



NUMBER WORLDS™

Accelerate Math Success

Teacher Edition

Creating Equations

Week at a Glance

This week, students continue **Number Worlds**, Level H, Algebra. Students will explore verbal sentences and translate them into equations that use one or multiple operations.

Skills Focus

- Write algebraic equations.
- Apply algebraic notation to real-world problems.

How Students Learn

Help students develop a process for translating between verbal sentences and algebraic equations. Students may first determine the relationship between quantities in the sentence and the operation(s) used. Then they may use an appropriate letter to represent the unknown quantity. Finally, students may use numbers, operation symbols, and letters to translate the words into an equation.

English Learners **ELL**

For language support, use the **English Learner Support Guide**, pages 64–65, to preview lesson concepts and teach academic vocabulary. **Number Worlds** Vocabulary Cards are listed as additional materials in many lessons and can be used to preteach and reinforce academic vocabulary.

Math at Home



Give one copy of the Letter to Home, page 16, to each student. Encourage students to share and complete the activity with their caregivers.



Weekly Planner

Lesson	Learning Objectives	
1 pages 234–235	Students can create algebraic equations involving addition and subtraction from verbal sentences.	
2 pages 236–237	Students can create algebraic equations involving multiplication and division from verbal sentences.	
3 pages 238–239	Students can create algebraic equations involving addition/subtraction and multiplication/division from verbal sentences.	
4 pages 240–241	Students can create algebraic equation from real-world problems.	
5 pages 242–243	Review and Assess Students review skills learned this week and complete the weekly assessment and project.	
Project pages 244–245	Students can write algebraic equations for real-life situations.	

Key Standard for the Week

Domain: Expressions and Equations

Cluster: Reason about and solve one-variable equations and inequalities.

6.EE.7 Solve real-world and mathematical problems by writing and solving equations of the form $x + p = q$ and $px = q$ for cases in which p , q and x are all nonnegative rational numbers.



Materials		Technology
Program Materials <ul style="list-style-type: none">• Student Workbook, pp. 41–43• Practice, p. 64• Activity Card 3M, Writing Math Add/Subtract• Translating Verbal Sentences: Addition and Subtraction	<ul style="list-style-type: none">• Counters• Number Cards 0–100• Plus-Minus Cube Additional Materials cups	Teacher Dashboard Function Machine Tool
Program Materials <ul style="list-style-type: none">• Student Workbook, pp. 44–45• Practice, p. 65• Activity Card 3N, Writing Math Multiply/Divide	<ul style="list-style-type: none">• Translating Verbal Sentences: Multiplication and Division• Number Cards 0–100 Additional Materials coin	Teacher Dashboard Function Machine Tool
Program Materials <ul style="list-style-type: none">• Student Workbook, pp. 46–47• Practice, p. 66• Activity Card 3O, Algebraic Equation Match	<ul style="list-style-type: none">• Algebraic Equation Cards• Verbal Sentence Cards Additional Materials index cards	Teacher Dashboard Function Machine Tool
Program Materials <ul style="list-style-type: none">• Student Workbook, pp. 48–49• Practice, p. 67• Activity Card 3P, Write Your Own Story• Story Cards	Additional Materials <ul style="list-style-type: none">• colored pencils• index cards• paper	Teacher Dashboard Function Machine Tool
Program Materials <ul style="list-style-type: none">• Student Workbook, pp. 50–51• Weekly Test, Assessment, pp. 43–44		Review previous activities.
Program Materials <ul style="list-style-type: none">• Student Workbook, p. 52• Number 1–6 Cube		

WEEK 4

Creating Equations

Find the Math

This week, introduce students to writing algebraic equations from verbal sentences.

Use the following to begin a guided discussion:

- **How is money used in everyday life?** **Answers will vary. Possible answers:** Money is sometimes earned at an hourly wage; money is used to pay for food and bills.

Have students complete *Student Workbook*, page 41.

Lesson 1

Objective

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


Standard

6.EE.7 Solve real-world and mathematical problems by writing and solving equations of the form $x + p = q$ and $px = q$ for cases in which p , q and x are all nonnegative rational numbers.

Creating Context

Have English Learners keep a written record of words and phrases and the mathematical meaning of each. Encourage students to read these words or phrases aloud, and state the operation represented. Have students use this written record to add words and phrases throughout the week.

Materials

- | | |
|---|--|
| Program Materials | Additional Materials |
| <ul style="list-style-type: none">•  Translating Verbal Sentences: Addition and Subtraction, 1 per student• Counters• Number Cards 0–100, 20 random cards per pair of students• Plus-Minus Cube, 1 per student or pair of students | <ul style="list-style-type: none">• cups |

Preparing Ahead

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

1 WARM UP

Prepare

- Have students write algebraic expressions for the verbal phrases below. Discuss the words or phrases that are used for each operation.
- the sum of y and 3
- 4 less than m
- x increased by 6
- 7 decreased by a number


WEEK
4

Creating Equations

Lesson 1

Find the Math

Many people keep money in a bank. You can add money each week to watch your balance grow, or you can withdraw money and watch your balance decrease.



How are addition, subtraction, multiplication, and division used with money?

