

TEACHER AND STUDENT RESOURCE

Systems: common solutions



NC Math 1 • NC.M1.A-REI.6

Reasoning with Equations and Inequalities

Seven instructional sections with 30 multiple-choice and 30 open or performance tasks, teaching scripts, original mathematical visuals, generous workspaces, and worked keys.

Free sample | Contents

NC.M1.A-REI.6 | NC Math 1 mathematics

This sample contains 18 complete selected pages from the 106-page resource, plus this sample contents page. Original printed page numbers are retained. Gaps are intentional.

Included original pages: 1-14, 34-35, 64, 79

Representative activities

M01: sample PDF page(s) 15; original page(s) 14

M02: sample PDF page(s) 15; original page(s) 14

O01: sample PDF page(s) 16; original page(s) 34

O02: sample PDF page(s) 17; original page(s) 35

Selected teacher prompts and keys: original page(s) 64, 79

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.

ALIGNMENT

Standard and learning targets

Use tables, graphs, or algebraic methods (substitution and elimination) to find approximate or exact solutions to systems of linear equations and interpret solutions in terms of a context.

T1 Solve linear systems by substitution.

T2 Solve linear systems by elimination.

T3 Connect a graph intersection to a common solution.

T4 Use tables and contexts to interpret a system.

T5 Distinguish one, no and infinitely many solutions.

Each item names its own target. The bank supports multiple sessions; do not assign all 60 tasks in one sitting.

NAVIGATION

Choose evidence deliberately

Warm-up: M01-M04 and O01-O04

I Do: M05-M08 and O05-O08

We Do: M09-M13 and O09-O13

Collaborative practice: M14-M18 and O14-O18

Independent practice: M19-M23 and O19-O23

Small-group reteach: M24-M27 and O24-O27

Exit ticket: M28-M30 and O28-O30

T1: M01, M07, M13, M19, M25, O01, O07, O13, O19, O25

T2: M02, M08, M14, M20, M26, O02, O08, O14, O20, O26

T3: M03, M09, M15, M21, M27, O03, O09, O15, O21, O27

T4: M04, M06, M10, M12, M16, M18, M22, M24, M28, M30, O04, O06, O10, O12, O16, O18, O22, O24, O28, O30

T5: M05, M11, M17, M23, M29, O05, O11, O17, O23, O29

PLANNING

Materials, access and pacing

Materials

Pencils, erasers, straightedge, student pages, and optional graph paper. A calculator may support arithmetic after a learner states the intended relationship. No device or paid software is required.

Prerequisites

Evaluate expressions, plot ordered pairs, use signed numbers, and distinguish an equality from an inequality. Revisit these skills with an unscored example before collecting evidence.

Pacing

Use a short diagnostic warm-up, a model and shared task in one session; collaborative and independent reasoning in later sessions; then targeted reteaching and an exit task. Select two to four tasks at a time based on evidence. Each section's full bank is reusable, not mandatory in one lesson.

Neutral access

Read directions aloud without interpreting the graph, enlarge a page, supply a writing or pointing response method, and allow a learner to dictate an explanation. Keep axes, units, data and mathematical demand unchanged.

Separate instruction from evidence

Keep the learner's first response. Record answer-supplying cues separately from access supports. A completed teacher graph or worked key is for discussion after independent work, never a student construction template.

