

Different forms, same value

Grade 6 | Expressions and Equations

NC.6.EE.3 | Apply the properties of operations to generate equivalent expressions without exponents.



Teacher guide • Student practice • Worked keys

An 80-minute selected core, adaptable across sessions, plus a reusable bank of 30 multiple-choice and 30 open/performance tasks. Do not assign the entire bank as one timed test.

Includes operation organizers, reasoning spaces, targeted reteaching, an evidence record, and a three-session inquiry.

Aligned to currently implemented NC standards. The standards adopted in 2026 begin implementation in 2028-29; this packet uses the current code and wording.

Free sample | Contents

NC.6.EE.3 | Sixth Grade mathematics

This sample contains 13 complete selected pages from the 93-page resource, plus this sample contents page. Original printed page numbers are retained. Gaps are intentional.

Included original pages: 1-9, 11-12, 62, 77

Representative activities

M01: sample PDF page(s) 10; original page(s) 9

M02: sample PDF page(s) 10; original page(s) 9

O01: sample PDF page(s) 11; original page(s) 11

O02: sample PDF page(s) 12; original page(s) 12

Selected teacher prompts and keys: original page(s) 62, 77

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

How to use this packet

Navigation

Pages 3-7: standard, preparation, worked teaching model, reusable organizer, and selected-core plan. Each of the seven teaching sections then contains a script page, choice practice pages, and individual open-response pages. Worked keys, assessment tools, inquiry, and sources follow. Exact section page ranges appear on the last page.

Choose, observe, respond

Teach the selected pair in each section; use other items for later practice, interviews, or additional evidence. In I Do, the teacher completes the selected model. In We Do, students explain decisions before the teacher records them. Collaborative tasks still require an individual explanation. Keep the answer-key pages teacher-only.

Student response routes

Students may write, draw, speak, sign, use AAC, or dictate mathematical explanations. A scribe records without choosing operations or correcting reasoning. Read wording neutrally; do not emphasize a clue word or break the expression into the intended operations for the learner. Record these access supports separately from mathematical prompts.

What counts as evidence

MC choices show recognition, not full performance. Collect an original expression or transformation and an explanation on an open task. A correct value without the required reasoning does not establish every target. One successful item is a teaching signal, not a certified mastery decision.

TEACHER GUIDE

Standard and learning targets

NC.6.EE.3

Apply the properties of operations to generate equivalent expressions without exponents.

A | I can distribute a factor and factor a sum without changing its value.

B | I can use commutative and associative properties.

C | I can combine like terms and explain why unlike terms stay separate.

Essential question: How can we change the form of an expression without changing its value?

Boundary: All expressions in this packet are WITHOUT exponents. Examples use nonnegative whole-number coefficients and constants; the property identities are not restricted to particular substitutions. Area sketches interpret nonnegative variable lengths and are not drawn to scale.

TEACHER GUIDE

Prepare and support

Prerequisites and materials

Paper, pencil, optional colored pencils, and this packet are sufficient. Students should recall multiplication, division, fractions, and the meaning of equality. For formula work review length, area, and volume units. No proprietary manipulative or external worksheet is required. Use calculators only after the written structure is clear; record calculator use.

Vocabulary in context

Equivalent: equal in value for every allowed input. Distribute: multiply every addend by the outside factor. Factor: reverse distribution. Like terms share the same variable part. Commutative changes order; associative changes grouping.

Access without giving the mathematics away

Offer enlarged print, a straightedge for tracking lines, neutral read-aloud, and the blank organizer. A multilingual glossary may translate operation names but must not translate the item directly into its solution. Invite an initial oral explanation before transcription. Extra time is not an error.