1. Addition: **Answers will vary. Possible answer: I can add money to my bank each week.**
2. Subtraction: **Answers will vary. Possible answer: I subtract money from my balance when I go shopping.**
3. Multiplication: **Answers will vary. Possible answer: I can multiply the pay per hour by the number of hours I babysit.**
4. Division: **Answers will vary. Possible answer: I can divide my balance by the number of days in a week to see how much I can spend each day.**

Week 4 Creating Equations • Lesson 1 41

Student Workbook, p. 41

2 ENGAGE

Develop: Writing Math Add/Subtract

“Today, we are going to practice writing algebraic equations from verbal sentences which include addition and subtraction.” Follow the instructions on the Activity Card **Writing Math Add/Subtract**. As students complete the activity, be sure to use the Questions to Ask.

ACTIVITY
3M

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 Groups Complete the activity as written with students exchanging papers with anyone in the group.

Questions to Ask
• 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 box. 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?
40 decreased by a number or is equal to 15

Activity Card 3M

Alternative Groupings

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

Progress Monitoring

- | | |
|---|--|
| If... students have difficulty writing addition and subtraction equations from verbal sentences, | Then... have them write the equations using different colors to match phrases within the verbal sentence. |
|---|--|

Practice

Have students complete *Student Workbook*, pages 42–43. Guide students through the Key Idea example and the Try This exercises.

Interactive Differentiation

Consult the *Teacher Dashboard* for grouping suggestions. You also can use performance on the Engage activity to guide students.

Independent Practice

For additional practice, have students explore one-step algebraic equations using the Function Machine Tool. Have students create a verbal sentence similar to those found in the activity. Then direct students to create a matching algebraic equation using the function machine. Point out that students will be using only addition and subtraction to create their algebraic equations.

Supported Practice

For additional support, use counters to help students model the verbal sentences and write algebraic equations.

- Supply students with a handful of Counters and a small cup. Place a slip of paper labeled with a “?” in the cup. Tell students that this cup represents “a number,” or the variable.
- Write the following sentence on the board: *The sum of 3 and a number is 7.*
► **Which operation is indicated here? Explain.** Addition; the sentence includes the word “sum.” **Which numbers are being added?** 3 and a number **What is the result?** 7
- Have students model $3 + x = 7$ on a piece of paper using the Counters and cup. The plus and equal symbols may be written on the paper.
- Repeat the process and appropriate questioning with subtraction using the verbal sentence *A number decreased by 5 is 2.* Have students explain why the verbal sentence does *not* represent $5 - x = 2$.

3 REFLECT

Think Critically

Review students’ answers to the Reflect prompt at the bottom of **Student Workbook**, page 43, and then review the Engage activity.

- **What is the difference between a verbal phrase representing an expression and a verbal sentence representing an equation?**
A verbal sentence representing an equation will have the word “is,” which means “equal.” A verbal phrase representing an expression will not have the word “is.”

4 ASSESS

Informal Assessment

Use the online or print Student Record, **Assessment**, page 128, to record informal observations.

Writing Math Add/Subtract

Did the student

- ☐ provide a clear explanation?
- ☐ choose appropriate strategies?
- ☐ communicate reasons and strategies?
- ☐ argue logically?

Additional Practice

For additional practice, have students complete **Practice**, page 64.

WEEK 4 Name _____ Date _____
Creating Equations: Lesson 1

Write the algebraic equation for each sentence.

1. The difference of a number y and 4 is 28. $y - 4 = 28$
2. Five more than a number w is 26. $w + 5 = 26$
3. The sum of a number u and 13 is 32. $u + 13 = 32$
4. Twelve less than a number v is 18. $v - 12 = 18$
5. Seventeen is 4 more than a number h . $17 = 4 + h$
6. The sum of 8 and a number k is 20. $8 + k = 20$

Practice, p. 64

Week 4 • Creating Equations

Lesson 1

Key Idea

Algebraic equations containing addition and subtraction can be written from verbal sentences. The order of the numbers and unknowns in the sentence is not always the same as the order of the numbers and the unknowns in the algebraic equation.

Verbal Sentence	Algebraic Equation
Six less than a number x is 14.	$x - 6 = 14$
Six minus a number x is 14.	$6 - x = 14$

Try This

Write the words or phrases from the word bank in the appropriate column.

Word Bank			
is	less than	more than	difference
minus	decreased by	increased by	sum

+	-	=
increased by	minus	is
sum	decreased by	
more than	difference	
	less than	

42 Level H Unit 3 Algebra

Practice

Write the algebraic equation for each sentence.

1. Six increased by a number m is 8. $6 + m = 8$
2. Twelve less than a number r is 18. $r - 12 = 18$
3. Forty is 12 more than a number k . $40 = 12 + k$
4. Eight plus a number c is 12. $8 + c = 12$
5. 12 decreased by a number m is 20. $12 - m = 20$
6. 62 is a number t more than 50. $62 = t + 50$
7. Five more than a number j is 26. $5 + j = 26$
8. A number p decreased by 18 is 42. $p - 18 = 42$
9. Fourteen is 6 less than a number w . $14 = w - 6$
10. Sixteen decreased by a number g is 10. $16 - g = 10$

Reflect

A student wrote an algebraic equation for the sentence shown.

