

NORTH CAROLINA MATHEMATICS

Mental Strategies Within 20



Grade 2 | Operations and Algebraic Thinking

NC.2.OA.2

Build accurate, efficient, flexible mental addition and subtraction within 20 across repeated opportunities.

Seven instructional sections; 30 multiple-choice items and 30 open/performance tasks. Select short sessions across days. This is a reusable bank, not a 60-item test.

Teacher scripts, original block models, student organizers, detailed keys, evidence records, differentiation, and sources.

Aligned to current NC standards used in 2026-27 and 2027-28. Revised standards adopted in 2026 begin in 2028-29.

Free sample | Contents

NC.2.OA.2 | Second Grade mathematics

This sample contains 23 complete selected pages from the 83-page resource, plus this sample contents page. Original printed page numbers are retained. Gaps are intentional.

Included original pages: 1-20, 35-36, 68

Representative activities

M01: sample PDF page(s) 21; original page(s) 20

M02: sample PDF page(s) 21; original page(s) 20

O01: sample PDF page(s) 22; original page(s) 35

O02: sample PDF page(s) 23; original page(s) 36

Selected teacher prompts and keys: original page(s) 2, 68

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

Choose a short-session pathway

Print only selected learner pages. Keep teacher models and all keys separate. The first portion of the bank holds choice pages; the second holds open/performance pages. Match IDs, not page proximity.

Day 1 (15-20 minutes): warm-up and I Do. Day 2: We Do. Day 3: collaborative practice. Day 4: independent practice and a short needs-based group. Day 5: exit evidence and revisit. Split a session further when needed.

Suggested core: M01/O01, M05/O05, M09/O09, M14/O14, M19/O19, M24/O24, M28/O28. Before teaching, choose additional tasks to cover every target below. Remaining items are for later dates and fresh evidence.

Allocation for both banks: warm-up 01-04; I Do 05-08; We Do 09-13; collaboration 14-18; independent 19-23; reteach 24-27; exit 28-30. Only selected examples are used in a lesson.

Contents: exact standard and targets; access and preparation; worked models; seven phase scripts; blank tools; choice bank; open bank; scoring and evidence records; inquiry and extension; worked keys; sources.

Use mathematical practices through sense-making, models, explaining a choice, checking, and revising. A correct multiple-choice selection does not replace the standard's actual performance.

TEACHER GUIDE

Exact NC standard

NC.2.OA.2: Demonstrate fluency with addition and subtraction, within 20, using mental strategies.

Source: NC DPI Second Grade Quick Reference Guide. Current source-verified standard, not a Common Core substitution.

Essential question: Which known number relationship helps me find this answer?

TEACHER GUIDE

Learning targets and evidence

A: Make ten mentally

B: Decompose subtraction through ten

C: Use doubles or near doubles

D: Use related addition/subtraction

E: Use zero, one, and known facts

F: Count on strategically or use a known relationship

Collect the actual performance named by the target, plus an explanation or check in any accessible mode. Target IDs appear in the included worked keys; use them with the evidence record.

Boundaries: Addition totals and subtraction starting values stay within 20, with nonnegative whole-number answers. Mental strategy use is the goal; explanation drawings follow the initial mental attempt.

Use fresh tasks on different dates before concluding that a skill is reliable. This packet supplies instructional evidence, not state endorsement or an official mastery threshold.

TEACHER GUIDE

Prepare, access, and language

Prerequisites: count objects one-to-one; connect numerals and quantities; understand joining, removing, and equal quantities. Briefly check these before introducing symbolic work.

Materials: pencils, crayons, blank paper, and large age-appropriate blocks or counters; 100 for OA.1 if needed, 20 for OA.2/OA.3, 25 for OA.4. For quantities to 100, groups of ten may replace loose objects. Adults handle cutting. All printed diagrams are conceptual models, not scale-measurement tools.

Vocabulary: mental strategy, known fact, make ten, decompose, double, related fact.

Read directions and choices neutrally. Allow oral, signed, AAC, pointed, drawn, built, or dictated responses. Enlarge print or use tactile blocks as access requires. Do not give a missing number, pair the child's objects, or supply the next operation during independent evidence.