Respond to a misconception

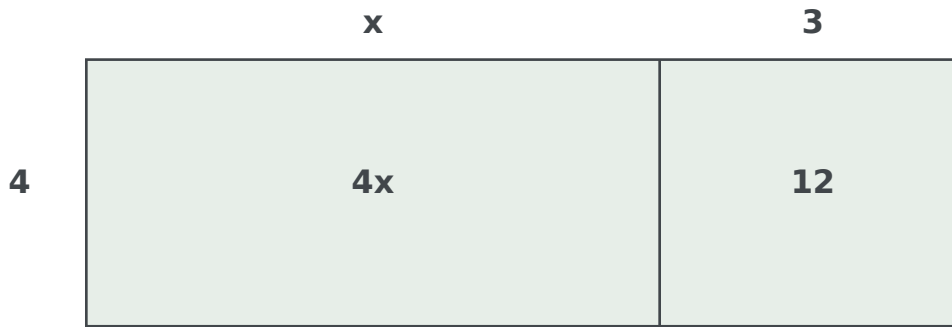
If only one addend is multiplied, sketch a split rectangle and trace the common height through both regions. If x terms and constants merge, compare what each piece counts. Reconstruct the original by reversing the transformation.

TEACHER MODEL

Think aloud and connect

Model: $4(x + 3) + 2x$

Say: “I distribute 4 across both parts: $4x + 12 + 2x$. I reorder the addends to place like terms together: $4x + 2x + 12$. I factor x from the like terms: $(4 + 2)x + 12 = 6x + 12$. No exponent is needed.”



Conceptual area organizer, not to scale: $4(x + 3) = 4x + 12$. The shared height multiplies both widths. The pictured area model uses nonnegative x ; the property also applies beyond a particular drawing.

Reverse check: $6x + 12 = 2(3x + 6)$. Both are equivalent to the original. Multiplying 6 by 12 or merging the constant into $18x$ would change the expression.

REUSABLE STUDENT ORGANIZER

Keep the structure visible

Name: _____ Date: _____ Item: _____

Copy the expression or pair exactly. Keep grouping symbols, operations, and powers attached to the correct quantities.

1. Given expression(s) / context and allowed values**2. Structure map / diagram / substitution or transformation steps****3. Conclusion, units if needed, and mathematical reason**

TEACHER GUIDE

Selected core and evidence

Warm-up | 8 minutes | Bank M01-M04, O01-O04. Selected core: M01 and O01.

I Do | 12 minutes | Bank M05-M08, O05-O08. Selected core: M05 and O05.

We Do | 15 minutes | Bank M09-M13, O09-O13. Selected core: M09 and O09.

Collaborative practice | 13 minutes | Bank M14-M18, O14-O18. Selected core: M14 and O14.

Independent practice | 17 minutes | Bank M19-M23, O19-O23. Selected core: M19 and O19.

Small-group reteach | 10 minutes | Bank M24-M27, O24-O27. Selected core: M24 and O24.

Exit ticket | 5 minutes | Bank M28-M30, O28-O30. Selected core: M28 and O28.

Pacing

The seven sections total 80 minutes. Split after We Do for two shorter lessons, or extend modeling and conferences across several days. The core selects 14 items, including teacher/shared models; the other 46 are optional practice. If students need more time for a written explanation, omit a choice item rather than rush the reasoning.

Collect by target

A: O06, O07, O08, O09, O14, O15, O17, O19, O20, O24, O25, O30.

B: O03, O04, O18, O22, O23, O26.

C: O01, O02, O05, O10, O11, O12, O13, O16, O21, O27, O28, O29.

Before teaching, read the key for each selected item. Use open work to decide whether to reteach structure, the property argument, arithmetic, or interpretation. Record which parts were supplied by the adult.

TEACHER SCRIPT | WARM-UP

Warm-up • 8 minutes

Purpose: I can combine like terms and explain why unlike terms stay separate.
Selected items: M01 and O01.

0-2 min | Invite students to read the expression structure before calculating. Ask: “What is being acted on as one whole quantity?”

2-4 min | Display M01. Ask students to choose privately, then justify without using the answer letter as evidence.

4-6 min | Use O01. Invite a prediction, pause for individual thinking, and record a property or operation reason.

6-8 min | Collect the response. Ask: “What mathematical reason makes this step valid?” Record target, reasoning, and the support used.

Exact teaching anchor

Say: “Every new form must have the same value. I name the property that changes the form, and I keep unlike terms separate.”

Teacher-only selected solution: $6x + 7x = (6 + 7)x = 13x$ by the distributive property in reverse. The constant 8 remains separate: $13 \times x + 8$. At $x = 2$, both expressions equal 34. This check supports, but does not replace, the property justification.