Five more than a number x is 25.
 $5 + x = 25$

Is there another way to write the algebraic equation and not change the meaning? Explain.


Yes, the algebraic equation can be written as $x + 5 = 25$, $25 = 5 + x$, and $25 = x + 5$. All these equations represent the same thing.

Week 4 Creating Equations • Lesson 1 43


Student Workbook, pp. 42–43

Lesson 2

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

Standard 
6.EE.7 Solve real-world and mathematical problems by writing and solving equations of the form $x + p = q$ and $px = q$ for cases in which p , q and x are all nonnegative rational numbers.

Creating Context
Help English Learners connect to prior language knowledge by pointing out the use of the word *is* in other common English sentences. For example: *The dog is brown. The glass is broken. The book is red.* Further explain that although *dog* and *brown* are not equal concepts in English, the word *is* represents equality in mathematics.

- Materials**
- | | |
|---|---|
| Program Materials | Additional Materials |
| •  Translating Verbal Sentences: Multiplication and Division, 1 per student | coin, 1 per student or pair of students |
| • Number Cards 0–100, 20 random cards per pair of students | |

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

1 WARM UP

- Prepare**
- Have students think of verbal phrases for algebraic expressions that include multiplication and division. Examples include *the product of 6 and p* , *the quotient of 8 and a number*, *a number multiplied by 5*, or *9 divided by a number*.
 - For each example, have students explain how they determined the mathematical operation from the verbal phrase.

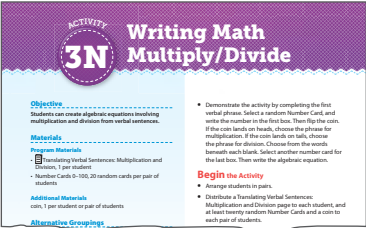
Just the Facts
Have students give a choral response for fact family. Use questions such as the following:

- $6 + 4$ 10
- $4 + 6$ 10
- $10 - 6$ 4
- $10 - 4$ 6

2 ENGAGE

Develop: Writing Math Multiply/Divide

“Today, we are going to practice writing algebraic equations from verbal sentences which include multiplication and division.” Follow the instructions on the Activity Card **Writing Math Multiply/Divide**. As students complete the activity, be sure to use the Questions to Ask.



Activity Card 3N

Alternative Groupings

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

Progress Monitoring

- | | |
|--|---|
| If... students have difficulty writing multiplication and division equations from verbal sentences, | Then... have them underline the key words or phrases to help with the translation. |
|--|---|

Practice

Have students complete **Student Workbook**, pages 44–45. Guide students through the Key Idea example and the Try This exercises.

Interactive Differentiation



Consult the **Teacher Dashboard** for grouping suggestions. You also can use performance on the Engage activity to guide students.

Independent Practice



For additional practice, have students explore one-step algebraic equations using the Function Machine Tool. Have students create a verbal sentence similar to those found in the activity. Then direct students to create an algebraic equation using the function machine. Point out that students will be using only multiplication and division to create their algebraic equations.

Supported Practice

For additional support, have students work with a partner to create equations for the following verbal sentences:

- Forty-eight is twice a number.
- Nine is the quotient of 63 and a number.
- For each sentence, ask the following questions:
 - **Which operation is indicated?** Answers may vary.
 - **Which numbers are being multiplied/divided?** Answers may vary.
 - **What is the result?** Answers may vary.
 - **Does the order of the numbers being multiplied or divided matter? Explain.** Answers may vary.

3 REFLECT

Think Critically

Review students' answers to the Reflect prompt at the bottom of **Student Workbook**, page 45, and then review the Engage activity.

- **Compare writing multiplication and division equations to writing addition and subtraction equations. How are they the same? How are they different?** Writing multiplication equations is similar to writing addition equations because the order of the numbers do not matter; however, the order for subtraction and division problems does matter because these operations are not commutative.

Real-World Application

Manufacturers must pack multiple items for shipping. It is important to know how many boxes are in a single shipping container.

- **A box contains 12 toys and the shipping container contains a total of 96 toys. The total number of boxes in the shipping container can be found knowing that 96 is the product of 12 and the number of boxes, b . What is the algebraic equation representing this situation?** $96 = 12b$

4 ASSESS

Informal Assessment

Use the online or print Student Record, **Assessment**, page 128, to record informal observations.

Writing Math Multiply/Divide

Did the student

- | | |
|--|---|
| <input type="checkbox"/> provide a clear explanation? | <input type="checkbox"/> choose appropriate strategies? |
| <input type="checkbox"/> communicate reasons and strategies? | <input type="checkbox"/> argue logically? |

Additional Practice

For additional practice, have students complete **Practice**, page 65.

Name _____ Date _____
4

Creating Equations: **Lesson 2**

Write the algebraic equation for each sentence.

- A number n divided by 4 is 7. $\frac{n}{4} = 7$
- The product of a number p and 8 is 48. $8p = 48$
- The quotient of a number f and 4 is 20. $\frac{f}{4} = 20$
- A number u times 11 is 55. $11u = 55$
- Twice a number m is 82. $2m = 82$

Practice, p. 65

Lesson 2

Key Idea

Algebraic equations containing multiplication and division can be written from verbal sentences. When translating verbal sentences to algebraic equations, it helps to identify key words, phrases, and variables.

