Writing Expressions With Numbers and Letters

Teacher		**Class**	Grade 6
Subject	Math	**Topic**	Algebraic expressions
Date		**Room**	
Lesson length	60 minutes	**Country**	United States

Students learn to turn operation words into math with letters. They sort phrases and write one-step expressions in the right order.

Curriculum links

- Write expressions that record operations with numbers and with letters standing for numbers
- Explain correspondences between equations, verbal descriptions, tables, and graphs [1]

Learning objectives

- Students will write one-step expressions for + - x ÷ phrases with letters.
- Students will keep correct order in subtraction and division with from and by.

Success criteria

- I can turn words like sum and difference into + - x ÷.
- I can write subtract y from 5 as 5 - y in right order.

What students already know

Ask: What math do we do if we hear sum? product? Show 5 - 2 and ask what words match it.

Key words

variable	a letter that stands for a number we do not know yet [6]
expression	math writing that tells what to do, with no = sign [8]
sum	answer when you put numbers together with plus [11]
difference	answer when you take one number away from another [11]
product	answer when you multiply numbers together [11]
quotient	answer when you split one number by another [11]

Materials

- phrase cards - 12 per group
- four operation mats labeled sum, difference, product, quotient
- mini whiteboards and markers
- word bank cards showing sum, difference, product, quotient with symbols
- Slides 1-4, 6-7, 9-12
- Video clip 1 (0:00-4:50) ready to play
- Worksheet Task D copies

Before the lesson

- Print phrase cards and four operation mats, one set per small group
- Print Worksheet Task D, one copy per student
- Print word bank cards for support tables
- Test Slide 6 with Video clip 1 (0:00-4:50) for sound and picture
- Set desks for groups of 3-4 with whiteboards within reach

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Lesson outline

0–5 min **Starter** 5 min · Whole class

Hook interest in code words and recall which words mean add, subtract, multiply, or divide.

YOU DO

1. Show Slide 1: Writing Algebraic Expressions: Turning words into math with numbers and letters.
2. Say the hook: Mathematicians use code words. If I say sum, difference, product, or quotient, can you tell me if I add, subtract, multiply, or divide?
3. Show Slide 2 photo and read: A letter is a box for a number we do not know yet. The number can change, the letter stays.
4. Cold-call for sum, difference, product, quotient and point to Slide 4 cards.

STUDENTS DO

1. Listen and call out the operation for each code word.
2. Repeat what a letter means in their own words to a neighbor.

Say: Mathematicians use code words. If I say sum, difference, product, or quotient, can you tell me if I add, subtract, multiply, or divide? Today we will crack that code and write it with numbers and letters.

Ask: If I say sum, do we add, subtract, multiply, or divide? (Add.) · In algebra letters called variables are used to represent what? [6] (Numbers we do not know yet.)

Check understanding: Hands up for each code word: 1 finger add, 2 subtract, 3 multiply, 4 divide. Reteach any mixed one with Slide 4.

Support: Hold up word bank showing sum means +, difference means -, product means x, quotient means ÷ [11]. **Stretch:** Ask: What other code words mean the same? Listen for plus, more than, less, times [11].

Use: Slides 1–2

5–17 min **Teaching** 12 min · Whole class

Model how to pick the operation from key words and keep order when writing with letters.

YOU DO

1. Show Slide 3 statement: An expression shows what to do, with no equal sign. Stress an algebraic expression does not contain an equals sign [8].
2. Show Slide 4 cards and explain sum, plus, more than mean +, difference, less, from mean -, product, times mean x, quotient words mean divide [11].
3. Play Video clip 1 (0:00-4:50) on Slide 6: Listen for why order matters with from. Watch how words become 5 - y.
4. Model with Slide 7 steps: Find numbers and the letter, Pick operation from key word, Keep order, write left to right, Check: no = sign.

STUDENTS DO

1. Watch the video and track why from changes the order.
2. Copy 5 - y and say back why it is not y - 5.
3. Choral respond to operation cues on Slide 4.

Say: Find the numbers and the letter first. Then use the code word to pick +, -, x, or ÷. Keep the order the same as the story, and do not add an equal sign.

Worked example: Subtract y from 5: Start amount is 5. Take y away. From tells us 5 comes first. Write 5 - y. Check with y = 2: 5 - 2 = 3, which matches subtract 2 from 5.

Ask: Why is subtract y from 5 written 5 - y and not y - 5? (We start with 5 and take y away, so 5 stays first.) · How do we show multiply with a letter without using x? (Write the number next to the letter, like 4 times x is 4x, because in algebra the cross symbol is normally not used [11] [4].)

Check understanding: All show on whiteboards: subtract y from 5. Look for 5 - y. If many show y - 5, test with numbers: subtract 2 from 5 is 5 - 2.

Support: Test with numbers first: subtract 2 from 5 is 5 - 2, not 2 - 5, then replace 2 with y. **Stretch:** Ask students to defend another tricky pair like divide 10 by x versus divide x by 10.

Use: Slides 3–4, Slide 6 with Video clip 1 (0:00–4:50), Slide 7

17–35 min **Main activity** 18 min · Groups

Sort phrases by operation and write the matching one-step expression with correct symbols and order.

YOU DO

1. Give each group four operation mats, 12 phrase cards, and whiteboards.
2. Model one: sum of a and 8 goes to sum mat. Combinations of variables and numbers along with operations form algebraic expressions [6]. Write a + 8.
3. Circulate as groups sort then write the symbol form for each, pressing for order with from, less than, and divided by.
4. Stop for show it: each group holds up two cards with the written expression, class checks if operation and order match.

