

Statistics and Probability

Who can this sample represent?



Grade 7 • NC.7.SP.1

Teacher guide, original models and student practice

Seven instructional sections • 30 multiple-choice items • 30 open/performance tasks •
Worked keys and evidence records

A multi-session resource bank: select a few tasks for each lesson. Do not assign all 60 in one sitting. Synthetic object data and safe paper-model investigations support reasoning without collecting children's personal information.

Current NC standards for 2026-27 and 2027-28; 2026-adopted standards for 2028-29 are not substituted here.

Free sample | Contents

NC.7.SP.1 | Seventh Grade mathematics

This sample contains 14 complete selected pages from the 84-page resource, plus this sample contents page. Original printed page numbers are retained. Gaps are intentional.

Included original pages: 1-10, 12-13, 63, 73

Representative activities

M01: sample PDF page(s) 11; original page(s) 10

M02: sample PDF page(s) 11; original page(s) 10

O01: sample PDF page(s) 12; original page(s) 12

O02: sample PDF page(s) 13; original page(s) 13

Selected teacher prompts and keys: original page(s) 63, 73

Using this sample

Read the preparation and access guidance before using a selected activity.

Keep teacher keys and private preparation pages separate from student copies.

Use the original resource contents to see the scope of the complete packet.

Complete paid download

The complete resource includes the full PDF task bank and teaching materials.

TEACHER GUIDE

Exact standard and learning targets

NC.7.SP.1 Understand that statistics can be used to gain information about a population by:

Recognizing that generalizations about a population from a sample are valid only if the sample is representative of that population.

Using random sampling to produce representative samples to support valid inferences.

A • I can identify the population, sample and characteristic of interest.

B • I can evaluate whether a sampling method can support a population inference.

C • I can design and carry out random selection from a complete population list.

D • I can state a justified generalization and its uncertainty.

Essential question: What can data tell us about a population, and what remains uncertain?

Evidence: actual selection records, calculated summaries, original displays and justified interpretations. A correct choice alone does not establish performance in sampling, constructing or explaining.

TEACHER GUIDE

Readiness, access and materials

Prerequisites: distinguish a group from one member; read equal-interval number lines; order data; compute mean and median; use fractions and decimals. For SP.3 and SP.4, teach quartiles using medians of halves and MAD using absolute distances. Calculators may check arithmetic after a learner specifies the method. No fixed speed cutoff is used.

Materials: pencil, ruler, blank paper, optional calculator, 20 equal opaque numbered slips, opaque container and the teacher-only lookup table supplied here. Adults prepare cutting. Digital uniform random integers 1-20 are an alternative, with repeated IDs rejected within a sample. No external accounts, private surveys or purchases are needed.

Access: neutral read-aloud, large print, tactile or enlarged plots, AAC, signed/oral/dictated explanations, and a scribe for the learner's own reasoning are allowed. Preserve the statistical decision: do not choose the sample, name the correct measure, calculate for the learner or identify a correct plot feature during independent evidence collection.

Support log: distinguish access supports from answer-supplying prompts. Modeled or jointly completed tasks are instruction; obtain a fresh individual response later. N/O means unobserved, inaccessible or insufficient evidence, not incorrect. Mark 0 only for an interpretable observed incorrect response.

Vocabulary: population, sample, sampling frame, random, representative, bias, estimate, sampling variation, center, range, MAD, quartile, IQR, overlap and inference. Use home-language explanations and define only words needed for the current task.

Differentiation: reteach with a new smaller data set or a visible complete ID frame; then restore the full task for a fresh check. Extend by changing one extreme value, sample size or selection rule and defending the effect. Do not replace statistical reasoning with memorized definitions.

TEACHER-ONLY WORKED MODEL

Define, sample, qualify

Say: "Our population is the 20 model objects, not just the five we can reach. I label every object 1-20 and draw five distinct IDs from equal, thoroughly mixed slips without looking. Suppose I draw 2, 7, 11, 16, 19. This is a sample of five; all 20 objects were eligible. I cannot choose only large objects and call that random. A fair selection helps us make a representative inference, but chance may still produce an unusual sample. After measuring, I can estimate a typical population length, not claim every unmeasured object equals the sample mean."

Ask: What does one mark represent? Which population or data set does the claim address? What cannot be determined from this evidence? Invite an alternative explanation and verify it against the data.

REUSABLE ANCHOR

Connect evidence to the claim

Population: the complete group addressed by the question. Sample: selected members measured or observed.

Representativeness: a sample must reasonably reflect the target population to support a generalization.

Random selection from a complete frame gives every member a selection chance; it does not guarantee an exact miniature of the population.