The product of 8 and a number q is 32.
The product of 8 and a number q is 32.
 $8q = 32$

Try This

Underline the word or phrase in each sentence that indicates the operation. Circle the numbers and the variable. Draw a square around the word that indicates *equal*. Then write the algebraic equation.

- 56 divided by a number is 7. $\frac{56}{y} = 7$
- Forty-eight is the product of 4 and a number n. $48 = 4n$
- The quotient of 30 and a number is 6. $\frac{30}{k} = 6$
- Eighteen multiplied by a number is 36. $18w = 36$

Practice

Write the algebraic equation for each sentence.

- The product of 5 and a number u is 45. $5u = 45$
- A number z divided by 5 is 12. $\frac{z}{5} = 12$
- Twenty-seven divided by a number r is 3. $\frac{27}{r} = 3$
- The quotient of 8 and a number y is 4. $\frac{8}{y} = 4$
- Forty-two is the product of 6 and a number b . $42 = 6b$
- Twice a number t is 12. $2t = 12$
- Six is the quotient of 54 and a number h . $6 = \frac{54}{h}$
- A number n multiplied by 10 is 120. $10n = 120$
- Twenty multiplied by a number v is 80. $20v = 80$
- Eight times a number z is 32. $8z = 32$

Reflect

Is it possible for both sides of an equation to contain an operation? If so, write the verbal sentence and the corresponding algebraic equation. If not, explain why not.

It is possible. For example, the product of 4 and 6 is the product of 8 and a number x . The algebraic equation is $(4)(6) = 8x$.

WEEK 4

Creating Equations

Lesson 3

Objective

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

Standard



6.EE.7 Solve real-world and mathematical problems by writing and solving equations of the form $x + p = q$ and $px = q$ for cases in which p , q and x are all nonnegative rational numbers.

Creating Context

Encourage English Learners to read verbal sentences aloud before translating them into algebraic equations. If desired, have them place special emphasis on words that indicate specific operations.

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

Prepare Ahead

Cut apart the Verbal Sentence Cards before class begins.

1 WARM UP

Prepare

- Remind students of the algebraic expressions they wrote when given verbal phrases in an earlier lesson. Then have students write the algebraic expression for the following examples.
- What is the algebraic expression for the sum of 8 and the product of 5 and x ?** $8 + 5x$
- What is the algebraic expression for four less than 2 times m ?** $2m - 4$
- What is the algebraic expression for three times the sum of nine and a number?** $3(9 + x)$

Just the Facts

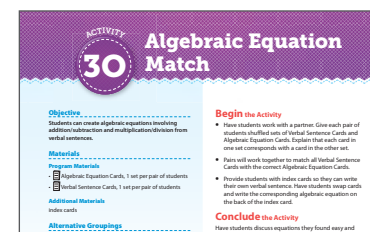
Have students review the order of operations by stating the operation that will be performed first in each equation. Use statements such as the following:

- $3x + 4$ multiply
- $5(x + 6)$ add
- $8 - 3 + x$ subtract

2 ENGAGE

Develop: Algebraic Equation Match

"Today, we are going to match verbal sentences with two operations with a corresponding algebraic equation." Follow the instructions on the Activity Card **Algebraic Equation Match**. As students complete the activity, be sure to use the Questions to Ask.



Activity Card 30

Alternative Groupings

Small Group: Complete the activity as written.

Progress Monitoring

- If...** students have difficulty writing the algebraic equations,
- Then...** have students review the key words for each of the four operations.

Practice

Have students complete **Student Workbook**, pages 46–47. Guide students through the Key Idea example and the Try This exercises.

Interactive Differentiation



Consult the **Teacher Dashboard** for grouping suggestions. You also can use performance on the Engage activity to guide students.

Independent Practice



For additional practice, have students explore two-step algebraic equations using the Function Machine Tool. Students can use the Verbal Sentence Cards from the **Algebraic Equation Match** activity and create the equation in the Function Machine. Encourage students to input different values for x to explore the meaning of the variable.

Supported Practice



For additional support, have students use the Function Machine Tool to practice writing equations from verbal sentences containing multiple operations. Begin with multiplication and addition, then multiplication with subtraction. Next, explore division with addition, then division with subtraction. For example:

- Have students set the Function Machine Tool so that the first operation is multiplication and the second is addition. Students can select any numbers. Then have students input a number for x .
- Have students read the equation aloud: *The product of _____ and x plus _____ is equal to _____.* Students must fill in the numbers used and the result.
- Have students continue exploring using the appropriate statements below.
 - The product of _____ and x plus _____ is equal to _____.*
 - The product of _____ and x increased by _____ is equal to _____.*
 - The product of _____ and x minus _____ is equal to _____.*
 - The product of _____ and x decreased by _____ is equal to _____.*
- Repeat using *quotient* instead of *product*.

3 REFLECT

Think Critically

Review students' answers to the Reflect prompt at the bottom of **Student Workbook**, page 47, and then review the Engage activity.

