

Expressions and Equations

Unit 5 Overview: 8 lessons

Students learn that grouping symbols decide what is done first. The same numbers grouped two ways can have different values; multiplying and dividing come before adding and subtracting, each from left to right; brackets and braces are worked from the inside out, one step on each line. Then they write expressions from words and compare expressions without working them out: $6 \times$ (a big sum) is 3 times as large as $2 \times$ (the same sum). In some states the unit goes on to true or false equations with a value put in, where a pair of parentheses goes, equivalent expressions with the properties, expressions and equations with a letter, and multi-step stories with a letter for the unknown (lessons 5.5 to 5.8). Ask “what do you do first, and how do you know?” every day.

THE UNIT, DAY BY DAY

Day 1	Pre-Check	What students already know, before the first lesson.
Day 2	5.1 Parentheses first	I can work inside parentheses first.
Day 3	5.2 The order of operations	I can multiply and divide before I add and subtract.
Day 4	5.3 Brackets and braces	I can work from the inside out with brackets and braces.
Day 5	5.4 Write and compare expressions	I can write an expression and compare without working it out.
Day 6	5.5 True or false? Where do the parentheses go? ★	I can tell if an equation is true and place parentheses.
Day 7	5.6 Equivalent expressions ★	I can use the properties to write equal expressions.
Day 8	5.7 Variables ★	I can write and evaluate expressions with a letter.
Day 9	5.8 Multi-step stories with a letter ★	I can write and solve an equation for a story.
Day 10	Unit Review	The review, to go over together.
Day 11	Unit Test	Form A; Form B (other numbers) is for a retest.

★ Taught in 5th grade in some states. Skip these lessons if yours teaches them in another grade; animalmath.com/standards shows your state's list.

GET READY FOR THE UNIT

- Expression cards (the same numbers grouped two ways) and story cards for each pair
- Highlighters or colored pencils for the step that comes first
- Whiteboards and dry erase markers, and sticky notes
- Grid paper (1 centimeter) for rectangles in lesson 5.6
- Chart paper for anchor charts: the order of operations, from the inside out, words for operations

HOW EACH LESSON GOES

- 1. Warm up** (5 min)
 - 2. Teach** (10 min)
 - 3. Try it together** (10 min)
 - 4. Practice** (15 min)
 - 5. Exit ticket** (5 min): a quick check on the lesson.
- Each lesson page ends with the Animal Math sheets, makers, tools and quizzes for it. “Sheet 3” is the third worksheet of a pack; a color pack prints each sheet again in black and white.

CHECKING AS YOU GO

PRINTABLE	Pre-Check: Day 1, with a key	EXIT TICKET	Exit Tickets: one a lesson, two to a page
PRINTABLE	Unit Review: the day before the test	PRINTABLE	Unit Test: Forms A and B, with keys



Expressions and Equations

Lesson 5.1: Parentheses first

GOAL Students work inside parentheses first, write each step on its own line, and see that the same numbers grouped two ways can have different values: $(10 + 6) \div 2 = 8$, but $10 + (6 \div 2) = 13$.

About 45 minutes

I can work inside parentheses first.

THE LESSON

- 1 Warm up** (5 min) Write $18 - 6 - 2$. Half the class subtracts 6 first, the other half finds $6 - 2$ first. Compare the answers, 10 and 14. How could we show which step to do first?
- 2 Teach** (10 min) Write $(10 + 6) \div 2$ and highlight the parentheses. Work inside them first: $10 + 6 = 16$. Write the new expression, then finish: $(10 + 6) \div 2 = 16 \div 2 = 8$. Now group the same numbers another way: $10 + (6 \div 2) = 10 + 3 = 13$. Same numbers, same order, different values. One more pair: $(15 - 3) \times 2 = 24$ and $15 - (3 \times 2) = 9$.
Say: "Parentheses say 'do me first.' I work inside them, write the new expression, then finish."
- 3 Try it together** (10 min) Pairs get cards with the same numbers grouped two ways, $(21 + 7) \div 7$ and $21 + (7 \div 7)$, $(11 - 5) \times 2$ and $11 - (5 \times 2)$. Each partner works one card of a pair, writing every step, and they compare. Then they put parentheses in $7 \times 6 - 2$ two ways and find both values (40 and 28).
- 4 Practice** (15 min) Students do sheet 1 of Order of Operations: work inside the parentheses, writing the step, then the same numbers grouped two ways.
- 5 Exit ticket** (5 min) Students do **Exit Ticket 5.1** and circle a face beside the "I can" line. On question 1, look for 14 and 4; 14 for both means the parentheses were skipped in the second. On question 2, look for 8×7 and 56; 98 means 8×13 was done first.

