Lesson 21

Combining Like Terms (Part 2)

Goals

- Critique (in writing) methods for generating equivalent expressions with fewer terms.
- Identify equivalent expressions, and justify (orally and in writing) that they are equivalent.

Learning Targets

- I am aware of some common errors when writing equivalent expressions, and I can avoid them.
- When possible, I can write an equivalent expression that has fewer terms.

Lesson Narrative

In this lesson, students analyze expressions that include parentheses and write equivalent expressions with fewer terms. First, students analyze some worked examples that contain errors and identify why the expressions are not equivalent. Then they match expressions that are equivalent. As students contrast different strategies for rewriting the same expression, they are critiquing the reasoning of others.

The last activity in this lesson is optional because it provides an opportunity for additional practice working with parentheses in expressions.

Student Learning Goal

Let's see how to use properties correctly to write equivalent expressions.

Access for Students with Diverse Abilities

- Representation (Activity 1)
- Engagement (Activity 2)

Access for Multilingual Learners

- MLR2 (Activity 1)
- MLR7 (Activity 3)

Instructional Routines

- MLR2: Collect and Display
- MLR7: Compare and Connect
- Take Turns
- Which Three Go Together?

Required Materials

Materials to Gather

- Index cards: Warm-up

Required Preparation

Lesson:

- Access to index cards is suggested for students who need help isolating one expression at a time. They can use the index card to cover up nearby expressions.

Lesson Timeline

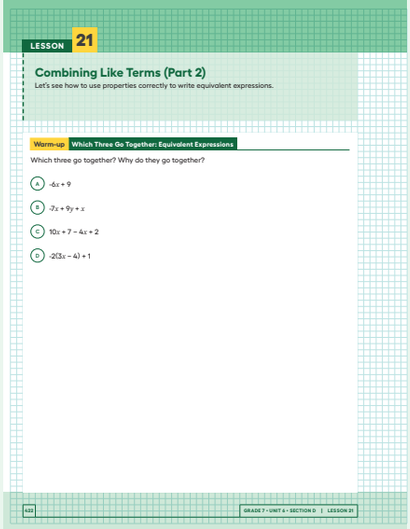
Warm-up	Activity 1	Activity 2	Activity 3	Lesson Synthesis	Assessment: Cool-down
5 min	15 min	15 min	10 min	10 min	5 min

Instructional Routines

Which Three Go Together?
Please log in to the site before using the QR code or URL.

ilclass.com/r/10690736

Student Workbook


LESSON 21

Combining Like Terms (Part 2)

Let's see how to use properties correctly to write equivalent expressions.

Warm-up Which Three Go Together: Equivalent Expressions

Which three go together? Why do they go together?

A. $-6x + 9$

B. $-7x + 9y + x$

C. $10x + 7 - 4x + 2$

D. $-2(3x - 4) + 1$

Warm-up

Which Three Go Together: Equivalent Expressions

5 min

Activity Narrative

This *Warm-up* prompts students to compare four expressions. It gives students a reason to use language precisely. It gives the teacher an opportunity to hear how students use terminology and talk about characteristics of the items in comparison to one another.

Launch

Arrange students in groups of 2–4. Display the expressions for all to see.

Give students 1 minute of quiet think time and ask them to indicate when they have noticed three expressions that go together and can explain why.

Next, tell students to share their response with their group and then together find as many sets of three as they can.

Student Task Statement

Which three go together? Why do they go together?

A. $-6x + 9$

B. $-7x + 9y + x$

C. $10x + 7 - 4x + 2$

D. $-2(3x - 4) + 1$

Sample responses:

- A, B, and C go together because they are all expanded expressions (there are no parentheses).
- A, B, and D go together because they have the term $-6x$.
- A, C, and D go together because they have x's and numbers but no y's. They only have one variable, x.
- B, C, and D go together because they can be rewritten with fewer terms.

Activity Synthesis

Invite each group to share one reason why a particular set of three go together. Record and display the responses for all to see. After each response, ask the class if they agree or disagree. Since there is no single correct answer to the question of which three go together, attend to students' explanations and ensure the reasons given are correct.

