other materials.** Round gravel goes at 31 dry. Soil with grass roots stands to 48 dry and 56 damp. Clay soil soaked goes at 13.5.

> The moment that lands is damp sand. Children who have learned that water weakens slopes see it hold steeper, and the soaked run then shows when that stops being true.

The ideas, in plain words

Loose material on a slope holds by friction between its grains. Dry sand slides at about 34 degrees, close to its angle of repose. A little water forms thin bridges between grains that pull them together, the way a sandcastle holds; that pull disappears when the spaces between the grains fill. Soaked, the water pushes the grains apart, they press on each other less, and the sand flows at a much flatter angle.

Roots tie soil together, which is why soil with grass roots stands steepest. Round grains roll past each other more easily than sharp ones. On a real hill the soaked case is the dangerous one: a hollow full of water after a long storm.

The tray measures a tilted layer letting go, a little different from a poured pile. The app is a model of a made-up hill and mountain. It is not a tool for judging a real slope.

Do it together

1. Open mytekdev.com/try/landslidelab?lesson=how-steep-can-it-stand&ref=fam-landslidelab-2 together. A short guide opens over the app. Press `Raise the tray`.

   > **You'll know it worked when:** The first grains roll at 31 degrees, and all of it goes at 34.

2. Ask: will damp sand stand steeper or flatter? Then pick `Damp` and raise it.

   > **You'll know it worked when:** It stands to about 45 degrees.

3. Pick `Soaked` and raise it.

   > **If you get stuck:** Press `Fill it again` if the tray is still tipped.
   >
   > **You'll know it worked when:** It flows at about 19 degrees.

4. Try `Round gravel` and `Soil with grass roots` the same way, and write the angles in a table.

   > **You'll know it worked when:** Your child can say which one stands steepest and why.

5. If you have sand and a dish, try dry and damp for real with the protractor.

   > **You'll know it worked when:** The real angles are close to the app's, a few degrees off.

Talk about it

Ask these while you work together. A child who has understood it can answer them without help:

- What is the difference between your two angles?
- Damp sand stood steeper than dry. Why?
- Soaked sand flowed. What did the water do to the grains?
- Which run changed two things at once?
- Which material would you plant grass on to hold a steep bank?

> The second and third questions together are the real test: a child who can say why a little water helps and a lot hurts has the idea.

For younger and older kids

Younger: For a younger child, do the sand three ways and talk about sandcastles.

Older: For a teenager, graph the angle against the water for two materials and explain the shape.

Keep going

- Graph the angle against the amount of water for sand and for clay soil, and explain the shape.
- Do the real tray with sand and a spray bottle, and compare the real angles with the app's.
- Explain why soil with grass roots stands steepest of all, dry or damp.

Bring it into other subjects

- Math: graph the angle against the amount of water for sand, with dry, damp, wet and soaked on the bottom axis.
- Engineering: design a sand slope at 40 degrees that stands through a spray of water, and test it in a real tray.
- History: read about why the pyramid builders wet the sand in front of a sledge.
- English: write the lab report: question, prediction, method, data, conclusion.

For your records

Ready to copy into an hour log, a portfolio or a transcript.

LESSON	Landslide Lab: How Steep Can It Stand?
SUBJECTS	Earth science
TIME	45 minutes
WHAT WE DID	Measured the angles at which sand, gravel and soils slide with different amounts of water, as a fair test, and explained how water changes slope stability.
SKILLS PRACTICED	Fair tests; Recording data; Slope stability

Activity sheet (optional)

Name: _____ Date: _____

Open the app: scan the QR code, or go to mytekdev.com/try/landslidelab?lesson=how-steep-can-it-stand

Essential question: How does water change how steep a slope of sand or soil can stand?

Warm-up: Dry, damp or soaked: which sand makes the best sandcastle, and why? _____

1. **Vocabulary.** Angle of repose, variable, fair test, saturated, friction: write each in your own words.

2. **Predict.** Dry sand: ____°. Damp sand: ____°. Soaked sand: ____°.
3. **The data table.** For each run: material _____; water _____; first grains rolled at ____°; all of it went at ____°. Twelve lines, one run on each.

1. A little water and a lot of water did different things to the sand. Explain both.

2. Which of your runs is most like a hillside hollow after a long storm? What does your data say about it?

Quick check

Name: _____

1. Damp sand stands steeper than dry sand because (A) water is sticky like glue (B) a little water pulls the grains together (C) damp sand is heavier

2. Which change is a fair test? (A) dry sand, then soaked gravel (B) dry sand, then soaked sand (C) damp gravel, then dry soil

3. A hillside of sandy soil fills with water in a long storm. Use the tray to explain what happens to it.

Answers

QUESTION	ANSWER	WHY
1	B	Thin bridges of water between grains pull them together. When the spaces fill, the pull is gone.
2	B	Only the water changes. The others change the material and the water together.
3	It can slide at a flatter angle	Soaked, the water pushes the grains apart and the slope that held when dry or damp can let go. Naming the angle with no reason is half.

If your state or umbrella school asks, this lesson covers NGSS MS-ESS3-2, NGSS MS-ESS2-2.

Terms of use

This lesson was made by mytekDev. You may print and copy it for the children you teach at home, and change it for them. You may not sell it, share it with other families, or post it publicly.

The app this lesson uses is free and runs in the browser, with nothing to install and no account needed. It is at mytekdev.com.

© 2026 mytekDev. All rights reserved.