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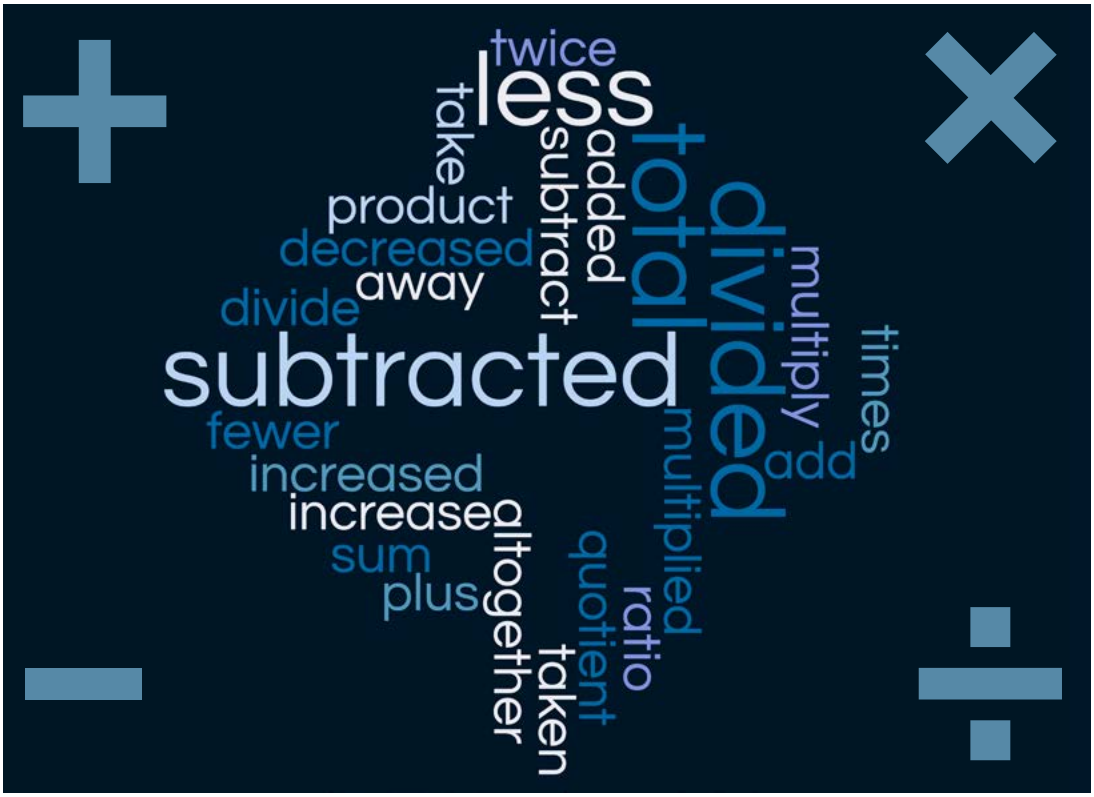
EXPRESSIONS IN WORD & NUMERICAL FORM

Volume 31

Developed with Kristin Hotter

Grade 5



TIME

45-60 minutes

CONTENT

Students will brainstorm different terms that are connected to each of the four operations. Together, you will investigate how to translate expressions from word to numerical form and vice versa.
After students have had some whole group practice, they will work with a partner to play a game of memory. Students will need to choose matches that name the numerical and word form of a particular expression.
For additional whole group practice, play a game of bingo. Students can create their own card using a mixture of word and numerical expressions provided. For additional individual practice, use the provided worksheet for independent practice.

OBJECTIVES

Students will be able to:

- Analyze the relationship between numerical and word expressions
- Convert expressions from one form to another
- Compare expressions in word and numerical form

MATERIALS

Operations Chart, Memory Card Set printed on heavy paper such as cardstock (1 set per pair of students) Bingo Card, Independent Practice Worksheet

COMMON CORE STATE STANDARDS

CCSS.Math.Content.5.OA.A.2 — Write simple expressions that record calculations with numbers, and interpret numerical expressions without evaluating them. For example, express the calculation "add 8 and 7, then multiply by 2" as 2 × (8 + 7). Recognize that 3 × (18932 + 921) is three times as large as 18932 + 921, without having to calculate the indicated sum or product.