Bias is a systematic selection problem. Larger samples do not fix an excluded part of the population.

Inference: explain what the evidence suggests and what remains unknown.

Question / population(s) / attribute and units

Selection method or numerical evidence

Claim / justification / uncertainty

TEACHER GUIDE

Select a core across sessions

Session 1: warm-up, worked model and guided practice (about 35 minutes). Session 2: collaborative and independent work (about 30 minutes). Session 3/conferences: reteach and exit (15+ minutes). Live repeat-sampling or two-plot investigations need another 20-30 minutes. The full bank is reusable across lessons, not an 80-minute test.

Warm-up: M01-M04, O01-O04. Start with M01 and O01; reserve other items for later practice or individual conferences.

I Do: M05-M08, O05-O08. Start with M05 and O05; reserve other items for later practice or individual conferences.

We Do: M09-M13, O09-O13. Start with M09 and O09; reserve other items for later practice or individual conferences.

Collaborative practice: M14-M18, O14-O18. Start with M14 and O14; reserve other items for later practice or individual conferences.

Independent practice: M19-M23, O19-O23. Start with M19 and O19; reserve other items for later practice or individual conferences.

Small-group reteach: M24-M27, O24-O27. Start with M24 and O24; reserve other items for later practice or individual conferences.

Exit ticket: M28-M30, O28-O30. Start with M28 and O28; reserve other items for later practice or individual conferences.

Scoring each dimension separately

Dimensions: selection/design or representation; numerical accuracy; contextual reasoning and uncertainty. 3 = accurate and justified independently; 2 = mostly sound with a limited error or incomplete justification; 1 = partial relevant evidence with substantial gaps; 0 = observed interpretable incorrect response; N/O = unobserved, inaccessible or insufficient evidence. These are instructional descriptions, not official mastery cutoffs.

Keep scores linked to an item and actual evidence. Do not score handwriting, spelling or accent if the statistical meaning is clear. Do not convert N/O to zero. Record access supports and answer-supplying cues separately.

TEACHER-ONLY PREPARATION • KEEP HIDDEN

Run the numbered-object investigations

Use 20 same-size opaque paper slips labeled 1-20 and an opaque container. Adults prepare any cutting. Slips model safe objects; no personal data or physical child measurements are used. Use the printable ID grid on the next page, or write equal slips yourself. Digital alternative: uniform integers 1-20, rejecting repeated IDs within a sample.

Keep the lookup table below hidden. Learners select IDs before you reveal their values. Do not show population totals or values of unselected IDs during an unknown-characteristic investigation. A learner can record your revealed value without handling any real stock. The toy stock is an instructional model, not real measurement evidence.

For each row: mix the full ID pool, draw the specified number without looking, and hold selected slips aside. Read values from this table. Restore all 20 slips and remix before the next row. In paired investigations, use independent draws for A and B; reset each pool. Record actual draws, not desired outcomes.

ID | length A (cm) | length B (cm) | starred status

1: 4 / 6 / star 2: 5 / 7 / plain 3: 5 / 7 / star 4: 6 / 8 / star 5: 6 / 8 / plain

6: 6 / 8 / plain 7: 7 / 9 / star 8: 7 / 9 / plain 9: 8 / 10 / star 10: 8 / 10 / plain

11: 8 / 10 / plain 12: 9 / 11 / star 13: 9 / 11 / plain 14: 10 / 12 / plain 15: 10 / 12 / star

16: 10 / 12 / plain 17: 11 / 13 / plain 18: 11 / 13 / star 19: 12 / 14 / plain 20: 13 / 15 / plain

Teacher check only: pool A mean=8.25 cm; pool B mean=10.25 cm. Starred count=8 of 20, proportion=0.4. These population facts are for validation after inference, never clues during sampling. A census may be revealed at the end to compare estimates with truth.

Audit every row: requested distinct ID count, valid IDs, exact value lookup, no selective omission, correct sum/mean or starred fraction. If generation is inaccessible, mark it N/O and use supplied simulation data only to assess analysis, not actual sampling performance.

TEACHER PREPARATION • PRINTABLE ID SLIPS

Equal slips for a complete frame

Adults may cut along the grid lines. Make all slips identical in size and fold identically so IDs cannot be seen before selection. Keep all 20 IDs in the frame. Grid dimensions are layout aids, not measurement tasks.

1	2	3	4	5
6	7	8	9	10
11	12	13	14	15
16	17	18	19	20

Optional public roles: selector draws without looking; recorder writes revealed values; checker verifies ID count and reset. Swap roles. Every learner submits their own calculations and inference. Keep the hidden value table with the teacher.

