Classroom notes

The Sleepover Chocolate Disaster · for teachers, librarians and reading-group leaders

At a glance

Grades	1–3 (ages 6–9). Works as a read-aloud from Grade 1; strongest for independent reading at ages 7–9.
Topic	Caffeine and sleep — and the habits of a scientist: observing, asking why, fair tests, honest question marks.
Story	Eight short chapters, about 1,600 words — roughly 18 minutes read aloud.
Back matter	Lumi's Secret Lab Notes (pp. 38–49) · Think Like a Scientist (pp. 50–51) · Lumi's Word Lab, 20 words (pp. 52–63) · Jiwoo's "Prove It" Tracker (pp. 64–69) · For the Grown-Up Lab Partner (pp. 70–72)

Big ideas

- Bodies respond to what we eat and drink — and responses differ from person to person.
- When can matter as much as what: the same cake at noon and at 9:47 p.m. can make two very different nights.
- Caffeine doesn't make you need less sleep. It blocks the message that says you do.
- Scientists observe before they decide. A question mark is honest data.
- A fair test changes one thing at a time.
- Some lessons aren't about bodies: sometimes a snack belongs to someone else.

How this book handles food — please keep it this way in class

- No food is called good or bad, and there are no caffeine charts or bedtime rules. Please keep it that way in class.
- No one's body is discussed. Keep comments on feelings and what bodies do, not on size or weight.
- Don't collect, display or grade students' records — bedtimes included. The tracker belongs to the child and stays at home.
- Plan activities without food or drink, and don't use sweets as rewards during the unit.
- Praise "I don't know" and the question mark. Let a wrong reason stand for a minute; ask one question instead of correcting it.

Sensitivity notes

Sleep at home. Students' nights differ for reasons that have nothing to do with chocolate: shared rooms, new babies, noise, family work hours. Don't ask students to report their bedtimes or sleep in class — the data activity uses Jiwoo's made-up week instead. If a student says they have trouble sleeping most nights, mention it privately to their family, as you would any health concern.

Medicines and health conditions. Some students take medicine that affects sleep or alertness, or live with a heart or other condition. Follow the family's and care team's lead, and don't ask a student to explain their health to the class.

Coffee, tea and energy drinks at home. Coffee and tea are part of many families' days and cultures. The book doesn't judge them, and the lesson shouldn't either. If energy drinks come up, use the book's own words: "Energy drinks have the most; doctors say kids skip them."

Taking food without asking. Jiwoo's second lesson is about a cake that belonged to someone else. Some children have been blamed for taking food, and some take food because they are hungry. Keep the talk on

Jiwoo and the story, not on anyone in the room — and keep every activity food-free.

Body talk. If a student comments on someone's body, redirect to what bodies do: "In this book we're scientists of how bodies feel and work."

Three short lessons

Lesson 1 · Read & Notice *40 min*

5 min	Cover prediction: "What could go wrong at a sleepover?" Record predictions on the board.
15 min	Read aloud. Stop after Chapter 4 (predict), Chapter 6 (what is the Sleepiness Chair?) and Chapter 8 (Jiwoo's two lessons).
10 min	Talk: choose two or three discussion questions.
7 min	Introduce Think Like a Scientist (p. 50): Notice · Wonder · Test · Report.
3 min	Exit ticket: one thing I noticed, one thing I wonder.

Lesson 2 · Model It *40 min*

10 min	Re-read Lab Notes 2–5 (pp. 42–45): the pile, the chair, the factory, the clock.
20 min	Activity: the Sleepiness Chair Game (active) or Draw the Sleepiness Pile (seated).
10 min	Debrief: "The chair BLOCKS a message. The factory sends its message LATE." Say it in your own words. Vocabulary: adenosine, receptor, block, melatonin.

Lesson 3 · Test It *40 min*

15 min	Activity: Four Things, One Night (card sort).
15 min	Data detectives: analyse Jiwoo's filled-in week (pp. 67–68) with the questions below.
10 min	Write a fair test on paper. Optional: send home the blank tracker with the family letter.

Data detectives — Jiwoo's week (pages 67–68)

Jiwoo's week (pages 67–68) is made-up data, which makes it safe to analyse together — no student shares their own food or bedtime. Ask the questions in order; teacher notes on the right.