- Give an example of a verbal sentence that includes subtraction and multiplication. State the corresponding algebraic equation.

Answers may vary.

Real-World Application

Two-step algebraic equations might be used anytime a group of friends is attending an event.

- A group of friends are going to a play. Each person, x , contributes \$25 for the play and transportation. Gas for transportation for all the friends is \$10. After paying for the gas, the group has \$190. Write an algebraic equation for this situation. $25x - 10 = 190$

4 ASSESS

Informal Assessment

Use the online or print Student Record, **Assessment**, page 128, to record informal observations.

Algebraic Equation Match

Did the student

- | | |
|--|---|
| <input type="checkbox"/> pay attention to the contributions of others? | <input type="checkbox"/> improve on a strategy? |
| <input type="checkbox"/> contribute information and ideas? | <input type="checkbox"/> reflect on and check accuracy of work? |

Additional Practice

For additional practice, have students complete **Practice**, page 66.

WEEK 4
Name _____ Date _____

Creating Equations: **Lesson 3**

Underline the words that represent operations. Draw a box around the word that indicates equal. Then write the algebraic equation.

- The difference between a number and 7, multiplied by 4, is 24.
 $4(x - 7) = 24$
- Twice a number decreased by 8 is 74.
 $2x - 8 = 74$
- The product of 3 and the sum of a number and 7 is 30.
 $3(x + 7) = 30$

Practice, p. 66

Lesson 3

Key Idea

Some verbal sentences contain multiple operations. For each sentence, you can underline the operations to help you write the algebraic equation.

Three times a number, decreased by 8, is 4.
 $3x - 8 = 4$

Try This

Write the words or phrases from the word bank in the appropriate column.

Word Bank

sum	less than	decreased by	quotient
minus	product	divided	is
more than	increased by	difference	multiplied

+	-	×	÷	=
increased by	minus	product	divided	is
sum	decreased by	multiplied	quotient	
more than	difference			
	less than			

Practice

Underline the words that represent operations. Draw a square around the word that indicates *equal*. Then write the algebraic equation.

- The product of 80 and 10 more than a number is 1,760. $80(10 + x) = 1,760$
- 24 is 4 less than 5 times a number. $24 = 5x - 4$
- The quotient of 40 and 2 more than a number is 8. $\frac{40}{2 + x} = 8$
- The sum of a number and 4, multiplied by 6 is 54. $(x + 4)6 = 54$ or $6(x + 4) = 54$
- Twice a number increased by 9 is 19. $2x + 9 = 19$
- 52 is 4 less than twice a number. $52 = 2x - 4$
- 48 is twice a number decreased by 15. $48 = 2x - 15$
- The sum of a number and 12, divided by 3 is 45. $\frac{x + 12}{3} = 45$


Reflect

Write at least two verbal sentences that represents the algebraic equation $45 = 5x - 15$.


Possible answers: Forty-five is 15 less than the product of 5 and x ; Forty-five is 15 less than 5 times a number x ; Forty-five is 5 times x , decreased by 15.

Lesson 4

Objective
Students can create algebraic equations from real-world problems.

Standard 
6.EE.7 Solve real-world and mathematical problems by writing and solving equations of the form $x + p = q$ and $px = q$ for cases in which p , q and x are all nonnegative rational numbers.

Creating Context
Have English Learners understand the real-life problems by drawing pictures to describe the situation. Students can begin by drawing a situation and then describing it in words, or they may write about a situation and then supply the drawing. Allow students to describe their drawing to peers so that they can work together in creating and writing problems.

Materials
Program Materials
 Story Cards, 1 set per pair of students

Additional Materials

- colored pencils
- index cards, 8 per pair of students
- paper

Prepare Ahead
Copy and cut apart the Story Cards before class begins.

1 WARM UP

Prepare

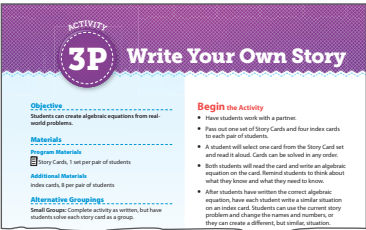
- Have students create a “dictionary” on a piece of paper that shows several verbal phrases that represent mathematical operations.
- Choose several volunteers to read their words, and instruct students to copy down any words or phrases they may have omitted.

Just the Facts
Have students use choral response to indicate whether the word or phrase means *addition*, *subtraction*, *multiplication*, *division*, or *equal*. Use statements such as the following:

- **altogether** addition
- **decreased by** subtraction
- **is** equal

2 ENGAGE

Develop: Write Your Own Story
“Today, we are going to write situations that can be expressed using algebraic equations.” Follow the instructions on the Activity Card **Write Your Own Story**. As students complete the activity, be sure to use the Questions to Ask.



Activity Card 3P

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

Progress Monitoring

If... students have difficulty creating real-life word problems, **Then...** have them create several problems using the same scenario and changing only the numbers.

Practice

Have students complete **Student Workbook**, pages 48–49. Guide students through the Key Idea example and the Try This exercises.

Interactive Differentiation



Consult the **Teacher Dashboard** for grouping suggestions. You also can use performance on the Engage activity to guide students.