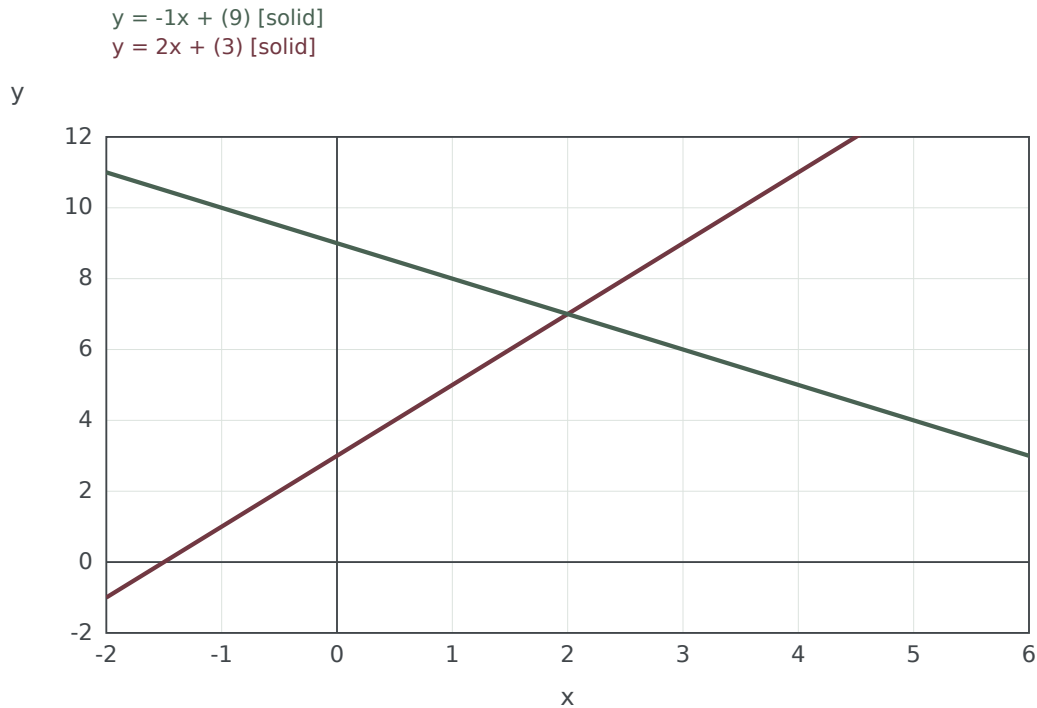
Review convention

Unless a task restricts the domain, variables are real numbers. Grids show a viewing window, not the entire solution set. Extend lines and curves beyond the window when discussing all solutions. Label curves with their equations; explain any rounded values.

TEACHER MODEL

Two plans, one shared cost

Plan A: $y = 2x + 3$. Plan B: $y = -x + 9$. Find the shared point and interpret x as hours and y as dollars.



Set $2x + 3 = -x + 9$. Add x and subtract 3: $3x = 6$, $x = 2$. Then $y = 7$. Each plan costs \$7 at 2 hours. Substitution in both original equations confirms the common point $(2, 7)$. Table rows $x=1,2,3$ give $A=5,7,9$ and $B=8,7,6$. The graph and table tell the same story.

REUSABLE REASONING GUIDE

Represent, justify, interpret

Name: _____ Date: _____

Givens, quantities and restrictions**Representation and calculation****Justification or check****Conclusion, domain and units**

WARM-UP

Teaching script

Core: 001 • T1: Solve linear systems by substitution.

Optional bank: M01–M04; O01–O04. Select tasks across more than one meeting if needed.

Suggested discussion/work time: 5–8 minutes. Adjust for access and evidence; this is not a speed criterion.

Display student page O01, including its graph when present. Invite a first independent response before discussion. Ask, “What do the symbols represent? What evidence supports your claim?”

Core task

Solve $y = 1x + 5$ and $y = -1x + 5$. Use substitution and check both original equations.

Teacher solution and discussion

Equate the expressions: $1x + (5) = -1x + (5)$, so $2x = 0$, $x = 0$. Substitute to get $y = 5$. Both equations give 5; the unique common ordered pair is $(0, 5)$.

Evidence and response

Look for a claim tied to specific equations, substitutions, operations or graph features. If a learner only names an answer, ask which values or parts of the graph support it. If a sign or operation is mishandled, reconstruct that step with a numerical analogy, then collect a fresh response. A selected option alone does not identify a unique misconception.

Closure: Ask learners to state one feature they verified and one check they used. Use the worked key for M01 to compare all alternatives after evidence is collected.

I DO

Teaching script

Core: 005 • T5: Distinguish one, no and infinitely many solutions.

Optional bank: M05–M08; O05–O08. Select tasks across more than one meeting if needed.

Suggested discussion/work time: 10–12 minutes. Adjust for access and evidence; this is not a speed criterion.

Display student page O05, including its graph when present. Think aloud through the core task. Say, “I will identify the quantities first, then build a representation and check it against the stated domain.” Hide the worked key until after predictions.

Core task

Consider $y = 1x - 1$ and $2y = 2x + (2)$. Graph and classify the solution set. Explain using equivalent equations as well as the graph.

Teacher solution and discussion

Dividing the second equation by 2 gives $y = 1x + 1$. The slopes are equal but the intercepts -1 and 1 differ. The parallel lines have no common point, so the system has no solution. Graph markers: $P=(0,-1)$; $Q=(1,0)$. Filled markers satisfy the equation or entire system; open markers do not.

Evidence and response

Look for a claim tied to specific equations, substitutions, operations or graph features. If a learner only names an answer, ask which values or parts of the graph support it. If a sign or operation is mishandled, reconstruct that step with a numerical analogy, then collect a fresh response. A selected option alone does not identify a unique misconception.

Closure: Ask learners to state one feature they verified and one check they used. Use the worked key for M05 to compare all alternatives after evidence is collected.

WE DO

Teaching script

Core: 009 • T3: Connect a graph intersection to a common solution.

Optional bank: M09–M13; 009–O13. Select tasks across more than one meeting if needed.

Suggested discussion/work time: 10–15 minutes. Adjust for access and evidence; this is not a speed criterion.