Need help? Cover everything outside the parentheses with a sticky note, work what shows, then take the note away.

Ready for more? Use 2, 6 and 8 with + and $\times$ and one pair of parentheses. Find the greatest and the least value you can make.

GET READY

- Expression cards with the same numbers grouped two ways
- Highlighters
- Whiteboards and markers

WORDS TO USE

expression: numbers and signs that stand for a value, with no equal sign, like 3×9

parentheses: the marks () that group numbers; work inside them first

value: the number an expression is worth

ASK

- What is inside the parentheses?
- What is the new expression after the first step?
- Why do these two expressions have different values?

WATCH FOR

Works left to right and skips the parentheses. Highlight the parentheses before starting, and write that step first.

Writes only the answer. Write the new expression after each step: it shows where a slip happened.

ON ANIMAL MATH

PRINTABLE

Order of Operations: sheet 1

QUIZ

Order of Operations Quiz: the Parentheses First level

EXIT TICKET

5th Grade Expressions and Equations Exit Tickets: Exit Ticket 5.1

Expressions and Equations

Lesson 5.2: The order of operations

GOAL Students follow the order of operations: groups first, then $\times$ and $\div$ from left to right, then $+$ and $-$ from left to right. They number the operations 1, 2, 3 over the signs before working anything out.

About 45 minutes

I can multiply and divide before I add and subtract.

THE LESSON

- 1 Warm up** (5 min) Find $(12 + 3) \times 2$ and $12 + (3 \times 2)$. Then ask: what if there were no parentheses at all?
- 2 Teach** (10 min) Write $25 - 3 \times 6 + 4$. There are no groups, so $\times$ and $\div$ come first: number the $\times$ as 1, then the $-$ as 2 and the $+$ as 3, left to right. $3 \times 6 = 18$, then $25 - 18 = 7$, then $7 + 4 = 11$. Next, $32 \div 4 \times 2$: $\times$ and $\div$ go left to right, so $8 \times 2 = 16$, not $32 \div 8$. And $40 - 12 + 5 = 28 + 5 = 33$: $+$ and $-$ go left to right too.
Say: "First groups, then times and divide from left to right, then plus and minus from left to right. I number the steps before I start."
- 3 Try it together** (10 min) Pairs number the operations in $6 + 20 \div 5 \times 3$ and in $50 - 4 \times 9 + 1$, then find the values (18 and 15). Then show a classmate's work: $9 + 6 \times 2 = 15 \times 2 = 30$. What went wrong, and what is the value?
- 4 Practice** (15 min) Students do sheet 2 of Order of Operations: find the value, then number the operations and find the value.
- 5 Exit ticket** (5 min) Students do **Exit Ticket 5.2** and circle a face beside the "I can" line. On question 1, look for $\div$ as 1, $-$ as 2 and $+$ as 3, and 41; 5 means the student worked left to right, and 37 means $+$ was done before $-$. On question 2, look for 16 and 42; 4 means $\times$ was done before $\div$, and 30 means $+$ before $-$.

Need help? Circle the $\times$ and $\div$ signs in one color and the $+$ and $-$ signs in another, then number the circles.

Ready for more? Write an expression with three operations where the last sign is done first, and trade with a partner.

GET READY

- An anchor chart: 1 groups, 2 $\times$ and $\div$ left to right, 3 $+$ and $-$ left to right
- Two colors of pencil
- Whiteboards and markers

WORDS TO USE

order of operations: the rules for which step comes first

left to right: $\times$ and $\div$ are one step, and $+$ and $-$ are one step: do them in the order you read them

ASK

- Are there any groups?
- Which operation is number 1? Why?
- Two operations are on the same step: which goes first?