During the discussion, prompt students to explain the meaning of any terminology they use, such as "terms," "coefficient," "combine," or "distribute" and to clarify their reasoning as needed. Consider asking:

- *"How do you know … ?"*
- *"What do you mean by … ?"*
- *"Can you say that in another way?"*

Activity 1
Seeing it Differently

15 min

Activity Narrative

In this activity, students encounter typical errors with signed numbers, operations, and properties. They are tasked with identifying which strategies are correct. For those that are not, students must describe the error that was made.

Since students are contrasting and critiquing different approaches, they are critiquing the reasoning of others.

This activity uses the *Collect and Display* math language routine to advance conversing and reading as students clarify, build on, or make connections to mathematical language.

Launch

Ensure students understand the task: first they decide whether they agree with each person's strategy, but they also need to describe the errors that were made. Give 5 minutes quiet work time followed by a whole-class discussion.

Student Task Statement

Some students are trying to write an expression with fewer terms that is equivalent to $8 - 3(4 - 9x)$.

Noah says, "I worked the problem from left to right and ended up with $20 - 45x$."

$$8 - 3(4 - 9x)$$
$$5(4 - 9x)$$
$$20 - 45x$$

Lin says, "I started inside the parentheses and ended up with $23x$."

$$8 - 3(4 - 9x)$$
$$8 - 3(-5x)$$
$$8 + 15x$$
$$23x$$

Instructional Routines

MLR2: Collect and Display

ilclass.com/r/10690754

Please log in to the site before using the QR code or URL.

Access for Multilingual Learners (Activity 1, Task Statement)

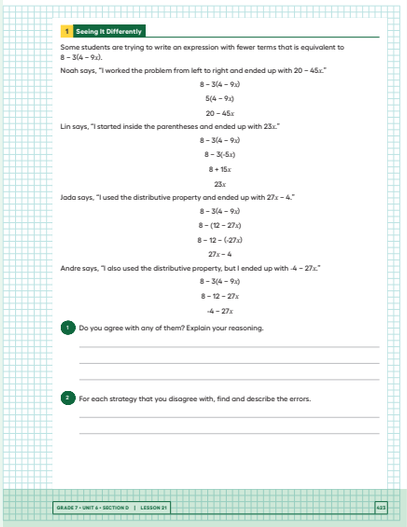
MLR2: Collect and Display.
Direct attention to words collected and displayed from the previous lesson. Invite students to borrow language from the display as needed and update it throughout the lesson.

Access for Students with Diverse Abilities (Activity 1, Task Statement)

Advances: Conversing, Reading
Representation: Internalize Comprehension.
Activate or supply background knowledge. Provide examples or rules for adding, subtracting, multiplying, and dividing signed numbers for students to use as a reference.

Supports accessibility for: Memory, Organization

Student Workbook


1 Seeing It Differently

Some students are trying to write an expression with fewer terms that is equivalent to $8 - 3(4 - 9x)$.

Noah says, "I worked the problem from left to right and ended up with $20 - 45x$."

$8 - 3(4 - 9x)$

$5(4 - 9x)$

$20 - 45x$

Lin says, "I started inside the parentheses and ended up with $23x$."

$8 - 3(4 - 9x)$

$8 - 3(-5x)$

$8 + 15x$

$23x$

Jada says, "I used the distributive property and ended up with $27x - 4$."

$8 - 3(4 - 9x)$

$8 - (12 - 27x)$

$8 - 12 - (-27x)$

$27x - 4$

Andre says, "I also used the distributive property, but I ended up with $-4 - 27x$."

