Lesson 9: Writing Addition and Subtraction Expressions

Student Outcomes

- Students write expressions that record addition and subtraction operations with numbers.
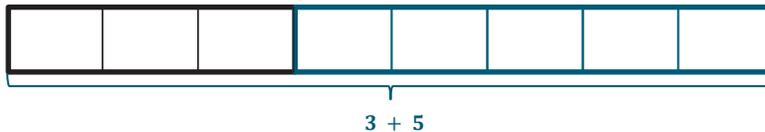
Lesson Notes

Individual white boards are recommended for this lesson.

Classwork

Example 1 (3 minutes)

Example 1

Create a bar diagram to show 3 plus 5.

$$3 + 5$$

How would this look if you were asked to show 5 plus 3?

There would be 5 *tiles and then* 3 *tiles.*

MP.2

Are these two expressions equivalent?
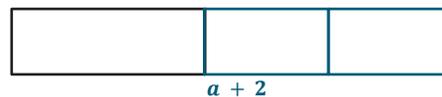
Yes, both $3 + 5$ *and* $5 + 3$ *have a sum of* 8.

Example 2 (3 minutes)

Example 2

How can we show a number increased by 2?

$a + 2$ *or* $2 + a$

$$a + 2$$

Can you prove this using a model? If so, draw the model.

Yes, I can use a bar diagram.

$$2 + a$$

Example 3 (3 minutes)

Example 3

Write an expression to show the sum of m and k.

$m + k \text{ or } k + m$

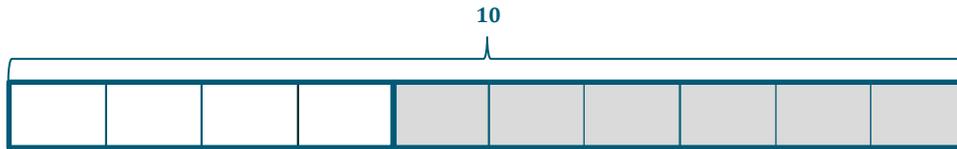Which property can be used in Examples 1–3 to show that both expressions given are equivalent?

The commutative property of addition

Example 4 (3 minutes)

Example 4

How can we show 10 minus 6?

▪ **Draw a bar diagram to model this expression.**

10

MP.2

▪ **What expression would represent this model?**

$10 - 6$

▪ **Could we also use $6 - 10$?**

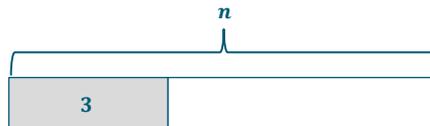*No, if we started with 6 and tried to take 10 away, the models would not match.*

Example 5 (3 minutes)

Example 5

How can we write an expression to show 3 less than a number?

▪ **Start by drawing a diagram to model the subtraction. Are we taking away from the 3 or the unknown number?**

We are taking 3 away from the unknown number.

n

3	

▪ We are starting with some number and then subtracting 3.

▪ **What expression would represent this model?**

So, the expression is $n - 3$.

Example 6 (3 minutes)

Example 6

How would we write an expression to show the number c being subtracted from the sum of a and b?

- Start by writing an expression for "the sum of a and b."

  $a + b$ or $b + a$

- Now show c being subtracted from the sum.

  $a + b - c$ or $b + a - c$

Example 7 (3 minutes)

Example 7

Write an expression to show c minus the sum of a and b.

$c - (a + b)$

Why are parentheses necessary in this example and not the others?

Without the parentheses only a is being taken away from c, where the expression says that $a + b$ should be taken away from c.

Replace the variables with numbers to see if $c - (a + b)$ is the same as $c - a + b$.

If students do not see the necessity for the parentheses, you can have them replace the variables with numbers to see whether $c - (a + b)$ is the same as $c - a + b$.

