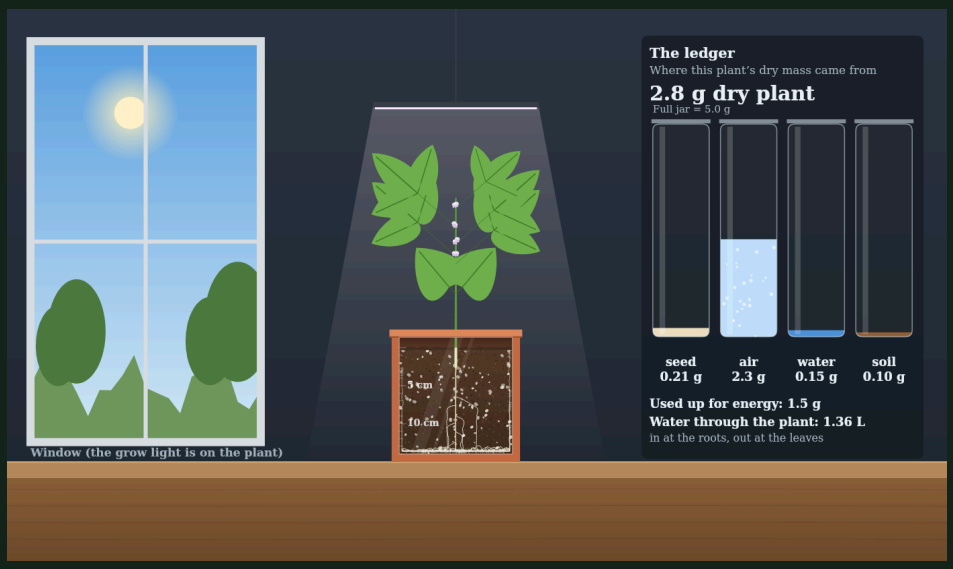
mytekDev

Seed Lab: One Change at a Time

Grades 6-8 · 45 minutes

Life science



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 results table and a graph
- 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 2 to 5 and in high school biology
- Standards: NGSS

Seed Lab: One Change at a Time

Grades 6-8 · 45 minutes · Life science

Students grow the same bush bean to its first flowers (Day 40) and record its dry mass. Then they go back in time to the start, change one thing, and grow it again. On Day 40 the light alone takes it from 0.24 g on a north window to 0.91 g on a south window, 2.7 g under a grow light that is always on and 7.6 g outdoors. Pot size and warmth each tell their own story. They graph the results and explain them as environmental factors.

At a glance

ESSENTIAL QUESTION

What makes a plant grow bigger, and how do you test it fairly?

OBJECTIVES

Students will be able to:

- change one variable at a time and keep the others the same
- compare plants by their dry mass on the same day
- graph the results and name the factor that mattered most
- explain the results with light, space and warmth as environmental factors

VOCABULARY

Variable, Fair test, Control, Dry mass, Environmental factor

STANDARDS

MS-LS1-5

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/seedlab?lesson=one-change-at-a-time&ref=tpt-seedlab-4 once on a student computer: a bean on a south window with the ledger open. Run it yourself, about ten minutes: press Next stage until Flowers lights up (Day 40, 0.91 g), drag Back in time all the way left, pick Grow light, always on, and press Next stage to Flowers again (2.7 g).

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: name three things that might make one bean plant bigger. List them as variables.	Answer the warm-up on the worksheet.
5 to 12	**Direct instruction (I do)** Model it	Project the app with the starter open. Press Next stage until the Flowers chip lights up (Day 40): 0.91 g on the ledger. Each press stops at the start of a stage, so every run stops on the same day. Drag Back in time all the way left and show how a change there regrows the days after it. Show the light slides. > **It's working when:** Back in time keeps everything before the change and regrows everything after it, so only the one variable differs.	Watch, and fill in the vocabulary on the worksheet.
12 to 22	**Guided practice (We do)** The control and one change	Students open the link or scan the QR code. A short guide runs the control and changes the light to the grow light, always on. > **Watch for:** Students who change two things at once. Ask which one made the difference; they cannot say.	Record the control (south window, 0.91 g) and the grow light run (2.7 g) in the results table.
22 to 38	**Independent practice (You do)** Three more runs	Students choose one variable and test it three ways: light (north, east, outdoors), pot size (outdoors: small 4.0 g, medium 7.6 g, large 12 g) or warmth (16 °C, 21 °C, 26 °C). Walk the room with the What to look for questions. > **If they ask:** "At 16 °C the bean only came up on Day 35. How does that change what you are comparing on Day 40?" Warmth	Fill in the results table and draw a bar graph of dry mass on Day 40.
38 to 45	**Closure** Showcase and exit ticket	Show the Showcase slide. Two students with different variables share their graphs and say how they kept the test fair. Hand out the exit ticket.	Answer the exit ticket.