INTRODUCTION (10 MINUTES)

(Distribute Operations Chart)

1. Think about the four mathematical operations. What are some key words or phrases that help you identify which operation to perform? Take one minute to brainstorm any words that you can think of to identify a particular operation. Write the word in the correct box on your Operations Chart.
   (If students initially struggle, give them an example. For instance, I know when I see the word plus I know I need to use addition.)
2. Turn and talk with your neighbor. Spend three minutes sharing your lists with one another. If your partner has a word or phrase you didn't think of, add it to your Operations Chart. Add any other words or phrases you can come up with together.
   (Display a blank Operations Chart)
3. We're going to put all of our brainstorming ideas together and make a class chart. If any words or phrases come up that you didn't think of, please make sure you add them to your personal Operations Chart.
   - Let's start with addition. What are some key words or phrases that help us know when we need to add? (Your list should include add, added to, sum, plus, total, altogether, increase, increased by, more, **more than**, in all, total of.)
   - What are some key words or phrases that help us know when we need to subtract? (Your list should include subtract, subtracted, **subtracted from,** less, **less than, fewer than,** take away, **taken from,** decreased by.)
   - What are some key words or phrases that help us know when we need to multiply? (Your list should include multiply, multiplied by, times, product of, twice.)
   - What are some key words or phrases that help us know when we need to divide? (Your list should include divide, divided by, **divided into,** quotient of, ratio of.)

(Ask students to put a special mark next to the key phrases listed that have been written in bold. The words from, into, and than indicate that the order of items in the expression needs to be reversed. You will go through this specifically as you work on Activity I.)

ACTIVITY I

Now that we've had a chance to review some key words and phrases, it's time to apply that review to a somewhat new concept. As we work more and more with algebra, we will work with numerical and word expressions.

A numerical expression is a mathematical sentence like 3 + 5 or 18 ÷ 6. Numerical expressions in algebra include a variable like n + 5 or x ÷ 6. Word expressions are simply that. They are the words that identify the numerical expression. Three plus five and eighteen divided by six are both word expressions. Word expressions are also used with algebraic numerical expressions. A number increased by five and a the quotient of a number and six are both examples.

ACTIVITY IA: THE SUM OF SIX AND TWELVE

Take a look at the Whole Class Practice found below your Operations Chart. The first item reads the sum of six and twelve.

- What numbers are identified in this word expression? (6 and 12)
- Put a box around those two words and write their digits above the words.
- Do any of the remaining words show up on our Operations Charts? (Yes, sum does.)
- What operation does the word "sum" indicate? (Addition)
- Underline the word "sum" and write the addition symbol above the word.
- How do we write this word expression as a numerical expression? (6 + 12)

ACTIVITY IB: FIVE DIVIDED BY 20

Now take a look at the next item. It reads five divided into twenty.

- What numbers are identified in this word expression? (5 and 20)
- Put a box around those two words and write their digits above the words.
- Which of the remaining words show up on our operations charts? (Divided into)
- What operation does the phrase "divided into" indicate? (Division)
- Underline the phrase and write the division symbol above the phrase.
- What do you notice about that particular phrase? (We put a special symbol next to it.)

All of the words and phrases on our list that have been given that special symbol require us to take an extra step.

If we kept our numerical expression as is, how would it read? (5 ÷ 20) and, sure that can be done, but the word expression asked for five to go into 20. The word "into" tells us we need to reverse the order of our digits.

The numerical expression should be 20 ÷ 5.

Look back at your operations chart. Look specifically at the phrases that have been given the special symbol. Besides "into" what other words indicate we need to reverse the order of our numbers? ("than" and "from")

Keep that in mind as we continue and as you work independently on some problems shortly.