Question	Teacher note
On how many days did Jiwoo write something down?	Five — Days 3 and 7 are blank. A blank day is not a failed day (p. 69).
Which two entries are question marks — results she couldn't call?	Day 4 ("UNCLEAR. Recording anyway.") and Day 5 ("Leaving a big fat ? here."). Day 1 has a ??? too — she never found out what time she fell asleep. Good catch if a student spots it.
At the end of the week, Jiwoo writes that it's not "chocolate = no sleep." What does she think it is instead?	"a LOT of caffeine RIGHT BEFORE BED = no sleep." Her 1 PM cupcake did nothing (p. 68).
On Day 2 Jiwoo had a cupcake at 1:00 PM and was out by 9. She wonders if it "really is the timing." What else was different about Day 2?	She had hardly slept the night before — she was still awake after Theo fell asleep at 2:00. And the page never says the cupcake had cocoa in it. More than one thing changed, so Day 2 can't prove the timing on its own. It's still a clue worth testing.

On Day 6, hot chocolate right before bed "took FOREVER." Does that fit Jiwoo's rule — "a LOT of caffeine RIGHT BEFORE BED"?	Not exactly: one hot chocolate is less than Day 1's three chocolate things. Maybe the clock matters more than the amount; maybe something else was going on at Grandma's. That's the next test — change one thing.
On Day 4, Jiwoo wondered if she was just "replaying the pizza." Why is it smart to write down a second explanation?	A scientist records every possible explanation, then tests one at a time.
What would Jiwoo need to do to be more sure?	More nights, and change one thing at a time while keeping the rest the same — like Lumi's list on page 47.

Science background for teachers

Sleepiness builds up while we're awake. The body keeps track of how long we have been awake, and the drive to sleep "gets stronger every hour you are awake". Adenosine is one of the chemical signals involved: in animal studies it rises during long stretches awake and falls during sleep. This is Lumi's "sleepiness pile." Only sleep shrinks it, so after a short night some is left over, which is why Jiwoo wakes up feeling like a soft wet pillow.

Caffeine takes the chair; it doesn't empty the pile. Caffeine fits the same receptors as adenosine without switching them on, so the "time to rest" message gets through less well. Receptors work like locks, but a look-alike key can sometimes fit, which is how blocking drugs work. Caffeine hides sleepiness for a while, but it is not a substitute for sleep.

Melatonin is a second, separate system. The pineal gland, a tiny pinecone-shaped gland in the brain, releases melatonin in the evening and at night, more in darkness and less in light. Room light before bed delays melatonin in adults, and children's melatonin is even more sensitive to light. In one small study of adults, a strong evening dose of caffeine also shifted the melatonin rhythm later. Light and caffeine make the signal come late or weaker; neither switches the gland off.

Chocolate has a little caffeine and more theobromine. Cocoa contains a small amount of caffeine and much more theobromine, a related substance; dark chocolate and cocoa have more of both than milk chocolate. Even so, chocolate and cocoa drinks are the main caffeine source for young children in many countries, simply because children have them more often than coffee or cola. Whether a dessert-sized amount changes a particular child's sleep has not been tested.

Amount, timing and the person all matter. Caffeine takes hours to clear, and people differ widely in how fast they clear it and how strongly they feel it, partly because of their genes. Children clear it at least as fast as adults; the concern is that their bodies are smaller and may be more sensitive. In a home sleep study, a large adult dose taken six hours before bed still shortened sleep, and the sleepers didn't notice. A survey of children aged 8–12 linked more caffeine with more restless sleep and morning tiredness, but it cannot show cause. In a controlled study, caffeine slightly slowed children's heart rates on average while nudging blood pressure up, so a racing heart at a sleepover may owe as much to excitement as to chocolate.

What pediatric guidance says, and where the book fits. The American Academy of Pediatrics says avoiding caffeine is the best choice for all kids, and that energy drinks have no place in children's diets. A 2025 expert panel that included the AAP recommends that children and teens avoid drinks with caffeine. Insomnia means poor sleep that keeps happening over weeks or longer, not one bad night, and trouble sleeping is common in children. The book's "notice, don't label" approach fits AAP advice against dieting and weight talk. A calm, dim wind-down and limiting caffeine from the afternoon on are standard pediatric sleep tips.

Standards connections

Short descriptions in our own words — check the official documents for exact wording. An honest note first: in U.S. science standards, the body's inner organs first appear in Grade 4 and energy from food in Grade 5. At Grades 1–3, this book supports the practices of science rather than a body or nutrition standard.