Independent Practice



For additional practice, have students explore by using the Function Machine Tool to create verbal sentences from algebraic equations. Direct students to create a one- or two-step function on the machine, and then write a real-life situation. Encourage students to use the Story Cards from the cards from the **Write Your Own Story** activity to help them write new scenarios.

Supported Practice

For additional support, have students use colored pencils and paper to draw a picture representing the situation below. Encourage students to discuss the action taking place to use the appropriate operation.

- A rectangular cake is divided into g parts for 6 people. Each person receives 2 pieces. Write the algebraic equation that represents this situation.
- Some students may focus simply on determining the value of g for this situation. Point out that writing an equation is equally important.
- Note that both equations $\frac{g}{6} = 2$ and $6 \times 2 = g$ represent this situation.

3 REFLECT

Think Critically

Review students' answers to the Reflect prompt at the bottom of **Student Workbook**, page 49, and then review the Engage activity.

- **Why is it important to know how to translate verbal sentences into algebraic equations?** *Answers may vary. Possible answer: Verbal sentences often represent real-life situations, so it is important to be able to translate to mathematics to solve real-life problems.*

Real-World Application

A restaurant manager needs to determine the number of pizza slices sold so he can determine how many pizzas to make the next day.

- **Each slice of pizza is \$3.00. The total amount the restaurant made is \$486. Write an equation to determine s , the number of slices of pizza sold.** $3s = 486$

4 ASSESS

Informal Assessment

Use the online or print Student Record, **Assessment**, page 128, to record informal observations.

Write Your Own Story

Did the student

- | | |
|---|--|
| <input type="checkbox"/> make important observations? | <input type="checkbox"/> provide insightful answers? |
| <input type="checkbox"/> extend or generalize learning? | <input type="checkbox"/> pose insightful questions? |

Additional Practice

For additional practice, have students complete **Practice**, page 67.

Name _____ Date _____

Creating Equations: **Lesson 4**

Write an algebraic equation for each situation.

1. There are x students in a class. Each student has 3 books. There are 93 books altogether.

a. What do you know? Each student has 3 books, and there are 93 books altogether.

b. What do you not know? the number of students in the class

c. Which operation is likely to be used? multiplication

d. Write an algebraic equation. $3x = 93$

2. A puppy weighed 6 pounds. The puppy grew by p pounds until he reached a weight of 27 pounds.

Practice, p. 67

Lesson 4

Key Idea

You can create algebraic equations for real-life situations. Use reasoning and any word clues to help you determine the correct operation or operations. Note that sometimes there are several algebraic equations that can represent the same situation.

Real-life Situation

Andrew pays a \$3 toll when he crosses a bridge on the way to work. There is no toll on the way back. Andrew starts with \$60 in his account. He has \$24 left after d days.

What do you know?	The toll is \$3 each day. Andrew starts with \$60.
What do you <i>not</i> know?	the number of days he crosses the bridge
Which operations are likely to be used?	multiplication and subtraction
Write an algebraic equation.	$60 - 3d = 24$

Try This

Answer each question based on the situation below.

1. Sam has saved x dollars. He spends \$25 on dinner and a movie, and now he has \$85 left.

a. What do you know? Sam spends \$25 on dinner and a movie and has \$85 left.

b. What do you *not* know? the number of dollars Sam originally saved

c. Which operation is likely to be used? subtraction

d. Write an algebraic equation. $x - 25 = 85$

Practice

Write an algebraic equation for each situation.

2. Katy has \$12, and Brian has x dollars. Together, they have \$46. $12 + x = 46$
3. The coach of a baseball team purchased 9 pretzels for the team for a total cost of \$27. The pretzels cost y dollars each. $9y = 27$
4. A book sale started with 500 books. Students purchased b books. There were 115 books left at the end of the day. $500 - b = 115$
5. Eighteen brownies in a pan are divided among x people. Each person receives 2 brownies. $\frac{18}{x} = 2$
6. A total of 50 people are going on a field trip. There will be 8 adults altogether and then s students in each of 3 mini-buses. $50 = 8 + 3s$
7. A vase v holds 7 flowers. All the vases hold a total of 420 flowers. $7v = 420$


Reflect

Choose one of the situations from above. Use reasoning or guess-and-check to determine the value of the variable in the algebraic equation. Explain your answer.

Answers may vary. Possible answer: If 18 brownies are divided among x people so that each person has 2 brownies, then I can think of a number multiplied by 2 to get 18. Since $9 \times 2 = 18$, I know that $x = 9$ for $\frac{18}{x} = 2$.

Lesson 5 Review

Objective
Students review skills learned this week and complete the weekly assessment and project.

Standard 
6.EE.7 Solve real-world and mathematical problems by writing and solving equations of the form $x + p = q$ and $px = q$ for cases in which p , q and x are all nonnegative rational numbers.

Vocabulary
Review vocabulary introduced during the week.

Creating Context
Direct English Learners to build on prior knowledge and practice writing, saying, and using mathematical vocabulary words they have worked with throughout this week. If time allows, have students create vocabulary lists and compare their definition to the definition in the glossary.