ACTIVITY IC: SIX TIMES A NUMBER

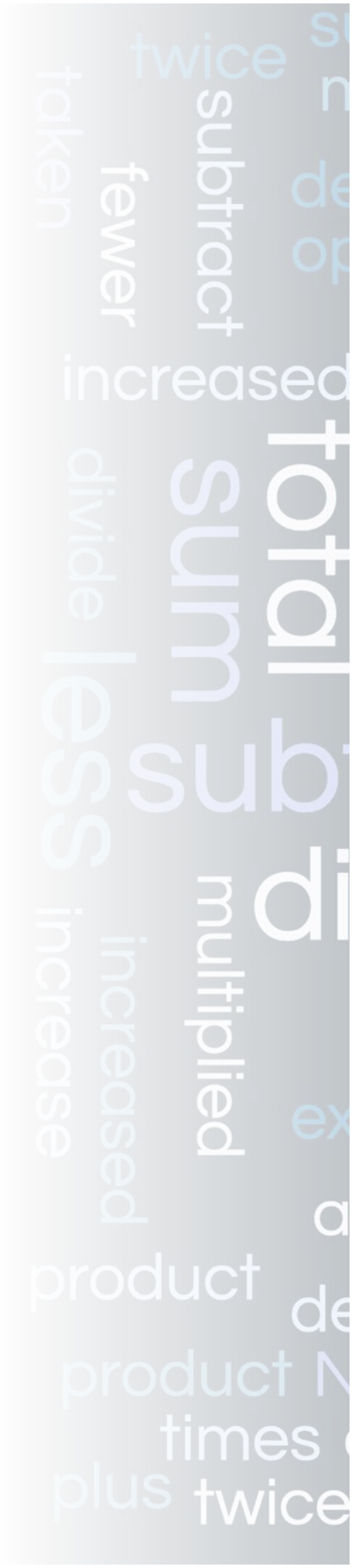
The next item reads six times a number.

- What number is identified in this word expression? (6)
- Put a box around the word and write the numeral 6 above the word.
- How does this expression differ from the previous two? (There is only one number indicated.)
- Which of the remaining words show up on our operations charts? (times)
- What operation does the word "times" indicate? (Multiplication)
- Underline the word and write the multiplication symbol above the word.
- We are left with "a number." Anytime we see "a number" it means we need to use a variable.
- What is a variable? (A letter used to represent an unknown number.)
- We need to choose a variable for this problem. Let's choose "y" for this problem. Put a box around the words "a number" and write a "y" above it.
- We are left with 6xy. When multiplication is used in algebra, the multiplication sign is dropped because it can easily be confused as the variable x.
- The final answer for this expression is 6y.

ACTIVITY ID: EIGHTY-SIX FEWER THAN A NUMBER

The next item reads eighty-six fewer than a number.

- What can we put a box around in this expression? (eighty-six and a number)
- Put a box around each and write the numerals for 86 and a variable above.
- Which of the remaining words can be found in our operation charts? (fewer than)
- What operation does that phrase indicate? (Subtraction)
- Underline the phrase and put a subtraction sign above the words.
- What else do you notice about that phrase? (It uses the word "than," so the order of numerals needs to be reversed in the numerical expression.)
- How do we write the word phrase "eighty-six fewer than a number" as a numerical expression? (g – 86)



CHECK FOR UNDERSTANDING

Students will translate the remaining expressions in the Whole Group Practice section independently. Circulate as students solve independently to assess student understanding. If students struggle, refer students to the operation chart. If you notice a large number of students struggling, reconvene the group and go through the remaining expressions together.

The sum of six and twelve $(6 + 12)$	**Five divided into twenty** $\frac{20}{5}$ or $20 \div 5$	**Six times a number** $6n$	**Eighty-six fewer than a number** $y - 86$
The quotient of fifty-six and seven $\frac{56}{7}$ or $56 \div 7$	**The difference of thirty-one and thirteen** $31 - 13$	**The product of fifteen and nine** $(15)(9)$	**Eight more than seven** $7 + 8$
Twice a number $2x$	**A number increased by four** $k + 4$	**The ratio of a number and three** $\frac{f}{3}$ or $f \div 3$	**Seventeen less than twenty-four** $24 - 17$

ACTIVITY II: MEMORY GAME

For this activity, place students in pairs. Give each pair a set of cut-out Memory Cards. Ask the pairs to place the cards face down in a 4 x 7 grid. Just like in the traditional game of Memory, students will take turns flipping two cards at a time. If the two cards flipped are a pair, the numerical and word form of the same expression, the student keeps the pair. Play continues back and forth until all matches have been uncovered. The student with the most pairs at the end of play wins.

ACTIVITY III: BINGO GAME

Give each student a bingo card. Show students the 24 numerical expressions listed. Give students a few minutes to fill in their blank bingo boxes. One expression should be placed in each box. Every expression should be used exactly once.
Read the provided word expressions randomly. As you read a phrase, students should mark or cross out the corresponding numerical phrase. Play continues until at leave five students get five in a row across, down, or diagonally.
The bingo game is the last activity because it requires students to understand differences between similar sounding word expressions. Many of the word expressions in the game are quite similar, so be sure students are equipped to notice and identify those differences.

Example: The product of 10 and 2 (10)(2) and The ratio of 10 and 2 (10 ÷ 2)

EXTENSION

Have students create their own expressions for partners to solve. Student can also name multiple ways a numerical expression can be written in words.