Look/listen for: a preserved grouping or variable meaning, a valid calculation or transformation, and a stated mathematical reason. If the first step is wrong, isolate that step with the organizer; do not supply the final answer. Early finisher: invent a tempting incorrect expression and explain exactly where it changes the meaning.

STUDENT CHOICE BANK | WARM-UP

Choose and explain • M01

Name: _____ Date: _____

M01 | Target C | Which expression equals $6 \times (x+7)+8 \times x$ for every x ?

A. $14 \times x+42$

B. $14 \times x+7$

C. $14 \times (x+7)$

D. $48 \times x+42$

My reason / useful calculation: _____

M02 | Target B | Which rearrangement preserves the value of $(3+x)+4$?

A. $3 \times x+4$

B. $x+6$

C. $7 \times x$

D. $x+7$

My reason / useful calculation: _____

STUDENT OPEN BANK | WARM-UP

001 • Show your reasoning

Name: _____ Date: _____

Target C | I can combine like terms and explain why unlike terms stay separate.

Rewrite $6 \times x + 7 \times x + 8$ with fewer terms. Explain which terms are alike and why the constant cannot be combined with them. Check using $x = 2$.

A. Expression / steps / labeled diagram**B. Explanation / check / conclusion**

STUDENT OPEN BANK | WARM-UP

002 • Show your reasoning

Name: _____ Date: _____

Target C | I can combine like terms and explain why unlike terms stay separate.

Simplify $3 \times (x+4) + 5 \times x$. Give a chain of equal expressions, name the properties, and explain why your reasoning works for every x .

A. Expression / steps / labeled diagram**B. Explanation / check / conclusion**

TEACHER KEY | MULTIPLE CHOICE

M01-M02 • Worked solutions**M01 | A | $14 \times x + 42$**

Distribute: $6x + 42 + 8x$. Reorder and combine the x terms: $(6 + 8)x + 42 = 14 \times x + 42$.

Option B: Loses distribution to a constant, applies an extra factor, or miscalculates like-term coefficients. For example, at $x = 1$, the intended expression is 56, but this option is 21.

Option C: Loses distribution to a constant, applies an extra factor, or miscalculates like-term coefficients. For example, at $x = 1$, the intended expression is 56, but this option is 112.

Option D: Loses distribution to a constant, applies an extra factor, or miscalculates like-term coefficients. For example, at $x = 1$, the intended expression is 56, but this option is 90.

M02 | D | $x + 7$

$(3 + x) + 4 = x + (3 + 4) = x + 7$. Commutativity changes the order of addends; associativity changes their grouping.

Option A: Changes an operation or miscalculates the constant instead of preserving the addends. For example, at $x = 1$, the intended expression is 8, but this option is 7.

Option B: Changes an operation or miscalculates the constant instead of preserving the addends. For example, at $x = 1$, the intended expression is 8, but this option is 7.

Option C: Changes an operation or miscalculates the constant instead of preserving the addends. For example, at $x = 1$, the intended expression is 8, but this option is 7.

TEACHER KEY | OPEN RESPONSE

001-003 • Sample responses**001 | Target C**

$6x + 7x = (6 + 7)x = 13x$ by the distributive property in reverse. The constant 8 remains separate: $13 \times x + 8$. At $x = 2$, both expressions equal 34. This check supports, but does not replace, the property justification.

Accept other mathematically equivalent forms or valid arguments that meet every requested part. Record omissions separately from computational errors.

002 | Target C

Distribute: $3x + 12 + 5x$. Reorder and combine the x terms: $(3 + 5)x + 12 = 8 \times x + 12$. Every equality follows from an operation property, so it does not rely on one chosen substitution.

Accept other mathematically equivalent forms or valid arguments that meet every requested part. Record omissions separately from computational errors.

003 | Target B

$(5 + x) + 6 = x + (5 + 6) = x + 11$. Commutativity changes the order of addends; associativity changes their grouping.

Accept other mathematically equivalent forms or valid arguments that meet every requested part. Record omissions separately from computational errors.