1 WARM UP

- Prepare**
- What is the meaning of the word *is* in mathematics? **equal**
 - What is the difference between an expression and an equation? **An equation contains an equal symbol and an expression does not.**
 - Describe the different words and phrases that represent mathematics in real life. Give the mathematical meaning of each. **Answers may vary. Possible answers: "Product" means multiplication; "less than" means subtraction; "increased by" means addition.**

2 ENGAGE

Practice
Have students complete *Student Workbook*, pages 50–51.

Week 4 • Creating Equations

Lesson 5 Review

This week, you learned to create equations that included addition, subtraction, multiplication, and division. You also learned to write algebraic equations when given a real-life situation.

Lesson 1 Write the algebraic equation for each verbal sentence.

1. Twenty is 26 less than n . $20 = n - 26$

2. The sum of 9 and a number j is 15. $9 + j = 15$

3. A number h decreased by 13 is 42. $h - 13 = 42$

Lesson 2 Write the algebraic equation for each verbal sentence.

4. The quotient of a number m and 3 is 20. $\frac{m}{3} = 20$

5. Fifty-two is twice a number d . $52 = 2d$

6. The product of a number b and 11 is 88. $11b = 88$

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Lesson 3 Write the algebraic equation for each verbal sentence.

7. The sum of 8 and a number, multiplied by 10, is 150. $(8 + x)10 = 150$ or $10(8 + x) = 150$

8. Ten is the product of 2 and the difference between a number and 4. $10 = 2(x - 4)$

9. The quotient of a number and 3, multiplied by 8, is 40. $\frac{x}{3}(8) = 40$

Lesson 4 Write an algebraic equation for each situation.

10. The drama club had a car wash and raised \$110 by charging x dollars per car. The club washed a total of 22 cars. $\frac{110}{x} = 22$

11. The school band raised a total of \$350 but needed to pay x dollars for the pizza they ordered. After paying for the pizza, each of the 10 members received \$33. $\frac{350 - x}{10} = 33$

12. Audrey started with \$100 in a savings account and added \$10 each week. After w weeks, Audrey has \$220 in the account. $100 + 10w = 220$

Reflect

Write two more algebraic equations that can be used to represent problem 12. Use reasoning or guess-and-check to determine the number of weeks it took Audrey to save \$220.

Answers may vary. Possible answer: $10w + 100 = 220$; $220 = 10w + 100$; I can subtract 100 from each side, so $10w = 120$, and then divide 120 by 10. It took Audrey 12 weeks to save \$220.

Week 4 • Creating Equations • Lesson 5 51

3 REFLECT

Think Critically

Review students' answers to the Reflect prompt at the bottom of **Student Workbook**, page 51.

Discuss the answer with the group to reinforce Week 4 concepts.

4 ASSESS

Formal Assessment

Students may take the weekly assessment online.

As an alternative, students may complete the weekly test on **Assessment**, pages 43–44. Record progress using the Student Assessment Record, **Assessment**, page 128.

Going Forward

Use the **Teacher Dashboard** to view results of the online assessments, to input the results of print student assessments, and to review progress before making decisions about next steps. Use the weekly test results and observations to determine the next steps for each student.

Retention

Student displays good grasp of this week's concepts and skills.

Have students use a combination of Number Cards 0–100, the Plus–Minus Cube, and a coin (to determine multiplication or division) to create additional verbal sentences. Then have students rewrite these sentences as algebraic equations.

Remediation

Student is still struggling with the week's concepts and skills.

Have students review the Verbal Translation Cards to practice understanding equations. For each sentence, have students write the algebraic equation directly after reading the verbal sentence. Encourage students to check equations with each other to notice and correct common errors.

Suggestions for Re-Evaluation: If a student has struggled without success for several weeks, use observations and test results to place the student at a level in which he or she can find success and build confidence to move forward.

Name _____ Date _____

Creating Equations

Write the correct math symbol beside each phrase.

1. Product of \times

2. Less than $-$

3. Quotient of \div

4. Increased by $+$

Write an algebraic equation for each sentence.

5. The quotient of 48 and 8 is y . $\frac{48}{8} = y$

6. The sum of x and 12 is 20. $x + 12 = 20$

7. The number n decreased by 7 is 15. $n - 7 = 15$

8. The product of 9 and 7 is m . $9 \times 7 = m$

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WEEK 4

Name _____ Date _____

Creating Equations

Underline the operations words in each sentence.

9. The product of 4 and 3 times n is 60.

10. The sum of n and 12 divided by 10 is 2.

11. The number 50 is 5 times the difference of n and 15.

12. The difference between 2 times n plus 6 is 14.

Write an algebraic equation for each situation.

13. Mina has 10 shells and Notah has 8 shells. They group them into n piles based on the kinds of shells they are. There are 3 shells in each pile.
 $(10 + 8) = 3n$

14. A group of 4 tour guides met some hikers. The hikers arrived in 3 vans with n hikers in each van. The total number of guides and hikers was 28.
 $4 + 3n = 28$

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Assessment, pp. 43–44

Project Preview

This week, students learned to write algebraic equations from verbal sentences using the four operations. Students also learned to write algebraic equations for real-life situations by defining a variable, determining operations, and writing the equation. The project for this unit requires students to write algebraic equations for real-life situations that might occur at a school carnival.