Science practices (Grades K–2 and 3–5)

Practice	What it looks like	Where it shows up
Asking questions	Ask questions you can test — in Grades 3–5, ask what would happen if one thing changed.	Four Things, One Night
Using models	Use a model to show how something works — and notice how the model differs from the real thing.	Sleepiness Chair Game · Draw the Sleepiness Pile
Fair tests	Plan a fair test that changes one thing at a time.	Four Things · My Case Report
Working with data	Record observations, look for patterns and compare them with predictions.	Data detectives · trackers
Explaining with evidence	Build an explanation from what you observed.	Discussion · Label Detective
Cause and effect	Things that happen together are not always cause and effect.	Four Things, One Night · Data detectives
Systems	The parts of a system work together.	Sleepiness Chair Game

Common Core State Standards — English Language Arts

Code	In short	Where it shows up
RL.1.3 · RL.2.3 · RL.3.3	Describe characters, how they respond to events, and how their actions move the story.	Read-aloud and discussion
RL.2.7 · RL.3.7	Use the pictures to understand characters, setting and plot — and what the art adds to the words.	Read-aloud picture walk
RI.2.3 · RI.3.3	Describe how scientific ideas connect, using sequence and cause-and-effect language.	Lab Notes · Sleepiness Pile · Sleepiness Chair Game
RI.2.4 · RI.3.4 · L.2.4 · L.3.4	Work out the meaning of subject words and phrases.	Word Lab Workout
SL.1.1 · SL.2.1 · SL.3.1	Take part in conversations about texts with partners and groups.	Discussion · Four Things · Label Detective

Codes refer to the Common Core State Standards for English Language Arts. © Copyright 2010. National Governors Association Center for Best Practices and Council of Chief State School Officers. All rights reserved.

Health education skills

Skill	What it looks like	Where it shows up
Influences	Notice what influences health choices — including media and labels.	Label Detective · Discussion
Checking claims	Ask whether health information and product claims can be trusted.	Label Detective · Discussion
Asking for help	Say how you feel, and know when to tell a trusted adult.	Discussion · trackers
Decisions	Compare options, then reflect on how a choice turned out.	Discussion · Data detectives

IB Primary Years Programme

Theme	Why it fits	Where it shows up
Who we are	An inquiry into the nature of the self, including physical and mental health.	The whole unit

Vocabulary — Lumi's Word Lab

Words for every case: case study · subject · data · observe · hypothesis · experiment

Words from this case: caffeine · stimulant · cocoa / cacao · milligram · sleepiness signal · adenosine · receptor · block · melatonin · insomnia · sensitivity · timing · habit · wind-down

When a student says...

"So chocolate keeps you awake."	"What was different about that night?" (the book's own question, p. 70)
"I don't know when I fell asleep."	"Good — you wrote down what you actually knew. That's the whole job."
"So I should never eat chocolate at night?"	Lumi's answer, p. 34: "That's not what I said." "I said your body has rules. You get to learn what yours are."
"Can we test it in class?"	Not with food or drinks. We test on paper here; at home, it's the family's choice, one week only.
"My brother drinks energy drinks."	No judgement of the brother. The book's own words: "Energy drinks have the most; doctors say kids skip them." Then move on gently.
"I can never fall asleep."	"Thanks for telling me." Don't probe in front of the class; mention it privately to the family or the school nurse.

Family letter

Copy onto school letterhead, or print the one-page version from the hub.

Dear families,

This week our class read The Sleepover Chocolate Disaster, a story about a sleepover, a secret chocolate cake and a very long night — and a girl who learns to observe her own body like a scientist.

Your child may bring home a one-week Wide-Awake Experiment. It is optional and private: nothing is collected, checked or graded. It asks your child to notice when they have something that might contain caffeine, at what time, and when they finally fell asleep — and it treats a question mark as a real result.

If you'd like to help: ask, don't check. Praise the question mark. Don't say the finding first. And stop after one week.

The book never calls a food good or bad and includes no milligram charts or bedtime rules; we're keeping it that way. If you have questions about your child's sleep or health, please talk with your pediatrician.

More for families: lumisnutritionlab.com

References

Every source behind the science in this book — what each one supports, and who was studied. Most of the research is in adults; we say so under each one. Nothing here is medical advice.

