CLASSROOM KIT · PROJECT 1: SIBLING INTERVIEWS

# Lesson 1.0
# Collecting Interviews

Population, sample and estimate, with a real interview project.
Grades 6–12 · Statistics and data science

FREE

- ✓ Teacher lesson plan with timed video pause points
- ✓ Student interview handout (prints in black and white)
- ✓ Eight-item quiz
- ✓ Answer guide with reasoning and partial credit

# How to Use This Kit

This is the classroom kit for **Lesson 1.0 of Project 1: Sibling Interviews**, the first lesson of Learn With Numbers' free, project-based statistics and data science course for grades 6–12. The lesson video is free on YouTube: https://youtu.be/syhLboRMhB0

In Project 1, students interview 15 to 20 people, turn their notebooks into a real dataset in Google Sheets, and learn to describe and analyze it. Lesson 1.0 is the planning lesson: no computers, just the ideas of population, sample and estimate, and a careful look at the interview questions before anyone collects data.

## What's inside

| Page | For | What it is |
|---|---|---|
| Lesson plan | Teacher | A timed run of show with pause points in the video, discussion prompts, common misconceptions, and what to do when things go sideways |
| Field task | Student | The interview handout: rules, a table where students spot problems in the interview questions and agree on wording, and three reflection questions |
| Quiz | Student | Eight items: recall, applying the ideas to a new example, and two short written explanations |
| Answer guide | Teacher | Answers with reasoning, common wrong answers, and partial-credit notes |

The student pages print in black and white. The answer guide is at the back, so you can print the student pages without it.

## How the rest of the project works

The next lessons are free on YouTube too. In Lesson 1.1, students turn their notebooks into a spreadsheet; in Lesson 1.2, they learn the names for every part of a dataset; in Lesson 1.3, they make their first charts. Kits for those lessons are part of the full Project 1 classroom kit: https://www.learnwithnumbers.com/classroom-kit

## Terms of use

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# Lesson 1.0 Lesson Plan: Collecting Interviews

## At a glance

| | |
|---|---|
| **Project** | Project 1: Sibling Interviews |
| **Lesson** | 1.0, Collecting Interviews (the planning lesson) |
| **Video** | "Foundations of All Statistics: Population, Sample, Estimate," 9 min 37 s, https://youtu.be/syhLboRMhB0 |
| **Class time** | One 45–55 minute period, plus about a week of interviews as homework |
| **Grade band** | Grades 6–12 (no math beyond 6th grade needed) |
| **Devices** | One screen to project the video. Students need no device today. |
| **Materials** | The field task handout (one per student), a paper notebook per student, the quiz (optional, next class) |
| **Motto of the day** | "To judge a soup, you only need a spoonful." |

## Objectives

By the end of the lesson, students will be able to:

1. Explain the difference between a population and a sample, and name both for a question of their own.
2. Describe an estimate as an educated guess about a population, made from a sample.
3. Give at least one reason, besides size, that we study a sample instead of the whole population (the future hasn't happened yet, testing destroys the thing, or most of the population is gone).
4. Spot an ambiguous interview question and rewrite it so everyone answers the same thing.
5. Explain why we keep respondents anonymous.

## Concepts introduced

From the video: **population**, **sample**, **estimate** (and the process that connects them, **statistical inference**). Also named in passing: **structured interview** and **survey**.

## Concepts revisited

None yet. This is the first lesson of the first project. The soup analogy returns throughout the course, so it is worth making sure every student can retell it.

## Run of show

| Time | What happens | Notes |
|---|---|---|
| 0–5 min | **Warm-up question on the board:** "Your school cafeteria wants to know whether students like the new lunch menu. Should they ask every student?" Take three or four answers. Don't resolve it yet. | You'll return to this at the end. |
| 5–8 min | **Play the video to 1:55** (the motto, the Stardew Valley Luau, the soup as population, the spoonful as sample, the governor's verdict as estimate). | If students don't know the game, the video explains it. |
| 8–12 min | **Pause at 1:55.** Ask: "In the Luau, what is the population? The sample? The estimate?" Then: "What would make the governor's spoonful a bad guide to the whole pot?" | Good answers mention mixing or stirring. Don't name bias yet; the video does it next. |
| 12–15 min | **Play 1:55 to 3:20** (chunky soup, oil on top, unstirred soup; then the school example and "can't we just measure everyone?"). | |
| 15–17 min | **Pause at 3:20**, where the video asks whether we still need statistics now that we can collect so much data. Let students vote yes or no before the answer. | The vote makes the next section land. |
| 17–21 min | **Play 3:20 to 5:40** (weather forecasts, destructive testing of phones and fireworks, T. rex fossils). | |
| 21–26 min | **Pause at 5:40. Small groups (3–4):** each group invents one more example where you *have* to use a sample, and says which of the video's reasons it fits. Share two or three. | See the discussion prompts below. |
| 26–30 min | **Play 5:40 to 7:10** (structured interviews vs surveys, anonymity, the interview questions). | |
| 30–40 min | **Pause at 7:10 (the video tells you to pause here).** Hand out the field task. In pairs, students look for problems with each interview question and write them in the "Problems we spotted" column before the video reveals them. | This is the most important ten minutes of the lesson. Let them find the problems themselves; see "What students should find" below. Don't read the list out. |
| 40–43 min | **Play 7:10 to the end** (the video's list of problems and fixes, the assignment). | Compare the class's list with the video's. |
| 43–50 min | **Class decisions.** Agree, as a class, on the exact wording of every question (including whether siblings include the person answering) and on the color list. Students write the final versions on the handout. | If the whole class uses the same wording, you can pool everyone's interviews later. |