WATCH FOR

Always multiplies before dividing. $\times$ and $\div$ are one step, so go left to right: $32 \div 4 \times 2$ is 8×2 .

Always adds before subtracting. $+$ and $-$ are one step too: $40 - 12 + 5$ is $28 + 5$.

Works left to right from the start. Number the operations over the signs before working anything out.

ON ANIMAL MATH

PRINTABLE

Order of Operations: sheet 2

QUIZ

Order of Operations Quiz: the Order of Operations level

EXIT TICKET

5th Grade Expressions and Equations Exit Tickets: Exit Ticket 5.2

Expressions and Equations

Lesson 5.3: Brackets and braces

GOAL Students work expressions with two and three levels of grouping from the inside out: parentheses, then brackets, then braces. They write one step on each line and copy what they have not worked yet.

About 45 minutes

I can work from the inside out with brackets and braces.

THE LESSON

- 1 Warm up** (5 min) Find $5 \times (7 - 2)$ and $5 \times 7 - 2$. Which one do the parentheses change?
- 2 Teach** (10 min) Write $3 \times [12 - (2 + 4)]$. Start inside the parentheses: $2 + 4 = 6$, so $3 \times [12 - 6]$. Then the brackets: $3 \times 6 = 18$. One step a line, copying everything not yet worked. Then braces: $\{[(8 + 4) \div 3] \times 5\} - 6 = \{[12 \div 3] \times 5\} - 6 = \{4 \times 5\} - 6 = 20 - 6 = 14$.
Say: "I work from the inside out: parentheses, then brackets, then braces. On each new line I copy everything I have not worked yet."
- 3 Try it together** (10 min) Pairs work $40 - [2 \times (5 + 7)]$ (16) and $[(9 - 3) \times 2] \div 4$ (3) on whiteboards, a line for each step, and check each other's lines. Then one with braces: $\{60 - [4 \times (2 + 3)]\} \div 8$ (5).
- 4 Practice** (15 min) Students do sheet 3 of Order of Operations: brackets step by step, then braces in a space to work.
- 5 Exit ticket** (5 min) Students do **Exit Ticket 5.3** and circle a face beside the "I can" line. On question 1, look for $4 \times [20 - 12]$, 4×8 and 32; 68 means 4×20 was done first. On question 2, look for 22 with the steps written; 34 means 4×3 was done before the brackets were finished.

Need help? Color the parentheses, brackets and braces three colors and work the colors in order.

Ready for more? Put parentheses and brackets in $2 \times 9 - 3 + 4$ two different ways and find both values.

GET READY

- Three colors of pencil for (), [] and { }
- Grid paper or lined paper for the steps
- Whiteboards and markers

WORDS TO USE

brackets: the marks [] that group a part holding parentheses

braces: the marks { } that group a part holding brackets

inside out: the innermost group first, then the next one out

ASK

- Which group is the innermost?
- What did you copy down unchanged?
- How many lines will this one take?

WATCH FOR

Works the outside operation first. Find the innermost parentheses and box them before starting.

Drops a number or a sign when copying. Point to each number and sign: is it on the next line?

ON ANIMAL MATH

PRINTABLE

Order of Operations: sheet 3

QUIZ

Order of Operations Quiz: the Brackets and Braces level

EXIT TICKET

5th Grade Expressions and Equations Exit Tickets: Exit Ticket 5.3



Expressions and Equations

Lesson 5.4: Write and compare expressions

GOAL Students write expressions from words, with parentheses where the words say to do something first, read expressions in words, and compare two expressions without working them out: $6 \times (1,284 + 539)$ is 3 times as large as $2 \times (1,284 + 539)$.

About 45 minutes

I can write an expression and compare without working it out.