1. Zoumas BL, Kreiser WR, Martin RA. Theobromine and caffeine content of chocolate products. J Food Sci. 1980;45(2):314-316. doi:10.1111/j.1365-2621.1980.tb02603.x. doi.org/10.1111/j.1365-2621.1980.tb02603.x
   Supports "cocoa carries a little caffeine": cocoa and plain chocolate have more caffeine than milk chocolate, and all of them have much more theobromine, a related substance. Laboratory tests of foods.
2. US Department of Agriculture, Agricultural Research Service. Caffeine: abridged list ordered by nutrient content in household measure. USDA National Nutrient Database for Standard Reference Legacy (2018). National Agricultural Library. Accessed November 4, 2026. www.nal.usda.gov/sites/default/files/page-files/Caffeine.pdf
   Supports typical caffeine amounts in chocolate foods and "dark has more." It also shows that chocolate-covered coffee beans are very high in caffeine. Food composition data.
3. European Food Safety Authority. Caffeine. EFSA explains risk assessment. EFSA; 2015. Accessed November 4, 2026. www.efsa.europa.eu/sites/default/files/corporate_publications/files/efsaexplainscaffeine150527.pdf
   Supports the facts that chocolate and cocoa drinks are young children's main caffeine source in most countries surveyed, that caffeine takes hours to clear, and that children clear it at least as fast as adults. Expert safety review.
4. Spilling the beans: how much caffeine is too much? US Food and Drug Administration. Updated August 28, 2024. Accessed November 4, 2026. www.fda.gov/consumers/consumer-updates/spilling-beans-how-much-caffeine-too-much
   Supports the tracker's list of where caffeine hides (soft drinks, tea, ice cream, energy drinks), the point that people differ widely in how caffeine affects them, and experts' advice that kids skip energy drinks.
5. Cacao. Encyclopaedia Britannica. Accessed November 4, 2026. www.britannica.com/summary/cacao
   Supports the Word Lab entry: cacao is a tropical tree whose pods hold the beans used to make cocoa and chocolate.
6. Martínez-Pinilla E, Oñatibia-Astibia A, Franco R. The relevance of theobromine for the beneficial effects of cocoa consumption. Front Pharmacol. 2015;6. doi:10.3389/fphar.2015.00030. doi.org/10.3389/fphar.2015.00030
   Background for teachers: cocoa has much more theobromine than caffeine, and these authors argue its caffeine is probably too little to act on the brain. Opinion article, not a study.
7. Brain basics: understanding sleep. National Institute of Neurological Disorders and Stroke. Reviewed February 25, 2025. Accessed November 4, 2026. www.ninds.nih.gov/health-information/public-education/brain-basics/brain-basics-understanding-sleep
   Supports the sleepiness pile (the drive to sleep grows every hour you are awake), adenosine helping make you sleepy, caffeine blocking adenosine, and melatonin rising when it gets dark.
8. Porkka-Heiskanen T, Strecker RE, Thakkar M, Bjørkum AA, Greene RW, McCarley RW. Adenosine: a mediator of the sleep-inducing effects of prolonged wakefulness. Science. 1997;276(5316):1265-1268. doi:10.1126/science.276.5316.1265. doi.org/10.1126/science.276.5316.1265
   Supports the idea that adenosine builds up during long stretches awake and goes down during sleep. Study in cats.
9. Reichert CF, Deboer T, Landolt HP. Adenosine, caffeine, and sleep–wake regulation: state of the science and perspectives. J Sleep Res. 2022;31(4):e13597. doi:10.1111/jsr.13597. doi.org/10.1111/jsr.13597
   Supports adenosine as one of the body's own sleep signals and caffeine as a blocker of its receptors. Review of human and animal research.
10. Spielman RM, Dumper K, Jenkins W, Lacombe A, Lovett M, Perlmutter M. Cells of the nervous system. In: Psychology. OpenStax; 2014: section 3.2. Accessed November 4, 2026. openstax.org/books/psychology/pages/3-2-cells-of-the-nervous-system
    A free textbook. Supports the lock-and-key idea of receptors and explains how a blocker can sit in a receptor without switching it on, which is how caffeine takes adenosine's chair.
11. Melatonin: what you need to know. National Center for Complementary and Integrative Health. Updated May 2024. Accessed November 4, 2026. www.nccih.nih.gov/health/melatonin-what-you-need-to-know
    Supports the facts that the brain makes melatonin in response to darkness and that melatonin helps time sleep.
12. Betts JG, Young KA, Wise JA, et al. The pineal gland. In: Anatomy and Physiology. 2nd ed. OpenStax; 2022: section 17.7. Accessed November 4, 2026. openstax.org/books/anatomy-and-physiology-2e/pages/17-7-the-pineal-gland
    A free textbook. Supports the facts that the pineal gland makes melatonin and that the amount depends on how much light there is.
13. Pineal gland: what it is, function & disorders. Cleveland Clinic. Updated June 22, 2022. Accessed November 4, 2026. my.clevelandclinic.org/health/articles/23334-pineal-gland

Supports Lumi's aside: the melatonin "factory" is a tiny pinecone-shaped gland, less than a centimetre long, that makes the most melatonin in the dark.

