

NUMBER WORLDS™

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Activity Cards

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Writing Math Add/Subtract

Objective

Students can create algebraic equations involving addition and subtraction from verbal sentences.

Materials

Program Materials

-  Translating Verbal Sentences: Addition and Subtraction, 1 per student
- Number Cards 0–100, 20 random cards per pair of students
- Plus-Minus Cube, 1 per student or pair of students

Alternative Groupings

Small Group: Complete the activity as written with students exchanging papers with anyone in the group.

Prepare Ahead

Keep extra copies of Translating Verbal Sentences: Addition and Subtraction on hand for students who finish early.

Introduce the Activity

- Explain that students will be learning to convert verbal sentences to algebraic equations.
- **What is the difference between an expression and an equation?** An equation has an equal sign and an expression does not.
- Have students suggest words or phrases that represent addition or subtraction. Write these on the board. Examples may include *plus*, *minus*, *more than*, *less than*, *increased by*, and *decreased by*.

- Demonstrate the activity by using a Number Card and Plus-Minus Cube to complete the first verbal phrase.
- Select a random Number Card and write the number in the first box. Roll the Plus-Minus Cube, and write the operation on the line. For example, if the cube has a minus sign, write *minus*, *less than*, or *decreased by*. Select another Number Card for the last box. Then write the algebraic equation.
- Point out that although *minus*, *less than*, and *decreased by* indicate subtraction, they have different meanings. Students can choose the word or phrase they would like to use, and then write the correct equation.

► What are the algebraic equations that represent the following?

48 decreased by a number m is equal to 13

$$48 - m = 13$$

48 minus a number m is equal to 13 $48 - m = 13$

- Note that *less than* has a different meaning than *decreased by* and *minus*.

Begin the Activity

- Arrange students in pairs.
- Distribute the Translating Verbal Sentences: Addition and Subtraction page to each student, at least twenty random Number Cards to each pair of students, and a Plus-Minus Cube to each student or pair of students.
- Have each student use the Number Cards and Plus-Minus Cube to fill in all numbers and operations for the verbal sentences. Encourage students to use all phrases that indicate addition and subtraction.

Verbal Sentence			Algebraic Equation
<div style="border: 1px solid black; padding: 10px; display: inline-block; text-align: center;"> 48 </div> <i>number</i>	<i>minus</i> <i>operation</i>	<div style="border: 1px solid black; padding: 10px; display: inline-block; text-align: center;"> 13 </div> <i>number</i>	$48 - m = 13$

- Students should not fill in the algebraic equation for their own paper. They will be writing the equations for their partner's paper.
- When completed, direct students to trade papers with their partner, and have each partner write the algebraic equation for each verbal sentence.

Conclude the Activity

Choose several students to explain each type of sentence. Address any misunderstandings.

Questions to Ask

- **Why do *minus* and *less than* have different meanings, while *plus* and *more than* do not?**
You can change the order of the numbers and unknowns in addition ($2 + n$ and $n + 2$). You cannot do this in subtraction; $n - 2$ is not the same as $2 - n$. Addition is commutative and subtraction is not.
- **What strategies did you use to convert each verbal sentence to an algebraic equation?**

Variation

Have students choose their own numbers for the verbal sentences instead of choosing a Number Card. Encourage students to select numbers that are fractions, decimals, or, if appropriate to their skills, negative numbers.

Challenge

Have students create their own verbal sentences without using the pre-written text on the page. Then have students trade with a partner and write the algebraic equation.




Writing Math Multiply/Divide

Objective

Students can create algebraic equations involving multiplication and division from verbal sentences.

Materials

Program Materials

-  Translating Verbal Sentences: Multiplication and Division, 1 per student
- Number Cards 0–100, 20 random cards per pair of students

Additional Materials

coin, 1 per student or pair of students

Alternative Groupings

Small Group: Complete the activity as written with students exchanging papers with anyone in the group.

Prepare Ahead

Keep extra copies of Translating Verbal Sentences: Multiplication and Division on hand for students who finish early.

Introduce the Activity

- Point out that this activity is similar to the previous activity, except that students will be using multiplication and division rather than addition and subtraction.
- Have students suggest words or phrases that represent mathematical numbers, multiplication, or division. Write these on the board. Examples may include *product*, *quotient*, *multiplied by*, and *divided by*.

- Demonstrate the activity by completing the first verbal phrase. Select a random Number Card, and write the number in the first box. Then flip the coin. If the coin lands on heads, choose the phrase for multiplication. If the coin lands on tails, choose the phrase for division. Choose from the words beneath each blank. Select another number card for the last box. Then write the algebraic equation.

Begin the Activity

- Arrange students in pairs.
- Distribute a Translating Verbal Sentences: Multiplication and Division page to each student, and at least twenty random Number Cards and a coin to each pair of students.
- Have each student use the Number Cards and coin to fill in all numbers and operations for the verbal sentences.
- When completed, direct students to trade papers with their partner, and have each partner write the algebraic equation for each verbal sentence.

Conclude the Activity

Choose several students to explain each type of sentence. Address any misunderstandings.