THE LESSON

- 1 Warm up** (5 min) Say “add 9 and 5, then multiply by 4”. Students write it on whiteboards. Compare what they wrote.
- 2 Teach** (10 min) Write the words as $(9 + 5) \times 4$: the parentheses keep the adding first, while $9 + 5 \times 4$ means something else. Read $6 \times (12 + 7)$ as “6 times the sum of 12 and 7”. Now compare without working it out: $6 \times (1,284 + 539)$ is 6 copies of the sum, and $2 \times (1,284 + 539)$ is 2 copies of the same sum, so the first is 3 times as large.
Say: “I look for what the words say to do first and put parentheses around it. To compare, I look at what is the same and what is different.”
- 3 Try it together** (10 min) Pairs match word cards to expressions: “subtract 4 from 19, then multiply by 2” with $(19 - 4) \times 2$; “divide 42 by 6, then add 10” with $42 \div 6 + 10$. Then they write words for $5 \times (8 - 3)$ and decide, without working it out, how many times as large $9 \times (465 + 78)$ is as $3 \times (465 + 78)$.
- 4 Practice** (15 min) Students do sheet 4 of Order of Operations: words to expressions and back, stories as expressions, comparing without working them out, and the value of an expression when $n = 6$.
- 5 Exit ticket** (5 min) Students do **Exit Ticket 5.4** and circle a face beside the “I can” line. On question 1, look for $(14 + 6) \times 3$ or $3 \times (14 + 6)$; without the parentheses the adding no longer comes first. On question 2, look for 2; 4 means the student subtracted $8 - 4$.

Need help? Underline the first action in the words and put parentheses around it before writing the rest.

Ready for more? Write two expressions with the same big sum where one is 7 times as large as the other. Trade with a partner to check.

GET READY

- Word cards and expression cards to match
- A chart of words for operations: sum, difference, product, quotient, times
- Whiteboards and markers

WORDS TO USE

sum: the answer to adding

product: the answer to multiplying

times as large: how many copies of one value make the other

ASK

- Which words tell you what to do first?
- Where do the parentheses go?
- How can you tell which is larger without finding the values?

WATCH FOR

Writes $9 + 5 \times 4$ for “add 9 and 5, then multiply by 4”. Ask what that expression does first. Parentheses keep the adding first.

Writes “subtract 4 from 19” as $4 - 19$. “Subtract from” starts with 19 and takes 4 away: $19 - 4$.

Works out both expressions to compare them. Cover the sum with your hand: one side is 9 copies of it, the other 3 copies.

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PRINTABLE

Order of Operations: sheet 4

QUIZ

Order of Operations Quiz: the Write Expressions level

EXIT TICKET

5th Grade Expressions and Equations Exit Tickets: Exit Ticket 5.4

Expressions and Equations

Lesson 5.5: True or false? Where do the parentheses go?

GOAL Students put a value in for n and find each side to decide whether an equation is true, and add one pair of parentheses to make an equation true by trying each place it can go.

About 45 minutes

★ Taught in 5th grade in some states

I can tell if an equation is true and place parentheses.

THE LESSON

- 1 Warm up** (5 min) Play a round of the Equal Sign Quiz (True or False level) as a class. Then ask: is $4 \times 5 = 30 - 10$ true? Find each side: 20 and 20.
- 2 Teach** (10 min) Write $2 \times (n + 6) = 22$ and say $n = 5$. Put 5 in place of n and keep the parentheses: $2 \times (5 + 6) = 2 \times 11 = 22$. Both sides are 22, so it is true. When $n = 4$ it is false: $2 \times 10 = 20$. Then add one pair of parentheses to make $4 + 5 \times 7 - 3 = 60$ true. Try each place:
 $4 + (5 \times 7) - 3$ is still 36, and $4 + 5 \times (7 - 3) = 24$.
 $(4 + 5) \times 7 - 3 = 9 \times 7 - 3 = 60$, so that is the place.
Say: "I put the number in place of the letter and find each side. For parentheses, I try every place and check each one."
- 3 Try it together** (10 min) Pairs test $3 \times (n - 2) = 21$ for $n = 9$ (true) and for $n = 8$ (false). Then they add one pair of parentheses to make $6 + 2 \times 4 + 1 = 33$ true, trying every place, and explain why only one works.
- 4 Practice** (15 min) Students do sheet 5 of Order of Operations (true or false, where the parentheses go, the riddle), then problems 1 to 7 on sheet 4 of Variables and Equations (true or false for the value given) and sheet 2 ($=$ or $\neq$, a number that makes it true).
- 5 Exit ticket** (5 min) Students do **Exit Ticket 5.5** and circle a face beside the "I can" line. On question 1, look for True, then False: $6 \times 8 = 48$, but $20 \div 4$ is 5, not 4. On question 2, look for $(3 + 5) \times 4 - 2$; a student who wrote it elsewhere did not check the value.