Before you teach: a ten-minute walkthrough

Open mytekdev.com/try/seedlab?lesson=one-change-at-a-time&ref=tpt-seedlab-4. A short guide opens over the app. A bush bean is planted on a south window at 21 °C, with the ledger open and the helper watering it.

1. **The control.** Press `Next stage` until the Flowers chip lights up. Each press stops at the start of a stage, so it stops on Day 40: 0.91 g on the ledger.

2. **Back in time.** Drag the `Back in time` slider all the way left. Pick `Grow light, always on`: a message says the days after are grown again.
3. **Run it again.** Press `Next stage` to Flowers: Day 40 again, now 2.7 g.
4. **More runs.** Day 40 by light: north window 0.24 g, east window 0.50 g, grow light 16 hours 0.85 g, south window 0.91 g, always on 2.7 g, outdoors 7.6 g. Outdoors by pot: small 4.0 g, medium 7.6 g, large 12 g. On a south window by warmth: 16 °C 0.22 g (up only on Day 35), 21 °C 0.91 g, 26 °C 0.76 g. Pot and soil can only be chosen before planting, so for pot size use Start over and plant again.

> The moment that lands is the north window: the same bean, the same day, nearly the same height, and a quarter of the mass.

Background for the teacher

Light is what a plant makes its food with: more light caught, more sugar, more plant. In dim light a plant makes little sugar: its stem stays thin and its leaves few, even when it is nearly as tall. A small pot holds a plant back: across many studies, doubling the pot gave about 43% more plant. Warmth speeds growth up to a point; warmer nights also burn more of the day's sugar, and at 26 °C the bean in the app ends Day 40 a little smaller than at 21 °C.

Flowering in the app follows warmth, not light, so at the same temperature every light reaches flowers on Day 40, which makes it a fair place to stop. A run at a different warmth reaches it on a different day; compare those on Day 40 by the clock.

Common mistakes: changing two things at once; comparing on different days; reading height as size (on Day 40 the north window plant is 14 cm tall against 16 cm on the south window, with about a quarter of the dry mass). The app grows one model plant, the same way every time, so two students with the same settings get the same numbers. Real plants vary from seed to seed; a real bean in a bag beside the app shows that.

What to look for

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

- What one thing did you change, and what did you keep the same?
- Why compare on the same day?
- The north window plant is almost as tall as the south window plant. Why is its dry mass so much smaller?
- Which variable made the biggest difference?
- How do you know your test was fair?

> The third question is the real test: a student who says height is not the same as how much plant there is has understood dry mass.

Cross-curricular extensions

- Math: how many times bigger is the outdoor bean than the north window bean on Day 40?
- Real plants: grow real beans on two windowsills and measure them for two weeks; are they the same every time?
- English: write a lab report for one variable: question, prediction, method, results, conclusion.
- Careers: find out what a greenhouse grower controls, and why.

Vocabulary

Variable	Anything that can change in a test.
Fair test	A test that changes only one variable, so the result shows what that one variable does.
Control	The run with the usual settings, to compare the others with.
Dry mass	What a plant weighs with all its water dried out.
Environmental factor	Something around a living thing that affects it, like light, water, warmth or space.

Differentiation

ENGLISH LEARNERS

- Keep the vocabulary slide up, and point at the screen as you say each word: the jars, the roots and the stage chips carry the meaning.
- Pair each learner with a partner; the dry mass is one number to copy each run.
- Accept the results table and graph without sentences.

STUDENTS WITH IEPS OR 504 PLANS

- Pair students for the independent part, one at the app and one filling in the table.
- Zoom the browser to 125%.
- Allow two runs instead of three, where the IEP allows a modified assignment.

STUDENTS WHO NEED MORE SUPPORT

- A sentence starter: "When I changed only the ___, the dry mass went from ___ to ___."
- A check-in after the control: every student has 0.91 g before anyone changes anything.
- Give the variable: test the light only.