Display student page 009, including its graph when present. Have learners propose the next step, then ask a partner to verify it using the original representation. Record more than one valid explanation.

Core task

Graph $y = 2x + 2$ and $y = -2x + 6$ on the grid. Label both lines, estimate their intersection, and verify it algebraically.

Teacher solution and discussion

The graphs meet at (1, 4). Since $2(1) + (2) = 4$ and $-2(1) + (6) = 4$, the point satisfies both equations. Only the common point solves the system, not either entire line. Graph markers: $P=(1,4)$. Filled markers satisfy the equation or entire system; open markers do not.

Evidence and response

Look for a claim tied to specific equations, substitutions, operations or graph features. If a learner only names an answer, ask which values or parts of the graph support it. If a sign or operation is mishandled, reconstruct that step with a numerical analogy, then collect a fresh response. A selected option alone does not identify a unique misconception.

Closure: Ask learners to state one feature they verified and one check they used. Use the worked key for M09 to compare all alternatives after evidence is collected.

COLLABORATIVE PRACTICE

Teaching script

Core: O14 • T2: Solve linear systems by elimination.

Optional bank: M14–M18; O14–O18. Select tasks across more than one meeting if needed.

Suggested discussion/work time: 15–20 minutes. Adjust for access and evidence; this is not a speed criterion.

Display student page O14, including its graph when present. Assign reader, representer, checker and explainer roles. Each learner first makes a private prediction; compare reasoning and resolve differences with the data.

Core task

Solve $x + y = 5$ and $3x - 4y = -6$. Use elimination. State why the operation preserves common solutions.

Teacher solution and discussion

Multiply the first equation by 4: $4x + 4y = 20$. Add the second: $7x = 14$, so $x = 2$. Then $y = 5 - (2) = 3$. Check: $x + y = 5$; $3x - 4y = -6$. Solution: $(2, 3)$. Multiplying an equation by a nonzero number and adding equations preserves every common solution.

Evidence and response

Look for a claim tied to specific equations, substitutions, operations or graph features. If a learner only names an answer, ask which values or parts of the graph support it. If a sign or operation is mishandled, reconstruct that step with a numerical analogy, then collect a fresh response. A selected option alone does not identify a unique misconception.

Closure: Ask learners to state one feature they verified and one check they used. Use the worked key for M14 to compare all alternatives after evidence is collected.

INDEPENDENT PRACTICE

Teaching script

Core: O19 • T1: Solve linear systems by substitution.

Optional bank: M19–M23; O19–O23. Select tasks across more than one meeting if needed.

Suggested discussion/work time: 15–20 minutes. Adjust for access and evidence; this is not a speed criterion.

Display student page O19, including its graph when present. Provide the printed task and neutral access supports. Preserve the first independent response; do not point to the requested answer or select a method for the learner.

Core task

Solve $y = 1x - 1$ and $y = -2x + 8$. Use substitution and check both original equations.

Teacher solution and discussion

Equate the expressions: $1x + (-1) = -2x + (8)$, so $3x = 9$, $x = 3$. Substitute to get $y = 2$. Both equations give 2; the unique common ordered pair is $(3, 2)$.

Evidence and response

Look for a claim tied to specific equations, substitutions, operations or graph features. If a learner only names an answer, ask which values or parts of the graph support it. If a sign or operation is mishandled, reconstruct that step with a numerical analogy, then collect a fresh response. A selected option alone does not identify a unique misconception.

Closure: Ask learners to state one feature they verified and one check they used. Use the worked key for M19 to compare all alternatives after evidence is collected.

SMALL-GROUP RETEACH

Teaching script

Core: O24 • T4: Use tables and contexts to interpret a system.

Optional bank: M24–M27; O24–O27. Select tasks across more than one meeting if needed.

Suggested discussion/work time: 10–15 minutes. Adjust for access and evidence; this is not a speed criterion.

Display student page O24, including its graph when present. Start with the learner’s prior evidence. Rebuild one representation with explicit terms and operations, then use a fresh item to check transfer without the prior cue.

Core task

A repair shop charges \$9 plus \$5 per hour. Another charges \$7 plus \$7 per hour. Let x be hours and y be dollars. Write a system, solve exactly, and interpret both coordinates. Explain why x cannot be negative here.

Teacher solution and discussion

Solve $y=5x+9$ and $y=7x+7$: $(7-5)x=9-7$; $x=1$, $y=14$. Both shops charge \$14 for 1 hours. This is meaningful for nonnegative service time; negative hours are not meaningful here.

Evidence and response

Look for a claim tied to specific equations, substitutions, operations or graph features. If a learner only names an answer, ask which values or parts of the graph support it. If a sign or operation is mishandled, reconstruct that step with a numerical analogy, then collect a fresh response. A selected option alone does not identify a unique misconception.