Ready for more? Write an equation with parentheses that is true when $n = 4$ and false when $n = 5$. Trade with a partner.

GET READY

- Equation cards
- Sticky notes to cover a letter
- Whiteboards and markers

WORDS TO USE

equal sign: both sides have the same value

true: both sides have the same value when the number is put in

n: a letter that stands for a number

ASK

- What number goes in place of n ?
- What is the value of each side?
- Where else could the parentheses go? Did you try them all?

WATCH FOR

Drops the parentheses when putting the number in: $2 \times 5 + 6 = 16$. Keep the parentheses when 5 takes the place of n : $2 \times (5 + 6)$.

Puts parentheses around the whole side. That changes nothing. Try each pair of numbers next to each other, then three at a time.

Need help? Write the value of n on a sticky note and lay it over the letter, then work the side with the parentheses still there.

ON ANIMAL MATH

PRINTABLE

Order of Operations: sheet 5

PRINTABLE

Variables and Equations: sheet 2, and sheet 4, problems 1 to 7

QUIZ

Order of Operations Quiz: the Where Do the Parentheses Go? level

QUIZ

Equal Sign Quiz: the True or False level

EXIT TICKET

5th Grade Expressions and Equations Exit Tickets: Exit Ticket 5.5

Expressions and Equations

Lesson 5.6: Equivalent expressions

GOAL Students use the order, grouping and distributive properties to write equal expressions and to multiply in their heads: $4 \times 17 \times 25 = 4 \times 25 \times 17 = 1,700$, and $7 \times 62 = 7 \times 60 + 7 \times 2$. **About 45 minutes** ★ Taught in 5th grade in some states

I can use the properties to write equal expressions.

THE LESSON

- 1 Warm up** (5 min) Mental math: $2 \times 37 \times 5$. Who found a fast way? ($2 \times 5 = 10$, then $10 \times 37 = 370$.)
- 2 Teach** (10 min) Order: $4 \times 17 \times 25 = 4 \times 25 \times 17 = 100 \times 17 = 1,700$. Grouping: $(46 + 27) + 3 = 46 + (27 + 3) = 46 + 30 = 76$. Distributive: draw a rectangle 7 squares tall and 62 long, cut it into 60 and 2. Its area is $7 \times 60 + 7 \times 2 = 420 + 14 = 434$, so $7 \times 62 = 434$. Each pair of expressions has the same value, so they are equivalent.
Say: "Moving or regrouping the numbers does not change the value. Breaking a number apart works if I multiply every part."
- 3 Try it together** (10 min) Pairs draw 6×24 on grid paper, cut it into 6×20 and 6×4 , and write $6 \times 24 = 6 \times 20 + 6 \times 4 = 144$. Then they fill in missing numbers on the board: $15 \times 8 \times 2 = 15 \times 2 \times \square$ and $(55 + 19) + 1 = 55 + (\square + 1)$, and name the property each one uses.
- 4 Practice** (15 min) No sheet teaches this at 5th grade size yet. Students start with sheets 4 and 5 of Properties of Operations and sheet 4 of Break Apart to Multiply (3rd and 4th grade facts, a step back), then write each property with a 2-digit number on a whiteboard and check that both sides have the same value.
- 5 Exit ticket** (5 min) Students do **Exit Ticket 5.6** and circle a face beside the "I can" line. On question 1, look for 13 and 18. On question 2, look for $6 \times 50 + 6 \times 8$ circled; $6 \times 50 + 8$ means only the tens were multiplied, and $6 \times 5 + 6 \times 8$ means 58 was split into 5 and 8, so draw the rectangle and label both parts.