Project-Based Learning

Standards-driven Project-Based Learning is effective in building deep content understanding. Project-Based Learning increases long-term retention of concepts and has been shown to be more effective than traditional instruction. Completing a project to answer an essential question challenges students to apply and demonstrate mastery of concepts and skills by expressing understanding through discussion, research, and presentation.

Essential Question

WHY do I need equations to help solve real-world problems?

Project Evaluation Criteria

Review project evaluation criteria with students prior to beginning the project.

Exceeds Expectations
<div><input type="checkbox"/> Project result is explained and can be extended.</div> <div><input type="checkbox"/> Project result is explained in context and can be applied to other situations.</div> <div><input type="checkbox"/> Project result is explained using advanced mathematical vocabulary.</div> <div><input type="checkbox"/> Project result is explained and extended, and shows advanced knowledge of mathematical concepts and skills.</div>
Meets Expectations
<div><input type="checkbox"/> Project result is explained.</div> <div><input type="checkbox"/> Project result is explained in context.</div> <div><input type="checkbox"/> Project result is explained using mathematical vocabulary.</div> <div><input type="checkbox"/> Project result is described, and mathematics are used correctly.</div> <div><input type="checkbox"/> Project result is explained, and shows satisfactory knowledge of mathematical concepts and skills.</div>
Does Not Meet Expectations
<div><input type="checkbox"/> Project result is not explained.</div> <div><input type="checkbox"/> Project result is explained, but out of context.</div> <div><input type="checkbox"/> Project result is explained, but mathematical vocabulary is oversimplified.</div> <div><input type="checkbox"/> Project result is described, but mathematics are not used correctly.</div> <div><input type="checkbox"/> Project result is not explained and/or extended, or shows less than satisfactory knowledge of mathematical concepts and skills.</div>

School Carnival

Objective

Students can write algebraic equations for real-life situations.

Standard



6.EE.7 Solve real-world and mathematical problems by writing and solving equations of the form $x + p = q$ and $px = q$ for cases in which p , q and x are all nonnegative rational numbers.

Materials

Program Materials

Number 1–6 Cube, 1 per student

Best Practices

- Coach, demonstrate, and model.
- Create adequate time lines for each project.
- Focus students on their work to maintain engagement.



Introduce

Different people like to spend different amounts at a carnival.

- What might make someone spend more money at a carnival?
- Why is it important to keep track of your spending?

Explore

- Today, you will write algebraic equations for going to the carnival. First, you will use the expressions you created last week to write an expression for total cost. Next, you'll read a situation. Finally, you'll write an equation to describe the situation.

Explain to students that they will be writing equations for real-life situations at the school carnival.

- What types of words or phrases indicate operations when writing an algebraic equation? Explain. Answers may vary. Possible answer: Increased by, sum, and more than all indicate addition. Minus, decreased by, difference, and less than indicate subtraction. Product and multiplied by indicate multiplication. Divided and quotient indicate division. The word is means "equals."
- Complete Student Workbook, page 52, to write and solve algebraic equations.

Wrap Up

- Have students compare their purchases and their reasoning when writing the equation.
- Discuss students' answers to the Reflect prompt at the bottom of Student Workbook, page 52.
- Be sure students understand that the whole expression for total cost must be subtracted from the original amount.

If time permits, have each student write an equation using numbers determined by another classmate. Students can note that the reasoning is the same.

Week 4 • Creating Equations

Project School Carnival

Write the total cost for the school carnival using variables g , s , and d . Use the numbers you chose in the previous activities. Answers may vary. Possible answer: $5 + 2g + 3s + 4d$

Decide:

- Which is your favorite game to play? _____
- Which is your favorite snack to eat? _____
- Which is your favorite drink? _____

Read the following situation:

You brought x tokens to the carnival and bought one ticket to get in. You played your favorite game _____ time(s). Then, you purchased _____ of your favorite snack(s) and _____ glass(es) of your favorite drink. You had 5 tokens when you left the carnival.

Roll: Use the Number 1–6 Cube to determine the number of games played and snacks and drinks purchased. Answers may vary.

Write an equation representing the situation above. Explain your steps.

Answers may vary. Possible answer: If I played 4 games, ate 2 snacks, and had 3 glasses of juice, I spent:

$$5 + 2g + 3s + 4d = 5 + (2 \times 4) + (3 \times 2) + (4 \times 3) \\ = 5 + 8 + 6 + 12 \\ = 31 \text{ tokens}$$

I began with x tokens. I spent 31 tokens, and had 5 tokens left. The algebraic equation for this situation is $x - 31 = 5$.

Reflect

Can an equation be written to represent the situation above if the values of g , s , and d are not known? If yes, write the equation. If not, explain why not.

Answers may vary. Possible answer: Yes; $x - (5 + 2g + 3s + 4d) = 5$ or

$$x - 5 - 2g - 3s - 4d = 5$$

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Student Workbook, p. 52

Teacher Reflect

- ☐ Did I explain what students had to find, make, or do before they began their projects?
- ☐ Did students tell or show the steps when they explained how to do something?
- ☐ Were students able to answer my questions about their solutions?

LEVEL



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