| Time | What happens | Notes |
|---|---|---|
| Last 2 min | **Return to the warm-up.** "Should the cafeteria ask everyone?" Now students can answer with population, sample and estimate. | Exit ticket option: quiz question 6. |

## Discussion prompts

1. **"In the Luau, what is the population, the sample and the estimate?"** A good answer: the pot of soup is the population, the governor's spoonful is the sample, and his verdict on the whole soup is the estimate.
2. **"What would make one spoonful a bad guide to the whole pot?"** A good answer names something about the soup, not the spoon: it wasn't stirred, the oil floated to the top, it has big chunks. This is the intuition behind bias and stratified sampling, which come later; the names aren't needed today.
3. **"If we can collect data on almost everyone, do we still need samples?"** A good answer gives one of the video's reasons: part of the population is in the future (weather), measuring destroys it (phone water tests, fireworks), or most of it is gone (T. rex). Strong answers notice that the video says the population is "fundamentally impossible to observe," not merely large.
4. **"Is 'How many siblings do I have?' a statistical question? What about 'How many siblings do students in our school have?'"** A good answer: the first has one answer; the second expects many different answers, and the variety is what we study. (This mirrors Common Core 6.SP.1, which uses the example "How old am I?" versus "How old are the students in my school?")
5. **"Why use nicknames instead of real names?"** A good answer is about respect: people are sharing information about their families with us, and the dataset may be shared with the class. Point out that a real name is never a variable we analyze, so we lose nothing.

## What students should find at the 7:10 pause

For you, not for the handout. These are the problems the video reveals after the pause. If a pair is stuck, ask a question ("Would you count yourself?") rather than giving the answer.

- **Siblings:** some people count themselves, some don't.
- **First cousins:** should the person's own siblings be counted as cousins? (The video's fix: no, not including siblings or the person themselves.)
- **Sleep:** people sleep different hours on weekdays and weekends. Which one are we asking about?
- **Hometown:** a town, a state or a country? It depends on who you're interviewing.
- **Favorite color:** people give very specific colors ("teal," "sky blue"). The video limits answers to red, orange, yellow, green, blue, purple, black and white.
- **Nickname:** a real name slips in. That breaks the anonymity rule.
- **Their own question:** will everyone understand it the same way?

Students often spot others too (half-siblings, step-siblings, a pet that died last year). Every one of them counts.

## Don't hand out a recording layout

The handout deliberately doesn't tell students how to lay out their notebook pages. In Lesson 1.1, students work out for themselves how to organize the answers so nothing gets lost, and that discovery only works if they haven't been given a table. Some will write one page per person, some a list per question, some something messier. That variety is exactly what makes Lesson 1.1 interesting: compare a few notebooks at the start of 1.1 and ask which layout made the answers easiest to find again. If a student asks how to set up the page, answer with a question: "How will you know, next week, which answers belong to which person?"

## Common misconceptions

- **"A sample is just a smaller population."** A sample is the part we actually observe *in order to learn about* the population. Ask: "What is this sample a sample *of*?"
- **"Bigger samples always fix everything."** The oil-on-top soup shows that one large spoonful from the surface is still misleading. How we pick matters as much as how many.
- **"An estimate is a guess, so any guess will do."** An estimate is an *educated* guess that comes from data and a method someone else could repeat.
- **"Our 20 interviews tell us about everyone."** They tell us about the 20 people we asked, and possibly about a larger group, depending on who those 20 are. Students should get used to saying "in my sample."