Need help? Build 7×62 with base-ten blocks: 7 rows of 6 rods and 2 cubes. Count the rods and the cubes apart, then add.

Ready for more? Find 99×6 in your head as 100×6 take away 1×6 , and explain why it works.

GET READY

- Grid paper (1 centimeter) and colored pencils
- Property cards: order, grouping, distributive
- Whiteboards and markers

WORDS TO USE

order property: add or multiply numbers in any order: $4 \times 25 = 25 \times 4$

grouping property: group the numbers either way when every sign is + or every sign is $\times$

distributive property: multiply each part of a number, then add: $7 \times 62 = 7 \times 60 + 7 \times 2$

equivalent: having the same value

ASK

- Which numbers are easy to put together first?
- Does the value change when you move or regroup the numbers?
- How does the rectangle show both parts?

WATCH FOR

Multiplies only one part: $7 \times 62 = 7 \times 60 + 2$.

Draw the rectangle: both parts are 7 rows tall, so both are multiplied by 7.

Regroups a subtraction:

$(25 - 9) - 4 = 25 - (9 + 4)$. Work both sides: 12 and 20. The grouping property is for all + or all $\times$.

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PRINTABLE

Properties of Operations: sheets 4-5 (3rd and 4th grade), a step back

PRINTABLE

Break Apart to Multiply: sheet 4 (3rd grade), a step back

EXIT TICKET

5th Grade Expressions and Equations Exit Tickets: Exit Ticket 5.6

Expressions and Equations

Lesson 5.7: Variables

GOAL Students write expressions with a letter from words (5 more than twice a number n is $2 \times n + 5$), evaluate them for a value of n , and write and solve a one-operation equation for a story. **About 45 minutes** ★ Taught in 5th grade in some states

I can write and evaluate expressions with a letter.

THE LESSON

- 1 Warm up** (5 min) A box holds 6 pencils. How many pencils are in 2 boxes? 5 boxes? b boxes? Write $6 \times b$.
- 2 Teach** (10 min) “5 more than twice a number n ” is $2 \times n + 5$. When $n = 7$: $2 \times 7 + 5 = 19$. “Twice the sum of a number n and 5” is $2 \times (n + 5)$, and when $n = 7$ it is 24. Then a story: Ana had some stamps and got 26 more. Now she has 75. Write $s + 26 = 75$ with s for the stamps she had. Undo the adding: $s = 75 - 26 = 49$ stamps.
Say: “The letter stands for a number. To evaluate, I put the number in. To solve, I undo the operation and check.”
- 3 Try it together** (10 min) Pairs write expressions for word cards and evaluate each for $n = 4$ and $n = 10$: “8 less than 5 times a number n ” ($5 \times n - 8$: 12 and 42) and “a number n divided by 2, plus 11” ($n \div 2 + 11$: 13 and 16). Then they write and solve an equation: a baker packs 84 muffins in boxes of 6 ($6 \times b = 84$, so $b = 14$ boxes).
- 4 Practice** (15 min) Students do sheet 3 of Variables and Equations (expressions with a letter and their values), sheet 1 (one-operation equations), then problems 8 to 12 on sheet 4 (equations for stories). Early finishers do a maker sheet, where a box stands for the letter.
- 5 Exit ticket** (5 min) Students do **Exit Ticket 5.7** and circle a face beside the “I can” line. On question 1, look for $6 \times n - 4$ ($n \times 6 - 4$ is right too) and 50; $4 - 6 \times n$ means “less than” was written in the order it is read. On question 2, look for $h - 38 = 115$ and $h = 153$; 77 means the student subtracted.

Need help? Act the words out with a cup of counters for n : “twice the cup” is two cups, “then 5 more” is 5 loose counters.

Ready for more? Write an expression with n whose value is 30 when $n = 6$ and 50 when $n = 10$.

GET READY

- Word cards for expressions
- Cups and counters (a cup stands for n)
- Whiteboards and markers

WORDS TO USE

variable: a letter that stands for a number

evaluate: put a number in for the letter and find the value

equation: two sides with an equal sign; the letter is the number that makes it true

ASK

- What does the letter stand for?
- What number do you put in place of the letter?
- Which operation undoes the one in the equation?