Separate access help from mathematical cues in the record. Do not score decoding, spelling, handwriting, accent, or speech speed. If evidence is inaccessible or unclear, record N/O and revise access.

Visual support: worked ten-frames illustrate decomposition; blank frames support explanation after the mental response. Record any need for manipulatives during computation separately.

TEACHER GUIDE

Collect mental fluency over time

The June 2025 NC unpacking describes fluent work through accuracy, efficiency, and flexibility. It connects meaningful repeated use of strategies to understanding number relationships.

Provide a fact without choices first during a fluency conference. Record the initial response and strategy before offering tools. Invite a drawing afterward to explain or check thinking. If objects are needed to compute, record that stage honestly and continue supporting conceptual understanding.

Make-ten and through-ten work, related facts, doubles, counting on, zero, and known facts all appear in this bank. Sample both operations across the whole 0-20 range over multiple dates. A bank is not an exhaustive test of every combination.

Record efficiency descriptively: known relationship, purposeful decomposition, repeated counting, restart, or self-correction. Ask whether another strategy could be helpful; flexibility is not a demand to use a prescribed method for every fact.

No seconds-per-item requirement or invented speed cutoff is used. The unpacking favors meaningful practice and mathematical conversation rather than relying on traditional nonvisual flash cards or timed tests to develop fluency.

TEACHER MODEL | ADULT ONLY

Fluency includes boundaries

20 - 0 = 20 because nothing leaves; 20 - 20 = 0 because all leave; 0 + 20 = 20. For 18 + 2, keep eighteen and count nineteen, twenty. Include small facts, zero, and results near twenty across dates, rather than practicing only a narrow middle range.

Say: "What does each part of the picture mean? What could we check?" Let the learner connect actions, the diagram, and the equation. These completed models are for instruction; keep them covered during fresh independent checks.

After the mental explanation: draw intermediate steps

TEACHER GUIDE

Warm-up | teaching moves

Bank: M01-M04 and O01-O04. Selected core: M01/O01. Target for the open core: C: Use doubles or near doubles

0-2 minutes: Invite one familiar quantity or relationship. Ask what the child notices before evaluating it.

2-6 minutes: Have each learner attempt the selected open task. Ask "How does your model match?" Wait without supplying a number or operation.

6-10 minutes: Compare a correct explanation with an incomplete one. Ask what can be checked. Use the worked key only after the learner's attempt.

10-12 minutes (or stop sooner): Invite a new example or a different valid representation. Close by asking what the child can now explain.

Exact neutral prompt: "Show me how you know. What does this number or group represent?" Listen for: Build accurate, efficient, flexible mental addition and subtraction within 20 across repeated opportunities.

If evidence shows a misconception: If counting all dominates, rebuild a known relationship with frames, then hide the model and try a related fact. If the child loses part of a decomposed number, connect both pieces to the original amount. Do not increase time pressure.

Extension: Compare two valid mental methods and explain which is useful for a nearby fact.

Record item/date, exact response, model or strategy, access supports, mathematical cues, and one next step. When teaching cues are used, do not label that attempt independent.

TEACHER GUIDE

I Do | teaching moves

Bank: M05-M08 and O05-O08. Selected core: M05/O05. Target for the open core: F: Count on strategically or use a known relationship

0-2 minutes: Read the selected task neutrally. Ask the child to name what needs to be found or shown.

2-6 minutes: Model one adult-only example above. Think aloud each step and match the equation to the representation. Let students watch before asking them to perform.

6-10 minutes: Compare a correct explanation with an incomplete one. Ask what can be checked. Use the worked key only after the learner's attempt.

10-12 minutes (or stop sooner): Invite a new example or a different valid representation. Close by asking what the child can now explain.

Exact neutral prompt: "Show me how you know. What does this number or group represent?" Listen for: Build accurate, efficient, flexible mental addition and subtraction within 20 across repeated opportunities.

If evidence shows a misconception: If counting all dominates, rebuild a known relationship with frames, then hide the model and try a related fact. If the child loses part of a decomposed number, connect both pieces to the original amount. Do not increase time pressure.

Extension: Compare two valid mental methods and explain which is useful for a nearby fact.