Preparation check / materials substituted / access adaptations

TEACHER MOVES • WARM-UP

Warm-up: evidence and next steps

Selected core: M01 and O01; bank M01-M04, O01-O04. **Suggested 8 minutes.**

Target: Design and carry out random selection from a complete population list.

0-2: Name the target population or data set and the unit. 2-5: Use the selected choice item as a low-stakes probe. 5-8: Begin the open task individually, then ask for one reason.

Say: "Which group does the question concern, and what does one recorded value mean?"

Look/listen for: the selected task's population or data interpretation, a method that includes the relevant observations, checked calculation or selection records, and a claim with appropriate limits. Use the full worked key for this specific item.

Respond to misconception: If sample and population are confused, draw a full ID list and circle only the selected IDs. If convenience is called random, ask which IDs have zero chance and repair the frame.

Neutral prompt: "Show where that comes from in your record." For an extension, change one sample condition or data value and justify what changes. Record the observed response, support and next step. Longer live performances may continue in a later session.

WARM-UP • STUDENT CHOICE PRACTICE

Read, choose, justify

M01 • Target D

A fictional depot has 240 model ramps. A team wants to estimate their typical height. A random sample of 20 has mean 11 cm. Which report respects uncertainty?

- A. Every object measures exactly 11 cm.
- B. The depot mean must equal 11 cm exactly.
- C. The depot mean may be near 11 cm; another sample could differ.
- D. Random sampling prevents all sample-to-sample variation.

Evidence / quick check: _____

M02 • Target C

A fictional depot has 120 empty cartons. A team wants to estimate their typical mass. A random-number generator repeats a label already selected. The plan requires distinct objects. What should happen?

- A. Skip the repeat and draw again until the distinct-count target is met.
- B. Count the same object again as a new distinct object.
- C. Delete all previously drawn labels and choose by size.
- D. Choose the nearest unselected object by sight.

Evidence / quick check: _____

WARM-UP • STUDENT PERFORMANCE

001 • Make your thinking visible

Target C • Design and carry out random selection from a complete population list.

Use the teacher-prepared object ID pool 1-20. Draw 4 distinct IDs at random without looking. Record the draw order. Return all slips, remix, and draw a second 4-ID sample. Explain why each sample is random and why the two samples may overlap. Do not collect data about people.

Selection 1: IDs / method

Selection 2: IDs / method

Compare procedures / explain representativeness and variation

WARM-UP • STUDENT PERFORMANCE

002 • Make your thinking visible

Target D • State a justified generalization and its uncertainty.

A fictional depot has 120 mock delivery runs. A team wants to estimate their typical elapsed time. A complete-list random sample has mean 12 seconds. Write a defensible inference and one statement the sample does not justify. Explain the difference.

Plan / records / calculations

Explanation / contextual claim / limitations

This image shows a single sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

TEACHER-ONLY WORKED KEYS

Check method, values and inference

M01 • Answer C: The depot mean may be near 11 cm; another sample could differ.

A representative random sample supports an estimate, not certainty. Sampling variation remains even with a fair design.

Distractors: A: Turns an average into an individual-value claim. B: Equates a sample statistic with the unknown population value. D: Confuses fair selection with guaranteed identical results.

M02 • Answer A: Skip the repeat and draw again until the distinct-count target is met.

Reject repeated IDs under a without-replacement plan, keeping all eligible unselected IDs equally likely.

Distractors: B: A repeated ID is not a new object. C: Abandons the random selection design. D: Substitutes a convenience choice.

M03 • Answer D: What were the values of these selected objects?

The measurements describe the measured group. Selection for extreme size undermines a generalization about typical depot values.

Distractors: A: Extreme selection is not a representative frequency sample. B: Makes an unsupported future universal claim. C: Unmeasured objects remain unknown.

TEACHER-ONLY WORKED KEYS

Check method, values and inference

001 • Sample response / required evidence

Observe two actual draws. Each row must contain 4 distinct IDs from 1-20; across rows repeats are allowed because the full pool is restored. Equal slips and thorough blind mixing give every ID a selection chance. Example legal rows are [1, 2, 3, 4] and [4, 5, 6, 7]; these are possible outcomes, not instructions to select consecutive IDs. Exact IDs vary; check observed slips. N/O for inaccessible/unobserved draws.

002 • Sample response / required evidence

The population mean may be near 12 seconds, assuming the selection and measurements were sound. It does not establish that every object is 12 seconds, or that the population mean equals it exactly. Sample averages vary; individual values can differ.

003 • Sample response / required evidence

The population mean may be near 13 cm, assuming the selection and measurements were sound. It does not establish that every object is 13 cm, or that the population mean equals it exactly. Sample averages vary; individual values can differ.