WATCH FOR

Writes $5 - 2 \times n$ for “5 less than twice a number”. “5 less than” means take 5 away from it: $2 \times n - 5$.

Evaluates $2 \times (n + 5)$ as $2 \times 7 + 5$. Keep the parentheses when 7 takes the place of n : $2 \times (7 + 5)$.

Uses the same operation to solve $s + 26 = 75$. Ask what plus 26 is 75. Undo the adding by subtracting.

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PRINTABLE

Variables and Equations: sheets 1 and 3, and sheet 4, problems 8 to 12

MAKER

Fill in the Blank Equations: Multiplication and Division only, Range Within 100, Position Mixed

QUIZ

Order of Operations Quiz: the Write Expressions level

EXIT TICKET

5th Grade Expressions and Equations Exit Tickets: Exit Ticket 5.7

Expressions and Equations

Lesson 5.8: Multi-step stories with a letter

GOAL Students solve stories with two or more steps and all four operations: they plan the steps, write one equation with a letter for the unknown and parentheses where a step must come first, solve it, and check with an estimate.

About 45 minutes

★ Taught in 5th grade in some states

I can write and solve an equation for a story.

THE LESSON

- 1 Warm up** (5 min) Solve: 4 packs of 6 juice boxes and 5 more. Then write it as one expression: $4 \times 6 + 5$.
- 2 Teach** (10 min) Read: A club has 125 stickers and buys 3 packs of 25. It shares all of them equally among 8 members. How many does each member get? Plan the steps and say what each answer means: $3 \times 25 = 75$ stickers bought, $125 + 75 = 200$ in all, $200 \div 8 = 25$ each. Write one equation with s for the stickers each member gets: $(125 + 3 \times 25) \div 8 = s$. The parentheses keep the adding before the dividing.
Say: "I plan the steps and say what each answer means. Then I write one equation, with parentheses where a step must come first, and check that the answer makes sense."
- 3 Try it together** (10 min) Pairs plan, write an equation and solve: A coach buys 7 shirts for \$14 each and 3 caps for \$9 each. She pays with \$150. How much change does she get? $(150 - (7 \times 14 + 3 \times 9)) = c$, so $c = 25$ dollars.) Then they check with an estimate: about $150 - 130 = 20$.
- 4 Practice** (15 min) Students do sheets 3 and 5 of Multi-Step Word Problems (match and write equations with a letter, then three steps or more with an estimate first). For a step back, sheet 5 of Equations with All Four Operations has one-step stories.
- 5 Exit ticket** (5 min) Students do **Exit Ticket 5.8** and circle a face beside the "I can" line. On question 1, look for an equation like $(14 \times 24 - 96) \div 8 = p$, with the parentheses. On question 2, look for 336, 240 and $p = 30$; 324 means $96 \div 8$ was done first.

Ready for more? Write a story for $(5 \times 18 + 40) \div 10 = n$ and solve it.

GET READY

- Story cards with two and three steps
- Strip diagram paper or grid paper
- Whiteboards and markers

WORDS TO USE

multi-step: a story that takes more than one operation

unknown: the number the story asks for, shown by a letter

reasonable: close to an estimate

ASK

- What do you find first? What does that number mean?
- Where do the parentheses go?
- Is your answer close to your estimate?

WATCH FOR

Leaves out the parentheses in the equation.

Work the equation as it is written: does it follow the story's steps?

Stops after two steps. Read the question again: what does it ask for?

Need help? Draw a bar for each step and label each answer before writing one equation.

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PRINTABLE

Multi-Step Word Problems: sheets 3 and 5

PRINTABLE

Equations with All Four Operations: sheet 5 (4th grade), a step back

MAKER

Word Problems: Problem Type Two Steps, Number Range 100–300 (adding and subtracting only), a step back

QUIZ

Word Problems Quiz: the Multi-Step Equations level

EXIT TICKET

5th Grade Expressions and Equations Exit Tickets: Exit Ticket 5.8