Record item/date, exact response, model or strategy, access supports, mathematical cues, and one next step. When teaching cues are used, do not label that attempt independent.

TEACHER GUIDE

We Do | teaching moves

Bank: M09-M13 and O09-O13. Selected core: M09/O09. Target for the open core: B: Decompose subtraction through ten

0-2 minutes: Read the selected task neutrally. Ask the child to name what needs to be found or shown.

2-6 minutes: Have each learner attempt the selected open task. Ask "How does your model match?" Wait without supplying a number or operation.

6-10 minutes: Compare a correct explanation with an incomplete one. Ask what can be checked. Use the worked key only after the learner's attempt.

10-12 minutes (or stop sooner): Invite a new example or a different valid representation. Close by asking what the child can now explain.

Exact neutral prompt: "Show me how you know. What does this number or group represent?" Listen for: Build accurate, efficient, flexible mental addition and subtraction within 20 across repeated opportunities.

If evidence shows a misconception: If counting all dominates, rebuild a known relationship with frames, then hide the model and try a related fact. If the child loses part of a decomposed number, connect both pieces to the original amount. Do not increase time pressure.

Extension: Compare two valid mental methods and explain which is useful for a nearby fact.

Record item/date, exact response, model or strategy, access supports, mathematical cues, and one next step. When teaching cues are used, do not label that attempt independent.

TEACHER GUIDE

Collaborative practice | teaching moves

Bank: M14-M18 and O14-O18. Selected core: M14/O14. Target for the open core: D: Use related addition/subtraction

0-2 minutes: Read the selected task neutrally. Ask the child to name what needs to be found or shown.

2-6 minutes: Have each learner attempt the selected open task. Ask "How does your model match?" Wait without supplying a number or operation.

6-10 minutes: Partners take turns explaining and checking. Each learner makes a separate record; a shared answer alone is not individual evidence.

10-12 minutes (or stop sooner): Invite a new example or a different valid representation. Close by asking what the child can now explain.

Exact neutral prompt: "Show me how you know. What does this number or group represent?" Listen for: Build accurate, efficient, flexible mental addition and subtraction within 20 across repeated opportunities.

If evidence shows a misconception: If counting all dominates, rebuild a known relationship with frames, then hide the model and try a related fact. If the child loses part of a decomposed number, connect both pieces to the original amount. Do not increase time pressure.

Extension: Compare two valid mental methods and explain which is useful for a nearby fact.

Record item/date, exact response, model or strategy, access supports, mathematical cues, and one next step. When teaching cues are used, do not label that attempt independent.

TEACHER GUIDE

Independent practice | teaching moves

Bank: M19-M23 and O19-O23. Selected core: M19/O19. Target for the open core: D: Use related addition/subtraction

0-2 minutes: Read the selected task neutrally. Ask the child to name what needs to be found or shown.

2-6 minutes: Have each learner attempt the selected open task. Ask "How does your model match?" Wait without supplying a number or operation.

6-10 minutes: Compare a correct explanation with an incomplete one. Ask what can be checked. Use the worked key only after the learner's attempt.

10-12 minutes (or stop sooner): Collect the response without coaching, note access and strategy, and choose a fresh task for the next date.

Exact neutral prompt: "Show me how you know. What does this number or group represent?" Listen for: Build accurate, efficient, flexible mental addition and subtraction within 20 across repeated opportunities.

If evidence shows a misconception: If counting all dominates, rebuild a known relationship with frames, then hide the model and try a related fact. If the child loses part of a decomposed number, connect both pieces to the original amount. Do not increase time pressure.

Extension: Compare two valid mental methods and explain which is useful for a nearby fact.

Record item/date, exact response, model or strategy, access supports, mathematical cues, and one next step. When teaching cues are used, do not label that attempt independent.

TEACHER GUIDE

Small-group reteach | teaching moves

Bank: M24-M27 and O24-O27. Selected core: M24/O24. Target for the open core: F: Count on strategically or use a known relationship

0-2 minutes: Read the selected task neutrally. Ask the child to name what needs to be found or shown.

2-6 minutes: Have each learner attempt the selected open task. Ask "How does your model match?" Wait without supplying a number or operation.

6-10 minutes: Compare a correct explanation with an incomplete one. Ask what can be checked. Use the worked key only after the learner's attempt.