STUDENTS READY FOR MORE

- Test the warmth: why is 26 °C smaller than 21 °C on Day 40, though the bean came up three days sooner?
- Pick a light and a pot size that together beat 12 g by Day 40. Is that still a fair test?
- Open Puzzles and solve Too deep?.

Adapting for other grades

Younger students: In grades 2 to 5, test one variable as a class: light or no light, water or no water (2-LS2-1 tests one variable at a time). Run it on the projector and compare the plants by eye.

Older students: In high school, add the reasons: light is caught and turned into sugar, a small pot holds a plant back (doubling the pot gives about 43% more plant), and warmth speeds growth up to a point and then costs more in burned sugar.

Student worksheet

Name: _____ Date: _____

Open the app: scan the QR code, or go to mytekdev.com/try/seedlab?lesson=one-change-at-a-time

Essential question: What makes a plant grow bigger, and how do you test it fairly?

Warm-up: Name three things that might make one bean plant bigger than another. _____

1. **Vocabulary.** Variable, fair test, control, dry mass, environmental factor: write each in your own words.

2. **The results table.** The variable I changed: _____. Control: _____, _____ g on Day 40. Run 2: _____, _____ g. Run 3: _____, _____ g. Run 4: _____, _____ g. Draw a bar graph of the four runs.

1. Which variable made the biggest difference? Use your numbers.

2. How did you keep your test fair?

Seed Lab: One Change at a Time

Exit ticket

Name: _____

1. In a fair test you change (A) everything (B) one variable (C) nothing

2. On Day 40 a bean on a north window had 0.24 g of dry mass, and on a south window 0.91 g. The variable was (A) water (B) light (C) the seed

3. On Day 40 the north window plant was almost as tall as the south window plant but had a quarter of the dry mass. Explain how that can be.

Seed Lab: One Change at a Time

Exit ticket

Name: _____

1. In a fair test you change (A) everything (B) one variable (C) nothing

2. On Day 40 a bean on a north window had 0.24 g of dry mass, and on a south window 0.91 g. The variable was (A) water (B) light (C) the seed

3. On Day 40 the north window plant was almost as tall as the south window plant but had a quarter of the dry mass. Explain how that can be.

Answer key: exit ticket

QUESTION	ANSWER	WHY
1	B	Changing one variable shows what that one variable does.
2	B	Only the light changed between the two runs.
3	Thin, with little food made	In dim light the leaves make little sugar, so the stem is thin and the leaves few and small: tall is not the same as heavy. "It got less light" alone is half.

Rubric

Score each row from 1 to 4.

Name: _____

CRITERIA	4 EXCEEDS	3 MEETS	2 APPROACHING	1 BEGINNING
The fair test	Four runs, each changing only one variable from the control, with everything else named as kept the same.	Three runs changing one variable.	Runs that changed more than one thing.	No runs recorded.
Results and graph	A labeled bar graph of dry mass on Day 40 for every run, with units.	A graph of most runs.	A table with no graph.	Nothing recorded.
Explaining it	Names the factor and explains how it changes growth, with numbers from the runs.	Names the factor that mattered most, with numbers.	Names a factor, no numbers.	No answer.

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

Standards

The lesson is built for MS-LS1-5, whose own examples include light and space as factors in growth, with 2-LS2-1's one variable at a time for younger classes.

FRAMEWORK	CODE	GRADES	STANDARD	HOW THE LESSON MEETS IT
NGSS	**MS-LS1-5**	6-8	Construct a scientific explanation based on evidence for how environmental and genetic factors influence the growth of organisms.	Students change light, pot size or warmth one at a time and explain the growth with evidence.

Checked November 2026 against: NGSS MS-LS1-5, From Molecules to Organisms.

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/seed-lab/lessons/one-change-at-a-time/start instead of the worksheet link. Each one gets their own copy of the starter, and the same link reopens it next time.

Terms of use

Thank you for downloading this lesson. The plan, the handouts and the art were made by mytekDev.

You may:

- print and copy it for your students
- change it for your own classes
- post it on your class website or learning management system
- share this file with other teachers, whole and unchanged, with this page included

You may not:

- sell it, or put it in a product you sell
- share a changed copy
- claim it as your own

The app this lesson uses is free and runs in the browser. Students need no account. It is at mytekdev.com.

Questions, or found a mistake? Ask on the Teachers Pay Teachers Q&A for this resource, or write to us at mytekdev.com/contact.

© 2026 mytekDev. All rights reserved.