Closure: Ask learners to state one feature they verified and one check they used. Use the worked key for M24 to compare all alternatives after evidence is collected.

EXIT TICKET

Teaching script

Core: 028 • T4: Use tables and contexts to interpret a system.

Optional bank: M28–M30; O28–O30. Select tasks across more than one meeting if needed.

Suggested discussion/work time: 5–8 minutes. Adjust for access and evidence; this is not a speed criterion.

Display student page O28, including its graph when present. Ask for a concise claim supported by the representation. Collect the response before sharing a solution; use it to choose the next instructional step.

Core task

Two plans cost $A(x) = 6x + 5$ dollars and $B(x) = 1x + 40$ dollars for x hours.

Input x	5	6	7
Output A	35	41	47
Output B	45	46	47

Identify and interpret the common solution. Extend the table by one row on either side and verify using algebra.

Teacher solution and discussion

The equal entries are $A(7) = B(7) = 47$. Thus both plans cost \$47 for 7 hours. Algebra: $(6-1)x = 40-5$, so $x=7$. The y -coordinate is the shared cost, not elapsed time. Extra rows: $x=4$: $A=29$, $B=44$; $x=8$: $A=53$, $B=48$.

Evidence and response

Look for a claim tied to specific equations, substitutions, operations or graph features. If a learner only names an answer, ask which values or parts of the graph support it. If a sign or operation is mishandled, reconstruct that step with a numerical analogy, then collect a fresh response. A selected option alone does not identify a unique misconception.

Closure: Ask learners to state one feature they verified and one check they used. Use the worked key for M28 to compare all alternatives after evidence is collected.

MULTIPLE-CHOICE BANK

M01 / M02 • Select and justify**M01 | Warm-up | T1****Solve $y = 1x + 5$ and $y = -1x + 1$. Which ordered pair solves both?**

- A. (3, 8)
- B. (-2, -7)
- C. (-1, 3)
- D. (-2, 3)

Reasoning: _____

M02 | Warm-up | T2**Solve $x + y = 1$ and $1x - 2y = -8$. Which step eliminates y ?**

- A. Multiply the first equation by 2, then add.
- B. Multiply the first equation by 2, then subtract the second.
- C. Add the original equations without scaling.
- D. Multiply the second equation by 2, then add the original first.

Reasoning: _____

WARM-UP

001 • Show your reasoning**T1: Solve linear systems by substitution.****Solve $y = 1x + 5$ and $y = -1x + 5$. Use substitution and check both original equations.****Representation / calculation****Explanation / check**

WARM-UP

002 • Show your reasoning**T2: Solve linear systems by elimination.****Solve $x + y = 5$ and $1x - 2y = -10$. Use elimination. State why the operation preserves common solutions.****Representation / calculation****Explanation / check**

WORKED TEACHER KEYS

M01 / M02**M01 • T1: Solve linear systems by substitution.****Answer: D. (-2, 3)**

Equate the expressions: $1x + (5) = -1x + (1)$, so $2x = -4$, $x = -2$. Substitute to get $y = 3$. Both equations give 3; the unique common ordered pair is $(-2, 3)$.

Check each alternative

- A. At $(3, 8)$, first equation RHS is 8 and second is -2; at least one fails to equal y .
- B. At $(-2, -7)$, first equation RHS is 3 and second is 3; at least one fails to equal y .
- C. At $(-1, 3)$, first equation RHS is 4 and second is 2; at least one fails to equal y .
- D. At $(-2, 3)$, first equation RHS is 3 and second is 3; both equal y .

M02 • T2: Solve linear systems by elimination.**Answer: A. Multiply the first equation by 2, then add.**

Multiply the first equation by 2: $2x + 2y = 2$. Add the second: $3x = -6$, so $x = -2$. Then $y = 1 - (-2) = 3$. Check: $x+y = 1$; $1x-2y = -8$. Solution: $(-2, 3)$.

Check each alternative

- A. The y terms are opposites, so adding removes y .
- B. Subtraction produces $4y$ rather than eliminating y .
- C. The y coefficient is $1 - 2$, which is nonzero.
- D. The y coefficients do not sum to zero.

WORKED TEACHER KEYS

001 / 002**001 • T1: Solve linear systems by substitution.**

Equate the expressions: $1x + (5) = -1x + (5)$, so $2x = 0$, $x = 0$. Substitute to get $y = 5$. Both equations give 5; the unique common ordered pair is $(0, 5)$.

002 • T2: Solve linear systems by elimination.

Multiply the first equation by 2: $2x + 2y = 10$. Add the second: $3x = 0$, so $x = 0$. Then $y = 5 - (0) = 5$. Check: $x + y = 5$; $1x - 2y = -10$. Solution: $(0, 5)$. Multiplying an equation by a nonzero number and adding equations preserves every common solution.