$8 - 3(4 - 9x)$

$8 - 12 - 27x$

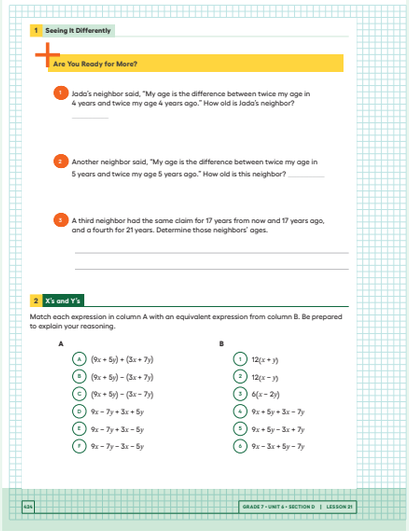
$-4 - 27x$

1. Do you agree with any of them? Explain your reasoning.

2. For each strategy that you disagree with, find and describe the errors.

GRADE 7 • UNIT 6 • SECTION D | LESSON 21

Student Workbook



1 Seeing It Differently

Are You Ready for More?

1. Jada's neighbor said, "My age is the difference between twice my age in 4 years and twice my age 4 years ago." How old is Jada's neighbor?

2. Another neighbor said, "My age is the difference between twice my age in 5 years and twice my age 5 years ago." How old is this neighbor?

3. A third neighbor had the same claim for 17 years from now and 17 years ago, and a fourth for 21 years. Determine those neighbors' ages.

2 X's and Y's

Match each expression in column A with an equivalent expression from column B. Be prepared to explain your reasoning.

A		B	
A	$(9x + 5y) + (3x + 7y)$	1	$12(x + y)$
B	$(9x + 5y) - (3x + 7y)$	2	$12(x - y)$
C	$(9x + 5y) - (3x - 7y)$	3	$6(x - 2y)$
D	$9x - 7y + 3x + 5y$	4	$9x + 5y + 3x - 7y$
E	$9x - 7y + 3x - 5y$	5	$9x + 5y - 3x + 7y$
F	$9x - 7y - 3x - 5y$	6	$9x - 3x + 5y - 7y$

424 GRADE 7 • UNIT 6 • SECTION D | LESSON 21

Jada says, "I used the distributive property and ended up with $27x - 4$."

$$8 - 3(4 - 9x)$$
$$8 - (12 - 27x)$$
$$8 - 12 - (-27x)$$
$$27x - 4$$

Andre says, "I also used the distributive property, but I ended up with $-4 - 27x$."

$$8 - 3(4 - 9x)$$
$$8 - 12 - 27x$$
$$-4 - 27x$$

1. Do you agree with any of them? Explain your reasoning.

Answers vary. Sample response: I agree with Jada because I tried some values of x and Jada's expression always evaluates to the same number as the original expression. Jada applied the distributive property correctly by multiplying both terms in parentheses by 3. Then she correctly applied the operations to the expanded terms.

2. For each strategy that you disagree with, find and describe the errors.

Sample response: Noah subtracted before multiplying. Lin combined 4 and 9x. Andre multiplied -3 and -9 and got -27.

Are You Ready for More?

1. Jada's neighbor said, "My age is the difference between twice my age in 4 years and twice my age 4 years ago." How old is Jada's neighbor?

16

Sample reasoning: An expression for the neighbor's age is $2(a + 4) - 2(a - 4)$ or $2a + 8 - 2a + 8$ which is 16.

2. Another neighbor said, "My age is the difference between twice my age in 5 years and twice my age 5 years ago." How old is this neighbor?

20

Sample reasoning: An expression for this neighbor's age is $2(a + 5) - 2(a - 5)$ or $2a + 10 - 2a + 10 = 20$.

3. A third neighbor had the same claim for 17 years from now and 17 years ago, and a fourth for 21 years. Determine those neighbors' ages.

68 and 84

Sample reasoning: The expression is always twice the number of years + twice the number of years, or $4y$ where y is the number of years: $4(17) = 68$, $4(21) = 84$.

Activity Synthesis

The purpose of this discussion is to help students recognize some common missteps when rewriting expressions.

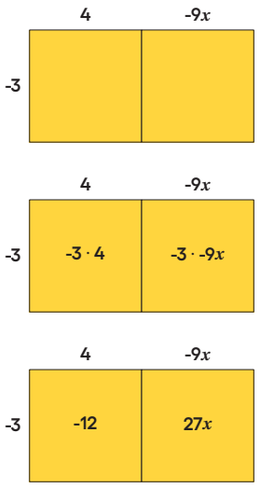
Invite students to share the errors they identified in the activity. Point out that since each given work in this activity contains at least two steps, students can use the steps to identify where the error occurs—where the expressions are

no longer equal for a value of the variable.