14. Gooley JJ, Chamberlain K, Smith KA, et al. Exposure to room light before bedtime suppresses melatonin onset and shortens melatonin duration in humans. J Clin Endocrinol Metab. 2011;96(3):E463-E472. doi:10.1210/jc.2010-2098. doi.org/10.1210/jc.2010-2098
Supports "bright lights can make it start late": ordinary room light before bed made melatonin start later in almost everyone. 116 adults aged 18–30.

15. Higuchi S, Nagafuchi Y, Lee SI, Harada T. Influence of light at night on melatonin suppression in children. J Clin Endocrinol Metab. 2014;99(9):3298-3303. doi:10.1210/jc.2014-1629. doi.org/10.1210/jc.2014-1629
Supports the point that children's melatonin is even more sensitive to evening light than adults'. 33 primary-school children (average age 9) and 29 adults.

16. Burke TM, Markwald RR, McHill AW, et al. Effects of caffeine on the human circadian clock in vivo and in vitro. Sci Transl Med. 2015;7(305). doi:10.1126/scitranslmed.aac5125. doi.org/10.1126/scitranslmed.aac5125
Supports "so can caffeine": a double-espresso-sized dose three hours before bed shifted the melatonin rhythm later. 5 adults, given far more caffeine than a chocolate dessert holds.

17. Drake C, Roehrs T, Shambroom J, Roth T. Caffeine effects on sleep taken 0, 3, or 6 hours before going to bed. J Clin Sleep Med. 2013;9(11):1195-1200. doi:10.5664/jcsm.3170. doi.org/10.5664/jcsm.3170
The study cited on the grown-up page: a large dose of caffeine (400 mg) taken six hours before bed still shortened sleep. 12 healthy adults.

18. Late afternoon and early evening caffeine can disrupt sleep. Sleep Education. American Academy of Sleep Medicine. Published November 15, 2013. Accessed November 4, 2026. sleepeducation.org/late-afternoon-and-early-evening-caffeine-can-disrupt-sleep/
A plain-language summary of the same study: sleep was cut by more than an hour, and the sleepers didn't notice.

19. Nehlig A. Interindividual differences in caffeine metabolism and factors driving caffeine consumption. Pharmacol Rev. 2018;70(2):384-411. doi:10.1124/pr.117.014407. doi.org/10.1124/pr.117.014407
Supports "different isn't wrong": genes, age, sex and other factors change how fast people clear caffeine and how it affects their sleep. Review, mostly of adult studies.

20. Temple JL, Ziegler AM, Graczyk A, Bendlin A, Sion T, Vattana K. Cardiovascular responses to caffeine by gender and pubertal stage. Pediatrics. 2014;134(1):e112-e119. doi:10.1542/peds.2013-3962. doi.org/10.1542/peds.2013-3962
Shows that children's bodies respond in their own ways: caffeine raised blood pressure and slightly slowed heart rate on average, and boys and girls responded differently after puberty. 101 children aged 8–9 and 15–17.

21. Watson EJ, Banks S, Coates AM, Kohler MJ. The relationship between caffeine, sleep, and behavior in children. J Clin Sleep Med. 2017;13(4):533-543. doi:10.5664/jcsm.6536. doi.org/10.5664/jcsm.6536
Supports a link between caffeine and children's sleep: children who had more caffeine reported more restless sleep and morning tiredness. Survey of 309 children aged 8–12; it shows a link, not a cause.

22. Corkins M. The effects of caffeine on kids: a parent's guide. HealthyChildren.org. American Academy of Pediatrics. Updated August 11, 2025. Accessed November 4, 2026. healthychildren.org/English/healthy-living/nutrition/Pages/the-effects-of-caffeine-on-kids-a-parents-guide.aspx
Supports AAP advice that avoiding caffeine is best for all kids, and the points that children may be more sensitive to it, that it affects kids' sleep and can last for hours, and that chocolate and ice cream can contain it.

23. Committee on Nutrition and the Council on Sports Medicine and Fitness. Sports drinks and energy drinks for children and adolescents: are they appropriate? Pediatrics. 2011;127(6):1182-1189. doi:10.1542/peds.2011-0965. doi.org/10.1542/peds.2011-0965
Supports "doctors say kids skip them": the American Academy of Pediatrics says the caffeine and other stimulants in energy drinks have no place in children's diets.