10-12 minutes (or stop sooner): Invite a new example or a different valid representation. Close by asking what the child can now explain.

Exact neutral prompt: "Show me how you know. What does this number or group represent?" Listen for: Build accurate, efficient, flexible mental addition and subtraction within 20 across repeated opportunities.

If evidence shows a misconception: If counting all dominates, rebuild a known relationship with frames, then hide the model and try a related fact. If the child loses part of a decomposed number, connect both pieces to the original amount. Do not increase time pressure.

Extension: Compare two valid mental methods and explain which is useful for a nearby fact.

Record item/date, exact response, model or strategy, access supports, mathematical cues, and one next step. When teaching cues are used, do not label that attempt independent.

TEACHER GUIDE

Exit ticket | teaching moves

Bank: M28-M30 and O28-O30. Selected core: M28/O28. Target for the open core: B: Decompose subtraction through ten

0-2 minutes: Read the selected task neutrally. Ask the child to name what needs to be found or shown.

2-6 minutes: Have each learner attempt the selected open task. Ask "How does your model match?" Wait without supplying a number or operation.

6-10 minutes: Compare a correct explanation with an incomplete one. Ask what can be checked. Use the worked key only after the learner's attempt.

10-12 minutes (or stop sooner): Collect the response without coaching, note access and strategy, and choose a fresh task for the next date.

Exact neutral prompt: "Show me how you know. What does this number or group represent?" Listen for: Build accurate, efficient, flexible mental addition and subtraction within 20 across repeated opportunities.

If evidence shows a misconception: If counting all dominates, rebuild a known relationship with frames, then hide the model and try a related fact. If the child loses part of a decomposed number, connect both pieces to the original amount. Do not increase time pressure.

Extension: Compare two valid mental methods and explain which is useful for a nearby fact.

Record item/date, exact response, model or strategy, access supports, mathematical cues, and one next step. When teaching cues are used, do not label that attempt independent.

TEACHER GUIDE

Anchor reminders

THINK -> EXPLAIN -> CHECK. What fact do I know? Can I make ten, use a double, or find a missing part? A helpful mental relationship is more useful than guessing quickly.

Ask: Did I use every object exactly once? Does my equation match my picture? Does my answer describe what was asked?

These reminders are for instruction and supported practice. During independent evidence, record whether the reminder was supplied. Support should clarify access without silently supplying the tested relationship.

REUSABLE STUDENT ORGANIZER

Show, explain, and check

Say the mental answer first. Then record your thinking.

My mental steps

Another way or check

STUDENT CHOICE BANK

Choose and explain 01-02

M01 $12 - 2 = \underline{\quad}$

- A. 12
- B. 9
- C. 14
- D. 10

M02 $16 + 4 = \underline{\quad}$

- A. 15
- B. 20
- C. 14
- D. 16

TEACHER-ONLY WORKED KEYS

Items 01-02

M01 | D: 10

Target: D: Use related addition/subtraction

$12 - 2 = 10$. One mental way: Think $2 + 10 = 12$, so $12 - 2 = 10$. Accept other valid mental strategies; record the method actually used.

Distractor check: 14: adds instead of subtracting; 12: does not remove the second quantity; 9: counts one too few. These are possible errors, not diagnoses from a choice alone.

001 | Sample performance

Target: C: Use doubles or near doubles

$3 + 3 = 6$. One mental way: Double 3: $3 + 3 = 6$. Accept other valid mental strategies; record the method actually used.

M02 | B: 20

Target: F: Count on strategically or use a known relationship

$16 + 4 = 20$. One mental way: Keep 16 in mind and count on 4: 17, 18, 19, 20. The result is 20. Accept other valid mental strategies; record the method actually used.

Distractor check: Other choices fail the stated quantity relationship. Reconstruct or substitute to check; a choice alone does not diagnose the cause of an error.

002 | Sample performance

Target: C: Use doubles or near doubles

$2 + 1 = 3$. One mental way: $1 + 1 = 2$; one more gives 3. Accept other valid mental strategies; record the method actually used.

Accept equivalent correct models and accessible explanations. Record actual strategy, access support, and mathematical cues separately.