Consider displaying these examples and asking student to explain the error each illustrates:

- $6 - 2x = 4x$ (We can't add or subtract terms that have variables from terms that are numbers.)
- $-2(x - 4) = -2x - 8$ (A negative times a negative is positive.)
- $6 + 3 \cdot 2 = 18$ (When there are no parentheses, multiply before adding.)

Review the useful approach of rewriting subtraction operations as adding the opposite. If desired, demonstrate such an approach for the expression $-3(4 - 9x)$ along with a box to organize the work of multiplying:



$8 - 3(4 - 9x)$

$8 + (-3)(4 + (-9x))$

$8 + (-3)(4) + (-3)(-9x)$

$8 + (-12) + 27x$

$-4 + 27x$

Activity 2

X's and Y's

15 min

Activity Narrative

In this partner activity, students take turns making sense of expressions written in different ways. As students trade roles explaining their thinking and listening, they have opportunities to explain their reasoning and critique the reasoning of others.

Instructional Routines

Take Turns

ilclass.com/r/10573524

Please log in to the site before using the QR code or URL

Access for Students with Diverse Abilities (Activity 2, Task Statement)

Engagement: Develop Effort and Persistence.
Differentiate the degree of difficulty or complexity. Begin with more accessible values. For example, present an expression with three terms, such as $6x - (2x + 8)$, and discuss different forms of equivalent expressions.

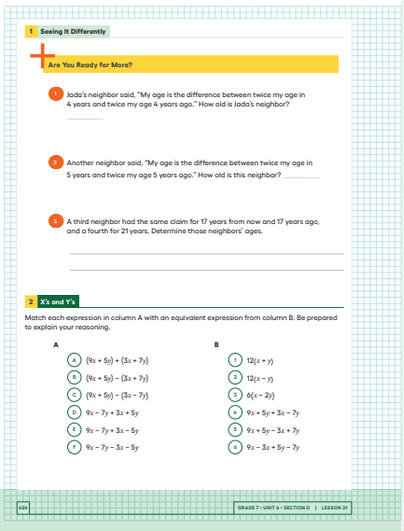
Supports accessibility for: Conceptual Processing, Memory

Building on Student Thinking

For the second and third rows, some students may not understand that the subtraction sign in front of the parentheses applies to both terms inside that set of parentheses. Some students may get the second row correct, but not realize how the third row relates to the fact that the product of two negative numbers is a positive number. For the last three rows, some students may not recognize the importance of the subtraction sign in front of $7y$. Prompt them to rewrite the expressions replacing subtraction with adding the inverse.

Students might write an expression with fewer terms but not recognize an equivalent form because the distributive property has been used to write a sum as a product. For example, $9x - 7y + 3x - 5y$ can be written as $9x + 3x - 7y - 5y$ or $12x - 12y$, which is equivalent to the expression $12(x - y)$ in column B. Encourage students to think about writing the column B expressions in a different form and to recall that the distributive property can be applied to either factor or expand an expression.

Student Workbook



1 Seeing It Differently

Are You Ready for More?

1.1 Jada's neighbor said, "My age is the difference between twice my age in 4 years and twice my age 4 years ago." How old is Jada's neighbor?

2 Another neighbor said, "My age is the difference between twice my age in 5 years and twice my age 5 years ago." How old is this neighbor?

3 A third neighbor had the same claim for 17 years from now and 17 years ago, and a fourth for 21 years. Determine those neighbors' ages.

2 X's and Y's

Match each expression in column A with an equivalent expression from column B. Be prepared to explain your reasoning.

