

Equations and Inequalities



Grade 7 | Expressions and Equations NC.7.EE.4

Seven teaching sections • 30 choice + 30 open/performance tasks
Detailed scripts, models, student workspaces, worked keys and evidence records

A reusable resource bank for several sessions. Select tasks to fit evidence and instruction; the full bank is not one sitting. Current standards are used; revisions adopted in 2026 begin in 2028-29.

Free sample | Contents

NC.7.EE.4 | Seventh Grade mathematics

This sample contains 18 complete selected pages from the 101-page resource, plus this sample contents page. Original printed page numbers are retained. Gaps are intentional.

Included original pages: 1-14, 29-30, 59, 74

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) 29

O02: sample PDF page(s) 17; original page(s) 30

Selected teacher prompts and keys: original page(s) 59, 74

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 coverage

NC.7.EE.4 | Use variables to represent quantities to solve real-world or mathematical problems.

a. Construct equations to solve problems by reasoning about the quantities.

Fluently solve multistep equations with the variable on one side, including those generated by word problems.

Compare an algebraic solution to an arithmetic solution, identifying the sequence of the operations used in each approach.

Interpret the solution in context.

b. Construct inequalities to solve problems by reasoning about the quantities.

Fluently solve multi-step inequalities with the variable on one side, including those generated by word problems.

Compare an algebraic solution process for equations and an algebraic solution process for inequalities.

Graph the solution set of the inequality and interpret in context.

The tasks preserve the official scope: variables on one side of multistep equations and inequalities, contextual construction, comparison of methods, graphs and interpretations.

TEACHER GUIDE

Targets and item navigation

Solve an inequality with a negative coefficient and compare equation and inequality methods.

Items: M01, M06, M22, M24, M26, O02, O07, O20, O21, O24

Solve a multistep equation with the variable on one side.

Items: M02, M04, M07, M11, M27, O06, O14, O15, O16, O22

Construct an inequality and interpret a discrete contextual solution set.

Items: M03, M12, M16, M23, M29, O04, O12, O13, O23, O27

Construct and solve an equation; compare algebraic and arithmetic steps and interpret.

Items: M05, M13, M17, M21, M28, O01, O05, O11, O18, O26

Construct and solve a contextual inequality; graph and interpret its solution set.

Items: M08, M09, M10, M14, M15, M18, M19, M20, M25, M30, O03, O08, O09, O10, O17, O19, O25, O28, O29, O30

Essential question: How can changing the form preserve the mathematics while revealing a relationship? MP2 connects quantities and symbols; MP3 critiques reasoning; MP4 models contexts; MP6 attends to signs, units and endpoints.

TEACHER GUIDE

Plan, materials and access

Suggested sequence: four 25-35 minute sessions. Session 1: warm-up and I Do. Session 2: We Do and collaborative work. Session 3: selected independent tasks. Session 4: reteach and exit. Each section initially uses its first M and O item; the remaining items support later practice or conferences.

Prerequisites: signed rational arithmetic, equal quantities, operation order, fractions/decimals/percent equivalence, and the meaning of a variable. Review prerequisites separately from scored evidence.

Materials: pencil, supplied workspaces and organizers, ruler for graphing. Optional paper strips or algebra tiles support instruction. No purchased manipulatives required. Adults handle cutting. Contexts and data are invented for instruction.

Access: neutral read-aloud, enlargement, high-contrast printing, AAC, signing or dictated explanations. A scribe follows the learner's exact mathematical directions. Do not supply an operation, coefficient, comparison direction, endpoint or equivalent form. Record cues separately from independent work.

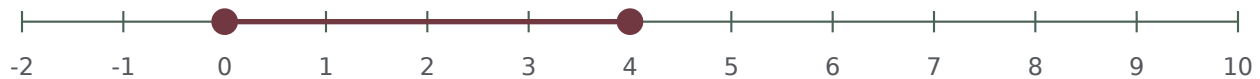
Calculators may check a completed solution after the first response. If computation fluency is being observed, collect unaided evidence first; do not invent time limits or official mastery cutoffs. N/O means inaccessible, unobserved or insufficient evidence, not incorrect.