## When it goes sideways

- **Students can't find 15 people.** Allow interviews with family members over the phone, neighbors, people at a club or team, or another class. Fewer interviews still work for the next lesson; ten is plenty to learn from.
- **Students want to interview only their friends.** Let them, then ask in Lesson 1.1 who their sample represents. A sample of friends is a perfect example of the unstirred soup.
- **A respondent doesn't want to answer a question.** That's their right. Students write "skipped" and move on. A missing answer is real data too, and Lesson 1.1 deals with it.
- **The class can't agree on a question's wording.** Take a vote and record the decision. The point is that everyone asks the *same* question, not that the question is perfect.
- **Online-only class or homeschool of one.** The interviews can happen by phone or video call. A single student can pool data with siblings, a co-op, or the course survey linked in the video description.

## Field task assigned

Interview 15 to 20 people with the class's agreed questions, and write the answers in a paper notebook, using nicknames or numbers instead of real names. See the field task handout in this kit. Answers are needed for Lesson 1.1, where students turn the notebook into a spreadsheet.

## Standards connections

These connections are to standards text we have checked word for word. They describe what the lesson touches, not full coverage of any standard.

- **CCSS-M 6.SP.A.1:** "Recognize a statistical question as one that anticipates variability in the data related to the question and accounts for it in the answers."

- **CCSS-M 7.SP.A.1:** "Understand that statistics can be used to gain information about a population by examining a sample of the population; generalizations about a population from a sample are valid only if the sample is representative of that population. …"
- **GAISE II (ASA/NCTM, 2020):** the first two steps of the statistical problem-solving process, formulating a statistical investigative question and collecting or considering data.

# Lesson 1.0 Field Task: Collect Your Interviews

**Name:** _____ **Due:** _____

**You will need:** a paper notebook, a pen, and 15 to 20 people willing to answer a few short questions.

## Your task

You are going to be a data collector. Interview **15 to 20 people** and write their answers in your notebook. They can be classmates, family, friends, neighbors, or anyone else you can reach. Interviews are short, usually two or three minutes.

We are doing a **structured interview**: you ask every person the same questions, in the same words. That way, when we put all the answers together, we are comparing like with like.

## The rules

1. **Keep every person anonymous.** Write a nickname or a number, never a real name. The person can choose their own nickname if they like.
2. **Keep a note of who is who** (privately, not in the notebook you share) in case you need to ask someone a follow-up question later.
3. **Anyone can skip a question.** If they do, write "skipped" and move on.
4. **Ask the questions exactly as your class agreed** below, so everyone's data can be compared.

## Before you start: check the questions

When the video asks you to pause, read each question carefully. Could two honest people understand it in different ways and give answers that can't be compared? Write down any problem you spot. Then, with your class, agree on the exact wording you will all use.

| # | Question | Problems we spotted | Our class's exact wording |
|---|---|---|---|
| 1 | Nickname | | |
| 2 | Birth year | | |
| 3 | How many siblings do you have? | | |
| 4 | How many first cousins do you have? | | |
| 5 | How many hours do you sleep a day? | | |
| 6 | Do you have a pet? | | |
| 7 | If yes, what species? | | |
| 8 | What is your hometown? | | |

| # | Question | Problems we spotted | Our class's exact wording |
|---|---|---|---|
| 9 | What is your favorite color? | | |
| 10 | My own question: | | |

## Write down your interviews

Write each person's answers in your notebook. How you lay out the page is up to you. Just make sure that, a week from now, you can still tell which answers belong to which person.

## Think about it (answer after your interviews)

**1. Population and sample.** Who are the people you interviewed? What bigger group might they tell us something about?

The sample is: _____

The population could be: _____

**2. The soup.** Is your sample "well stirred"? Name one group of people who are probably *not* in your sample.

_____

**3. One surprise.** Write one thing that surprised you while collecting the answers. (A question people found confusing counts.)

_____

## What to hand in

Bring your notebook to the next lesson. In Lesson 1.1, we turn your notes into a dataset in Google Sheets.

# Lesson 1.0 Quiz: Population, Sample, Estimate

**Name:** _____ **Date:** _____

**1.** In the Stardew Valley Luau, the governor tastes one spoonful of the communal soup and judges the whole pot. Match each part of the story to its statistics word.

| Part of the story | Statistics word (population, sample or estimate) |
|---|---|
| The whole pot of soup | |
| The governor's spoonful | |
| The governor's verdict on the soup | |

**2.** A student interviews 20 people at her school and finds that the typical number of siblings in her interviews is 2. She says, "Students at my school usually have about 2 siblings." What is her **sample**?

a) Every student at her school

b) The 20 people she interviewed

c) The number 2

d) Her own family

**3.** In the same example, what is her **estimate**?

a) The 20 people she interviewed

b) Every student at her school

c) That students at her school usually have about 2 siblings

d) The question "How many siblings do you have?"