Questions to Ask

- Does the order of the numbers in verbal sentence matter for multiplication? What about division? Explain.
- What strategies did you use to convert each verbal sentence to an algebraic equation?

Verbal Sentence			Algebraic Equation
<div style="border: 1px solid black; padding: 10px; display: inline-block; text-align: center;">8</div> number	multiplied multiplied/divided	<div style="border: 1px solid black; padding: 10px; display: inline-block; text-align: center;">24</div> number	$8x = 24$

Variation

Have students choose their own numbers for the verbal sentences instead of choosing a Number Card. Encourage students to select numbers that are fractions, decimals, or, if appropriate to their skills, negative numbers.

Challenge

Have students create their own verbal sentences without using the pre-written text on the page. Then have students trade with a partner and write the algebraic equation.



Algebraic Equation Match

Objective

Students can create algebraic equations involving addition/subtraction and multiplication/division from verbal sentences.

Materials

Program Materials

- Algebraic Equation Cards, 1 set per pair of students
- Verbal Sentence Cards, 1 set per pair of students

Additional Materials

index cards

Alternative Groupings

Small Group: Complete the activity as written.

Prepare Ahead

Cut apart the Verbal Sentence Cards before class begins.

Introduce the Activity

- Begin by writing *Eight increased by the product of 2 and a number x is 20* on the board.
- Underline each phrase and have students state the meaning.
- ▶ **What does *eight increased by* represent?** Possible answer: 8 added to something **What does *the product of 2 and a number x* represent?** $2x$ **What does *is 20* represent?** $= 20$
- Write $8 + 2x = 20$ on the board, and explain that this is the algebraic equation described by the verbal sentence.
- Next, write *Three times the sum of two and a number m is 12* on the board. Have students write the algebraic equation for this sentence, and compare their equation with a partner. If students came up with different equations, discuss whether the equations have the same meaning.

Begin the Activity

- Have students work with a partner. Give each pair of students shuffled sets of Verbal Sentence Cards and Algebraic Equation Cards. Explain that each card in one set corresponds with a card in the other set.
- Pairs will work together to match all Verbal Sentence Cards with the correct Algebraic Equation Cards.
- Provide students with index cards so they can write their own verbal sentence. Have students swap cards and write the corresponding algebraic equation on the back of the index card.

Conclude the Activity

Have students discuss equations they found easy and difficult to match.

Questions to Ask

- ▶ **What are some of the strategies you used to match up the cards?**
- ▶ **It is possible to write verbal sentences from algebraic equations. What might the verbal sentence corresponding to $4(x + 7) = 64$ be?**
The product of 4 and the sum of x and 7 is 64.

Variation

Have students play a memory game by laying all cards facedown. One student turns two cards over to find a match. If the cards do not match, the student must place both cards facedown, and his or her partner takes a turn. If the cards match, the student keeps the cards and takes another turn. The player with the most cards at the end wins the game.

Challenge

Instruct students to use guess-and-check or other reasoning to determine the value of the variable in the sentence. Note that some values might be negative or fractional values. Address this issue as appropriate to the students' skills.




Write Your Own Story

Objective

Students can create algebraic equations from real-world problems.

Materials

Program Materials

 Story Cards, 1 set per pair of students

Additional Materials

index cards, 8 per pair of students

Alternative Groupings

Small Groups: Complete activity as written, but have students solve each story card as a group.

Prepare Ahead

Copy and cut apart the Story Cards before class begins.

Introduce the Activity

- Tell students they will be writing algebraic equations for real-life situations. Point out that students will not be solving the equations, only writing them.
- Write the following situation on the board. *A teacher has 48 cookies. Students ate c cookies. The teacher has 10 cookies left.*
 - **What do you know?** A teacher has 48 cookies, and later has 10 cookies. **What do you not know?** the number of cookies the students ate **What variable can be used to represent the number of cookies the students ate?** Answers may vary. Possible answer: c **Which operation is most likely to be used?** subtraction **Write an equation that represents this situation.** $48 - c = 10$
- Now have each student write another real-life situation using subtraction.
- Tell students to swap papers with a partner and write the algebraic equation for the real-life situation.

Begin the Activity

- Have students work with a partner.
- Pass out one set of Story Cards and four index cards to each pair of students.
- A student will select one card from the Story Card set and read it aloud. Cards can be solved in any order.
- Both students will read the card and write an algebraic equation on the card. Remind students to think about what they know and what they need to know.
- After students have written the correct algebraic equation, have each student write a similar situation on an index card. Students can use the current story problem and change the names and numbers, or they can create a different, but similar, situation.
- Have students trade index cards to evaluate whether the new situation correctly represents the algebraic equation. Have them continue by selecting another story card, solving together, writing separate stories, and trading cards.

Conclude the Activity

Encourage volunteers to share their own real-life situations and the corresponding algebraic equation.

Questions to Ask

- Is there more than one way to write an algebraic equation for a real-life situation?
- How do you determine the operation to be used in the corresponding algebraic equation?
- Does the variable in an algebraic equation represent what you *do* know or what you *do not* know?

Variation

Have students write at least two possible algebraic equations for each situation.

Challenge

Have students use guess-and-check to determine the value of the variable for each story card.