Vocabulary: coefficient, constant, term, equivalent, distribute, factor, integer GCF, rational, variable, equation, inequality, boundary and solution set. Teach only terms relevant to the packet.

WORKED TEACHER MODEL

Compare boundaries and solutions

A tank starts with 2 liters and gains 3 liters per minute. For exactly 14 liters, solve $3x + 2 = 14$: subtract 2, divide by 3, $x = 4$ minutes. Arithmetic $(14 - 2)/3$ gives the same reversed operations. For at most 14 liters, $3x + 2 \leq 14$ gives $x \leq 4$. Because elapsed time is nonnegative, $0 \leq x \leq 4$. Include both endpoints. For $2 - 3x < -10$, subtract 2 and divide by -3: $x > 4$; dividing by a negative reverses the order.



Closed endpoints at 0 and 4; all elapsed times between work.



Open endpoint at 4; values greater than 4 work.

STUDENT TOOL

Reusable reasoning organizer

Name: _____ Date: _____

Given quantities, units and variable meanings**Expression / equation / inequality and operation steps****Equivalent form / second method / graph or model****Context meaning / check / what the representation reveals**

TEACHER GUIDE

Warm-up script

Core: M01 and O01. Optional bank: M01-M04 / O01-O04. Select, do not assign all by default.

1-3 min | Launch

Say: "What quantities or like terms do you notice?" Read the core task neutrally. Ask learners to identify given values and units before calculating.

4-8 min | Model or elicit

Ask: "Show your first line and tell what it represents." In shared work, pause for a student-proposed step. During independent and exit work, do not correct or hint before recording the first response.

3-6 min | Examine evidence

Target: Construct and solve an equation; compare algebraic and arithmetic steps and interpret. Listen for a reason that connects the operation or form to the quantities. A correct choice alone is incomplete evidence.

2-4 min | Respond to a gap

If a direction or endpoint is wrong, test the boundary and a value on each side. Contrast equality with a range of solutions; explicitly model order reversal after negative division. Record the initial evidence first; use a different item after instruction.

1-3 min | Close

Each learner writes an individual explanation before partner discussion. Record the item, accuracy, reasoning and support. Extension: change one context quantity and predict how the result or relationship changes, then verify.

TEACHER GUIDE

I Do script

Core: M05 and O05. Optional bank: M05-M08 / O05-O08. Select, do not assign all by default.

1-3 min | Launch

Say: "Which property justifies the next line?" Read the core task neutrally. Ask learners to identify given values and units before calculating.

4-8 min | Model or elicit

Demonstrate the worked-model page line by line. Cover the next line and ask for a prediction. Name the property, compute, then check.

3-6 min | Examine evidence

Target: Construct and solve an equation; compare algebraic and arithmetic steps and interpret. Listen for a reason that connects the operation or form to the quantities. A correct choice alone is incomplete evidence.

2-4 min | Respond to a gap

If a direction or endpoint is wrong, test the boundary and a value on each side. Contrast equality with a range of solutions; explicitly model order reversal after negative division. Record the initial evidence first; use a different item after instruction.

1-3 min | Close

Each learner writes an individual explanation before partner discussion. Record the item, accuracy, reasoning and support. Extension: change one context quantity and predict how the result or relationship changes, then verify.

TEACHER GUIDE

We Do script

Core: M09 and O09. Optional bank: M09-M13 / O09-O13. Select, do not assign all by default.

1-3 min | Launch

Say: "What must stay equal as we transform the expression?" Read the core task neutrally. Ask learners to identify given values and units before calculating.

4-8 min | Model or elicit

Ask: "Show your first line and tell what it represents." In shared work, pause for a student-proposed step. During independent and exit work, do not correct or hint before recording the first response.

3-6 min | Examine evidence

Target: Construct and solve a contextual inequality; graph and interpret its solution set. Listen for a reason that connects the operation or form to the quantities. A correct choice alone is incomplete evidence.

2-4 min | Respond to a gap

If a direction or endpoint is wrong, test the boundary and a value on each side. Contrast equality with a range of solutions; explicitly model order reversal after negative division. Record the initial evidence first; use a different item after instruction.