24. Healthy Eating Research. Healthy beverage consumption in school-age children and adolescents: recommendations from key national health and nutrition organizations. January 2025. Accessed November 4, 2026. healthyeatingresearch.org/research/healthy-beverage-consumption-in-school-age-children-and-adolescents/
Supports current advice from an expert panel that included the American Academy of Pediatrics: drinks with caffeine are not recommended for children and teens aged 5–18.

25. Golden NH, Schneider M, Wood C; Committee on Nutrition; Committee on Adolescence; Section on Obesity. Preventing obesity and eating disorders in adolescents. Pediatrics. 2016;138(3):e20161649. doi:10.1542/peds.2016-1649. doi.org/10.1542/peds.2016-1649

Supports the book's approach of no dieting and no weight talk. Guidance from the American Academy of Pediatrics, written about teenagers.

26. Insomnia: what is insomnia? National Heart, Lung, and Blood Institute. Updated March 24, 2022. Accessed November 4, 2026. www.nhlbi.nih.gov/health/insomnia
Supports "insomnia is a pattern, not one bad night."

27. Calhoun SL, Fernandez-Mendoza J, Vgontzas AN, Liao D, Bixler EO. Prevalence of insomnia symptoms in a general population sample of young children and preadolescents: gender effects. Sleep Med. 2014;15(1):91-95. doi:10.1016/j.sleep.2013.08.787. doi.org/10.1016/j.sleep.2013.08.787
Shows that trouble falling or staying asleep is common in children, not rare. 700 children aged 5–12.

28. American Academy of Sleep Medicine. New study in the journal SLEEP finds more reports of children having trouble falling asleep than maintaining sleep [news release]. October 1, 2007. Accessed November 4, 2026. aasm.org/new-study-in-the-journal-sleep-finds-more-reports-of-children-having-trouble-falling-asleep-than-maintaining-sleep/
Supports the same point: sleep problems are frequent in children and often last. 832 children followed for two years.

29. SickKids staff. Sleep tips: how to help your child get a good night's sleep. AboutKidsHealth. The Hospital for Sick Children. Updated August 28, 2024. Accessed November 4, 2026. www.aboutkidshealth.ca/sleep-tips-how-to-help-your-child-get-a-good-nights-sleep
Supports the wind-down entry: quiet time before bed, dim lights, screens off, and limiting caffeine (including chocolate) from the afternoon on. Advice for children.

30. American Academy of Sleep Medicine. How to sleep better [handout]. 2014. Accessed November 4, 2026. aasm.org/wp-content/uploads/2020/04/How-to-Sleep-Better_8-17.pdf
Supports turning screens off before bed and sleeping in a dark, quiet room. Advice for adults.

31. Gardner B, Lally P, Wardle J. Making health habitual: the psychology of 'habit-formation' and general practice. Br J Gen Pract. 2012;62(605):664-666. doi:10.3399/bjgp12X659466. doi.org/10.3399/bjgp12X659466
Supports the habit entry: habits are actions repeated in the same situation until they happen automatically.

32. Merriam-Webster.com Dictionary. Entries: case study; data; observe; subject. Merriam-Webster. Accessed November 4, 2026. https://www.merriam-webster.com/dictionary/case-study https://www.merriam-webster.com/dictionary/data https://www.merriam-webster.com/dictionary/observe www.merriam-webster.com/dictionary/subject
Supports the Word Lab definitions of case study, data, observe and subject.

33. Experiment (noun). Oxford Learner's Dictionaries. Oxford University Press. Accessed November 4, 2026. www.oxfordlearnersdictionaries.com/definition/english/experiment_1
Supports the Word Lab definition of experiment.

34. Hypothesis. EPICC Virtual Field Experiences glossary. University of California Museum of Paleontology; 2025. Accessed November 4, 2026. epiccvfe.berkeley.edu/glossary/hypothesis
Supports a more precise definition of hypothesis: a proposed explanation based on what you already know.

35. SI prefixes. The NIST Reference on Constants, Units, and Uncertainty. National Institute of Standards and Technology. Archived September 16, 2008. Accessed November 4, 2026. webarchive.library.unt.edu/eot2008/20080916082030/http:/physics.nist.gov/cuu/Units/prefixes.html
Supports the milligram entry: "milli" means one-thousandth, so a thousand milligrams make a gram.