STUDENTS DO

1. Sort 12 cards: sum of a and 8, add 4 to z, add n to 5, difference of m and 3, subtract y from 5, 7 less than m, product of 4 and n, 4 times x, 3 times m, quotient of 12 and p, 6 divided by n, n divided by 2.
2. Write the matching expression for each card on whiteboards.
3. Hold up two cards and explain operation and order to the class.

Say: Sort all 12 cards onto the four mats. Then write the math for each card on your whiteboard. You must agree on the operation and the order before you move on.

Worked example: Card: difference of m and 3 -> difference means subtract [11]. Start with m, take 3 away. Write m - 3. Card: product of 4 and n -> product means multiply. Write 4 x n as 4n.

Ask: Which mat does 7 less than m go to and what do you write? (Subtract mat. Write m - 7, m first.) · What do you write for quotient of 12 and p? (12 / p or 12 ÷ p, 12 first.) · Why is 4 times x written 4x? (When multiplying a number with a letter, they can be written next to each other [4].)

Check understanding: Gallery check of two expressions per group. If order is wrong, send group back to test with a number, like y = 2.

Support: Give a word bank showing sum means +, difference means - , product means x, quotient means ÷ [11]. **Stretch:** Add two-step cards like 3 more than twice x for students to write as 2x + 3.

Use: Slide 4

35–50 min **Practice** 15 min · Pairs

Write expressions alone with attention to order and check them with a partner.

YOU DO

1. Show Slide 9: Write all four on your own. Compare order with your partner. Test one with a number, like y = 2.
2. Hand out Worksheet Task D: Write each expression carefully. Watch the order.
3. Circulate, underline key words sum, difference, product, quotient for students who stall [11].
4. Show Slide 10 steps to self-check: Say it back in words. Point to numbers, letter, sign. Try a number to see if it fits.

STUDENTS DO

1. Complete Worksheet Task D on their own, writing expressions with letters.
2. Compare last four answers with partner and fix any reversed subtraction or division order.
3. Use Slide 10 to say it back and test with a number.

Say: Write each one on your own first. Watch from and by because they fix the order. Then compare with your partner and test one with a real number to prove it fits.

Worked example: add 4 to z: start with z, add 4. Write z + 4. Check z = 1: 1 + 4 = 5 fits. subtract y from 5: write 5 - y. Check y = 2: 5 - 2 = 3 fits.

Ask: How do you know n / 2 is an expression and not an equation? (It has numbers, a letter, and an operation but no equals sign [8].) · Partners explain correspondences between verbal descriptions and expressions [1]: what does your 5 - y say in words? (Subtract y from 5. 5 stays first, y is taken away.)

Check understanding: Pairs trade papers and circle any wrong order or operation. Collect Task D to spot class gaps for tomorrow.

Support: Cover target with folded flap for instant checking and start with numbers only, like 10 - 3, then swap 3 for a letter to make 10 - d. **Stretch:** Include phrases with less than that reverse order, like 7 less than m is m - 7, and two-operation mixes like 2x + 4.

Use: Slide 9, Slide 10, Worksheet Task D

50–60 min **Plenary** 10 min · Whole class

Confirm correct order and operation and link expressions to class meaning.

YOU DO

1. Show Slide 12 True or false: 5 - y means subtract y from 5. 5 stays first, y is taken away. 3m means 3 + m. Letter next to number means multiply. n / 2 is an expression.
2. Vote and correct: 3m means 3 + m is false because a number with a letter attached means multiply [4].
3. Show Slide 11 vote: What should 20 - n mean for our class? Dollars left after spending, Pages left to read, Minutes left to play.
4. Give 3-question exit ticket on paper.

STUDENTS DO

1. Vote true or false and explain why order and symbols are right or wrong.
2. Vote on what 20 - n should mean and say it in words.
3. Answer exit ticket silently.

Say: Show thumbs true or false and be ready to prove it. Then we will pick what n means for us and show what you can write on your own.

Ask: True or false: Letter next to number means multiply? (True. 3m means 3 times m [4].) · If 20 - n is dollars left after spending, what is n? (Dollars spent. Numbers are constants and the letter is the changing value [4].)

Check understanding: Exit tickets: if many reverse order, reteach tomorrow with numbers-first test before new work.

Support: Let students carry a cue card that pairs sum, difference, product, quotient with its symbol. **Stretch:** Ask students to make up and defend another tricky pair like divide 10 by x versus divide x by 10.

Use: Slides 11–12

Common mistakes

Mistake	How to spot it	How to fix it
Writing y - 5 for subtract y from 5	Whiteboard shows letter first for a from phrase	Test with numbers: subtract 2 from 5 is 5 - 2, not 2 - 5, so keep 5 first to get 5 - y [11].
Writing 3m as 3 + m	Plus sign added when letter sits next to number	Show a number with a letter attached means multiply, so 3m is 3 times m [4].
Adding = sign, like 5 - y = n	Equal sign and extra letter appear	Recall an expression does not contain an equals sign, which separates it from an equation [8]. Cross out = n.

Support

- Keep word bank visible pairing sum, difference, product, quotient with + - x ÷
- Test every from phrase with numbers first, then swap the number for the letter
- Underline the key operation word before writing anything

Stretch

- Write two-step expressions like 3 more than twice x as 2x + 3
- Create own tricky from and divided-by pairs and prove order with a number test

For the LSE or teaching assistant

Sit with target group during sort. Prompt to say phrase aloud, point to number, letter, sign, and test with y = 2. Check whiteboards for reversed order.

Check for understanding

Question	Answer
Write the expression: subtract y from 5.	5 - y
Write the expression: product of 4 and n.	4n
True or false: 6 divided by n is 6 / n and n is first? Explain.	False for n first. It is 6 / n with 6 first.

Homework

Write expressions for: add 5 to t, 8 less than s, 6 times r, q divided by 3.

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