1-3 min | Close

Each learner writes an individual explanation before partner discussion. Record the item, accuracy, reasoning and support. Extension: change one context quantity and predict how the result or relationship changes, then verify.

TEACHER GUIDE

Collaborative practice script

Core: M14 and O14. Optional bank: M14-M18 / O14-O18. Select, do not assign all by default.

1-3 min | Launch

Say: "How can your partner test your claim without copying it?" Read the core task neutrally. Ask learners to identify given values and units before calculating.

4-8 min | Model or elicit

Ask: "Show your first line and tell what it represents." In shared work, pause for a student-proposed step. During independent and exit work, do not correct or hint before recording the first response.

3-6 min | Examine evidence

Target: Solve a multistep equation with the variable on one side. Listen for a reason that connects the operation or form to the quantities. A correct choice alone is incomplete evidence.

2-4 min | Respond to a gap

If a direction or endpoint is wrong, test the boundary and a value on each side. Contrast equality with a range of solutions; explicitly model order reversal after negative division. Record the initial evidence first; use a different item after instruction.

1-3 min | Close

Each learner writes an individual explanation before partner discussion. Record the item, accuracy, reasoning and support. Extension: change one context quantity and predict how the result or relationship changes, then verify.

TEACHER GUIDE

Independent practice script

Core: M19 and O19. Optional bank: M19-M23 / O19-O23. Select, do not assign all by default.

1-3 min | Launch

Say: "What representation will make your reasoning visible?" Read the core task neutrally. Ask learners to identify given values and units before calculating.

4-8 min | Model or elicit

Ask: "Show your first line and tell what it represents." In shared work, pause for a student-proposed step. During independent and exit work, do not correct or hint before recording the first response.

3-6 min | Examine evidence

Target: Construct and solve a contextual inequality; graph and interpret its solution set. Listen for a reason that connects the operation or form to the quantities. A correct choice alone is incomplete evidence.

2-4 min | Respond to a gap

If a direction or endpoint is wrong, test the boundary and a value on each side. Contrast equality with a range of solutions; explicitly model order reversal after negative division. Record the initial evidence first; use a different item after instruction.

1-3 min | Close

Each learner writes an individual explanation before partner discussion. Record the item, accuracy, reasoning and support. Extension: change one context quantity and predict how the result or relationship changes, then verify.

TEACHER GUIDE

Small-group reteach script

Core: M24 and O24. Optional bank: M24-M27 / O24-O27. Select, do not assign all by default.

1-3 min | Launch

Say: "Where does the first incorrect transformation occur?" Read the core task neutrally. Ask learners to identify given values and units before calculating.

4-8 min | Model or elicit

Ask: "Show your first line and tell what it represents." In shared work, pause for a student-proposed step. During independent and exit work, do not correct or hint before recording the first response.

3-6 min | Examine evidence

Target: Solve an inequality with a negative coefficient and compare equation and inequality methods. Listen for a reason that connects the operation or form to the quantities. A correct choice alone is incomplete evidence.

2-4 min | Respond to a gap

If a direction or endpoint is wrong, test the boundary and a value on each side. Contrast equality with a range of solutions; explicitly model order reversal after negative division. Record the initial evidence first; use a different item after instruction.

1-3 min | Close

Each learner writes an individual explanation before partner discussion. Record the item, accuracy, reasoning and support. Extension: change one context quantity and predict how the result or relationship changes, then verify.

TEACHER GUIDE

Exit ticket script

Core: M28 and O28. Optional bank: M28-M30 / O28-O30. Select, do not assign all by default.

1-3 min | Launch

Say: "What can you explain independently about this relationship?" Read the core task neutrally. Ask learners to identify given values and units before calculating.

4-8 min | Model or elicit

Ask: "Show your first line and tell what it represents." In shared work, pause for a student-proposed step. During independent and exit work, do not correct or hint before recording the first response.

3-6 min | Examine evidence

Target: Construct and solve a contextual inequality; graph and interpret its solution set. Listen for a reason that connects the operation or form to the quantities. A correct choice alone is incomplete evidence.