**4.** A company tests how waterproof its new phones are by putting some of them in pressurized water until they leak. Why do they test only a sample of phones instead of all of them?

a) There are too many phones to count.

b) Testing a phone this way ruins it, so they would have none left to sell.

c) Samples are always more accurate than testing everything.

d) The law says they can only test a few.

**5.** The governor's soup has oil floating on top. He takes a spoonful from the surface. Why might his verdict be wrong?

a) The spoon is too small.

b) The spoonful isn't like the rest of the pot, because the soup wasn't mixed.

c) He should have tasted the soup twice.

d) Oil makes soup taste better.

**6.** Which of these is a **statistical question**, one where we expect many different answers? Circle **one** and explain your choice.

a) "How many siblings do I have?"

b) "How many siblings do the students in my class have?"

Explanation: _____

**7.** Your classmate wants to ask, "How many siblings do you have?" Explain one way people might answer this question differently, and rewrite the question so everyone answers the same thing.

The problem: _____

My rewrite: _____

**8.** In Lesson 1.0 we interview people using nicknames or numbers instead of real names. Give **one** reason why.

_____

# Lesson 1.0 Answer Guide

## Quiz

**1.** Pot of soup = **population**. The spoonful = **sample**. The verdict = **estimate**. *Grading:* one point each.

**2. b)** The 20 people she interviewed. *Why the others are wrong:* (a) is the population; (c) is a number she found, part of her estimate; (d) is one observation at most, not the sample.

**3. c)** That students at her school usually have about 2 siblings. *Watch for:* students who pick (b) are mixing up the estimate with the population the estimate is *about*. Ask, "Is the estimate a group of people or a claim?"

**4. b)** Testing ruins the phone. This is the video's destructive-testing example: the reason to sample is not that the population is big but that measuring it destroys it. *Watch for:* (a) is the textbook answer students expect. It's a reasonable instinct, but it isn't the reason in this case. Use it to open the conversation about why we sample.

**5. b)** The spoonful isn't like the rest of the pot. How we pick the sample matters as much as how big it is. *Watch for:* (a) and (c) are the "bigger sample fixes it" idea. Point out that a bigger spoonful from the oily surface is still oily.

**6. b)** We expect students in a class to have different numbers of siblings, so the answer is a collection of values, not one number. Question (a) has a single answer. *Strong explanation:* mentions that the answers vary, or that we would need to ask many people. *Partial credit:* correct choice with an explanation that only says "it asks more people." *Note:* this mirrors Common Core 6.SP.A.1's own example, "How old am I?" versus "How old are the students in my school?"

**7.** Any genuine ambiguity, with a rewrite that removes it. The video's main example: some people include themselves when counting siblings. *Sample strong answer:* "Some people count themselves. Rewrite: 'How many brothers and sisters do you have, not counting yourself?'" *Other acceptable problems:* half-siblings or step-siblings (if the class hasn't decided), siblings who have passed away. *Common weak answer:* "People might lie." It's true but not about the question's wording; ask the student for a way two *honest* people could answer differently.

**8.** Any reasonable privacy reason: respect for the people sharing information about their families; the dataset may be shared with the class; a real name is never something we analyze, so we lose nothing by leaving it out. *Partial credit:* "so we don't get in trouble." Ask them who the rule protects.

### Suggested scoring

Items 1–5: 1 point each (item 1 counts as 3 points if you score each match). Items 6–8: 2 points each (1 for the answer, 1 for the reasoning).

## Field task

There is no single right answer to the field task, because every student's interviews are different. Look for:

- **15 to 20 interviews** (fewer is fine if the reason is real; see the lesson plan).

- **Nicknames or numbers only.** If you find real names, have the student replace them before the notebook is shared.
- **The "Problems we spotted" column.** Any genuine ambiguity counts; see "What students should find" in the lesson plan for the list the video reveals. Credit problems the video doesn't mention too, if two honest people could really answer differently.
- **The notebook layout.** There is no right layout to grade at this stage, and students weren't given one on purpose. Only check that you can tell which answers belong to which person. Lesson 1.1 is where layouts get compared.
- **The class's agreed wording.** If a student changed a question halfway through, that's a good thing to discuss in Lesson 1.1: the early and late answers may not be comparable.
- **"Think about it" question 2** is the one to read closely. A strong answer names a specific group missing from the sample (for example, "no one over 60" or "only kids from my sports team") and connects it to the unstirred soup.