Here is a sample of what they could try:

$$a = 1, b = 2, c = 3$$

$$3 - (1 + 2) \qquad\qquad 3 - 1 + 2$$
$$3 - 3 \qquad \text{or} \qquad 2 + 2$$
$$0 \qquad\qquad\qquad 4$$

Exercises (12 minutes)

These questions can be done on the worksheet. However, if white boards, small chalkboards, or some other personal board is available, the teacher can give instant feedback as students show their boards after each question.

Exercises

1. Write an expression to show the sum of 7 and 1.5.

$7 + 1.5$ *or* $1.5 + 7$

2. **Write two expressions to show w increased by 4. Then draw models to prove that both expressions represent the same thing.**

    $w + 4$ *and* $4 + w$

w	4

4	w

3. **Write an expression to show the sum of a, b, and c.**
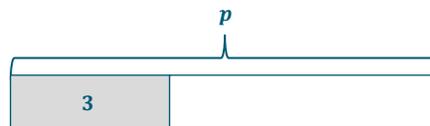
    Answers will vary. Below are possible answers.

    $a + b + c$ $b + c + a$ $c + b + a$

    $a + c + b$ $b + a + c$ $c + a + b$

4. **Write an expression and a model showing 3 less than p.**

    $p - 3$

    p

3	

5. **Write an expression to show the difference of 3 and p.**

    $3 - p$

6. **Write an expression to show 4 less than the sum of g and 5.**

    $g + 5 - 4$ *or* $5 + g - 4$

7. **Write an expression to show 4 decreased by the sum of g and 5.**

    $4 - (g + 5)$ *or* $4 - (5 + g)$

8. **Should Exercises 6 and 7 have different expressions? Why or why not?**

    The expressions are different because one includes the word "decreased by," and the other has the words "less than." The words "less than" give the amount that was taken away first, whereas the word "decreased by" gives us a starting amount and then the amount that was taken away.

Closing (7 minutes)

▪ Write the following in words.

- □ $m + k$ *Answers will vary; the sum of **m** and **k***
- □ $k + m$ *Answers will vary; the sum of **k** and **m***
- □ $m - k$ *Answers will vary; **m** minus **k***
- □ $k - m$ *Answers will vary; **k** minus **m***

- ▪   Is $m + k$ equivalent to $k + m$? Is $m - k$ equivalent to $k - m$? Explain.

  - □ *$m + k$ is equivalent to $k + m$. Both of these expressions have the same result. However, $m - k$ and $k - m$ will not have the same result. I would be starting with a new total amount and taking away a different amount as well. This will give different solutions. For example, $4 + 6 = 10$, and $6 + 4 = 10$. However, $6 - 4 = 2$, but $4 - 6$ does not.*

Exit Ticket (5 minutes)

Name _____   Date _____

Lesson 9: Writing Addition and Subtraction Expressions

Exit Ticket

1. Write an expression showing the sum of 8 and a number f.

2. Write an expression showing 5 less than the number k.

3. Write an expression showing the sum of a number h and a number w minus 11.

Exit Ticket Sample Solutions

1. Write an expression showing the sum of 8 and a number f.

   $8 + f$ *or* $f + 8$

2. Write an expression showing 5 less than the number k.

   $k - 5$

3. Write an expression showing the sum of a number h and a number w minus 11.

   $h + w - 11$

Problem Set Sample Solutions

1. Write two expressions to show a number increased by 11. Then, draw models to prove that both expressions represent the same thing.

   $a + 11$ *and* $11 + a$

a	11

11	a

2. Write an expression to show the sum of x and y.

   $x + y$ *or* $y + x$

3. Write an expression to show h decreased by 13.

   $h - 13$

4. Write an expression to show k less than 3.5.

   $3.5 - k$

5. Write an expression to show the sum of g and h reduced by 11.

   $g + h - 11$

6. Write an expression to show 5 less than y, plus g.

   $y - 5 + g$

7. Write an expression to show 5 less than the sum of y and g.

   $y + g - 5$