2-4 min | Respond to a gap

If a direction or endpoint is wrong, test the boundary and a value on each side. Contrast equality with a range of solutions; explicitly model order reversal after negative division. Record the initial evidence first; use a different item after instruction.

1-3 min | Close

Each learner writes an individual explanation before partner discussion. Record the item, accuracy, reasoning and support. Extension: change one context quantity and predict how the result or relationship changes, then verify.

STUDENT CHOICE

Choice practice 1-2

M01 | Solve $2 - 3x \geq -11/2$ for real x . Which solution set is correct?

- A. $x \leq 3/2$
- B. $x \leq 7/2$
- C. $x \leq 4$
- D. $x \leq 5/2$

M02 | Solve $6(x - 7/2) = 3$. Which value satisfies the equation?

- A. $x = 7/2$
- B. $x = 5$
- C. $x = 4$
- D. $x = 11/2$

STUDENT PERFORMANCE

001 | Warm-up

Target: Construct and solve an equation; compare algebraic and arithmetic steps and interpret.

A rental has a 2-dollar fee plus 3 dollars per hour. The total is $19\frac{1}{2}$ dollars. Define the variable if needed, write and solve the equation. Compare an arithmetic solution with your algebraic steps. Check and interpret the result.

Representation / transformations / calculations

Explanation / second form or method / check

STUDENT PERFORMANCE

002 | Warm-up

Target: Solve an inequality with a negative coefficient and compare equation and inequality methods.

Solve $3 - 5x \leq -29/2$ for real x . Construct or solve the inequality. Draw and label its solution set, explain endpoint inclusion and direction, and compare the process with solving the related equation. Interpret any context restrictions.



Label any fractional boundary and add endpoints, shading or discrete points.

Construction / operation steps / comparison of methods

Context / endpoint explanation / check

TEACHER ONLY

M worked keys 1-2

M01: D. $x \leq 5/2$

Subtract 2: $-3x \geq -15/2$. Divide by -3 and reverse the comparison: $x \leq 5/2$. The corresponding equation uses the same subtraction and division but has no comparison direction to reverse. Graph a closed point at $5/2$ and shade left. Test the boundary and one value on each side.

Distractor checks: A: solution set $x \leq 3/2$ differs in boundary, direction or endpoint inclusion; compare with $x \leq 5/2$. B: solution set $x \leq 7/2$ differs in boundary, direction or endpoint inclusion; compare with $x \leq 5/2$. C: solution set $x \leq 4$ differs in boundary, direction or endpoint inclusion; compare with $x \leq 5/2$. Ask for work before inferring a misconception.

M02: C. $x = 4$

Divide by 6: $x - 7/2 = 1/2$. Add $7/2$: $x = 4$. Arithmetic: $3/6 + 7/2 = 4$. Distribution gives $6x - 21 = 3$ and the same solution. Check: $6(4 - 7/2) = 3$.

Distractor checks: A: option minus correct quantity = $-1/2$. B: option minus correct quantity = 1. D: option minus correct quantity = $3/2$. Ask for work before inferring a misconception.

TEACHER ONLY

0 worked keys 1-2

001: $x = 5/2$

$3x + 2 = 19/2$. Subtract 2: $3x = 15/2$. Divide by 3: $x = 5/2$ hours. Arithmetic: $(19/2 - 2)/3 = 5/2$. Both undo addition before multiplication. Check: $3(5/2) + 2 = 19/2$.

Accept equivalent correct forms and valid alternative reasoning. Score the requested construction, transformation, model/graph and interpretation separately; a bare final value is incomplete evidence.

002: $x \geq 7/2$

Subtract 3: $-5x \leq -35/2$. Divide by -5 and reverse the comparison: $x \geq 7/2$. The corresponding equation uses the same subtraction and division but has no comparison direction to reverse. Graph a closed point at $7/2$ and shade right. Test the boundary and one value on each side.

Accept equivalent correct forms and valid alternative reasoning. Score the requested construction, transformation, model/graph and interpretation separately; a bare final value is incomplete evidence.