INTERVENTION

Split the lesson between two days. Focus heavily on addition and subtraction words and phrases during day one. Focus on multiplication and division on day two. Use the two games as culminating activities after all operations have been thoroughly covered.

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OPERATIONS CHART

ADDITION WORDS	SUBTRACTION WORDS
MULTIPLICATION WORDS	**DIVISION WORDS**

WHOLE GROUP PRACTICE

The sum of six and twelve	**Five divided into twenty**	**Six times a number**	**Eighty-six fewer than a number**
The quotient of fifty-six and seven	**The difference of thirty-one and thirteen**	**The product of fifteen and nine**	**Eight more than seven**
Twice a number	**A number increased by four**	**The ratio of a number and three**	**Seventeen less than twenty-four**

Thirteen more than a number	**d + 13**	**Seven fewer than a number**	**a – 7**
Twice a number	**2b**	**The ratio of a number and 3**	**m ÷ 3**
The total of eight and a number	**8 + u**	**A number subtracted from fourteen**	**14 – r**
The product of five and a number	**5t**	**The quotient of a number and 4**	**w ÷ 4**
A number increased by forty-four	**y + 44**	**Eighteen less than a number**	**g – 18**
Thirteen times a number	**13x**	**Seventy divided into a number**	**z ÷ 70**
Twelve subtracted from a number	**p – 12**	**A number plus fifteen**	**h + 15**

		FREE SPACE		

BINGO: NUMERICAL FORM EXPRESSIONS

Place each of the following numerical expressions in any square above to create your own BINGO card. Every square should be filled and each expression should only be placed once.

y + 11
20 x 5
h + 17
2n
20 + 5
b ÷ 11
11 – f
40 ÷ k
8 – 5
5s
5 + j
m + 3
16 – 11
20 ÷ 5
y – 17
a ÷ 2
20 – 5
16p
40 + c
(8)(5)
8 + 5
u – 5
3b
v ÷ 3

BINGO-WORD FORM EXPRESSIONS (WHAT YOU WILL READ ALOUD)

Consider cutting the cards apart and randomly drawing a card from the stack to determine the order of the expressions called.

Eleven more than a number	**Five less than eight**	**A number divided by two**	**The product of three and a number**
The product of twenty and five	**Five times a number**	**The difference of twenty and five**	**The ratio of a number and three**
The total of a number and seventeen	**The total of five and a number**	**Sixteen multiplied by a number**	**A number divided into forty**
Twice a number	**Three more than a number**	**Forty plus a number**	**Seventeen less than a number**
The sum of twenty and five	**Eleven fewer than sixteen**	**The product of eight and five**	**Five fewer than a number**
Eleven decreased by a number	**The ratio of twenty and five**	**Eight increased by five**	**The quotient of a number and eleven**

PART I: REWRITE EACH WORD EXPRESSION AS A NUMERICAL EXPRESSION.

A number minus sixty-seven	**Thirty-eight more than a number**	**The product of ten and a number**	**A number divided into seventy-two**
The quotient of a number and five	**Twenty-three less than a number**	**The total of thirty-seven and a number**	**Three times a number**

PART II: REWRITE EACH NUMERICAL EXPRESSION AS A WORD EXPRESSION.

$w + 35$	**$170 \div y$**	**$4a$**	**$63 - t$**
$h \div 3$	**$r + 91$**	**$(16)(b)$**	**$d - 48$**

PART I: REWRITE EACH WORD EXPRESSION AS A NUMERICAL EXPRESSION.

A number minus sixty-seven **a – 67**	**Thirty-eight more than a number** **b + 38**	**The product of ten and a number** **10c**	**A number divided into seventy-two** **72 ÷ d**
The quotient of a number and five **e ÷ 5**	**Twenty-three less than a number** **f – 23**	**The total of thirty-seven and a number** **g + 37**	**Three times a number** **72 ÷ d**

PART II: REWRITE EACH NUMERICAL EXPRESSION AS A WORD EXPRESSION.

w + 35 **A number plus thirty-five**	**170 ÷ y** **The quotient of one hundred seventy and a number**	**4a** **The product of four and a number**	**63 – t** **Sixty-three minus a number**
h ÷ 3 **Three divided into a number**	**r + 91** **Ninety-one more than a number**	**(16)(b)** **Sixteen times a number**	**d – 48** **Forty-eight less than a number**