A		B	
A	$(9x + 5y) + (3x + 7y)$	1	$12(x + y)$
B	$(9x + 5y) - (3x + 7y)$	2	$12(x - y)$
C	$(9x + 5y) - (3x - 7y)$	3	$6(x - 2y)$
D	$9x - 7y + 3x + 5y$	4	$9x + 5y + 3x - 7y$
E	$9x - 7y + 3x - 5y$	5	$9x + 5y - 3x + 7y$
F	$9x - 7y - 3x - 5y$	6	$9x - 3x + 5y - 7y$

424 GRADE 7 • UNIT 6 • SECTION D | LESSON 21

Launch

Arrange students in groups of 2. Display the task for all to see. Tell students that for each expression in column A, there is an equivalent expression in column B. If time allows, choose a student to be your partner and demonstrate how to set up and do the activity, otherwise share these steps:

- One partner picks an expression from column A.
- They identify an equivalent expression in column B and explain why they think it is equivalent.
- The other partner listens and makes sure they agree with the match and the reasoning.
- If they don't agree, the partners discuss until they come to an agreement.
- For the next expression in column A, the students swap roles.

Student Task Statement

Match each expression in column A with an equivalent expression from column B. Be prepared to explain your reasoning.

	A	B
1	**A.** $(9x + 5y) + (3x + 7y)$	**1.** $12(x + y)$
6	**B.** $(9x + 5y) - (3x + 7y)$	**2.** $12(x - y)$
5	**C.** $(9x + 5y) - (3x - 7y)$	**3.** $6(x - 2y)$
4	**D.** $9x - 7y + 3x + 5y$	**4.** $9x + 5y + 3x - 7y$
2	**E.** $9x - 7y + 3x - 5y$	**5.** $9x + 5y - 3x + 7y$
3	**F.** $9x - 7y - 3x - 5y$	**6.** $9x - 3x + 5y - 7y$

Activity Synthesis

Much discussion takes place between partners. Invite students to share how they used properties to generate equivalent expressions and find matches.

"Which term(s) does the subtraction sign apply to in each expression? How do you know?"

"Were there any expressions from column A that you wrote with fewer terms but were unable to find a match for in column B? If yes, why do you think this happened?"

"What were some ways you handled subtraction with parentheses? Without parentheses?"

"Describe any difficulties you experienced and how you resolved them."

Activity 3: Optional
Grouping Differently

10 min

Activity Narrative

In this activity, students continue the work of generating equivalent expressions as they decide where to place a set of parentheses and explore how that placement affects the expressions. As students consider the differences in applying the order of operations based on the placement of parenthesis, they notice and make use of structure.

Launch

Arrange students in groups of 2. Tell students to first complete both questions independently. Then trade one of their expressions with their partner. The partner's job is to decide whether the new expression is equivalent to the original or not, and explain how they know.

Student Task Statement

A question on a math quiz had the expression $8x - 9 - 12x + 5$. The teacher told the class there was a typo and the expression was supposed to have one set of parentheses in it.

1. Where could you put parentheses in $8x - 9 - 12x + 5$ to make a new expression that is still equivalent to the original expression? How do you know that your new expression is equivalent?
2. Where could you put parentheses in $8x - 9 - 12x + 5$ to make a new expression that is not equivalent to the original expression? List as many different answers as you can.

Sample responses:

1. $(8x - 9 - 12x + 5) = -4x - 4$, $(8x - 9) - 12x + 5 = -4x - 4$

2. $8x - 9 - (12x + 5) = -4x - 14$, $8x - (9 - 12x) + 5 = 20x - 4$, $8x - (9 - 12x + 5) = 20x - 14$, $8(x - 9 - 12x + 5) = -88x - 32$, $8(x - 9 - 12x) + 5 = -88x - 67$, $8(x - 9) - 12x + 5 = -4x - 67$

Activity Synthesis

Invite a few students to share their strategy for placing parentheses to create an equivalent expression, and then an expression that is not equivalent. Because of the subtracted terms, there are limited options for creating an equivalent expression, but lots of possibilities for creating an expression that is not equivalent.

Lesson Synthesis

Share with students,

"*Today we looked at expressions with parentheses and wrote equivalent expressions with fewer terms.*"

Instructional Routines

MLR7: Compare and Connect

ilclass.com/r/10695592

Please log in to the site before using the QR code or URL.

Building on Student Thinking

Students may not realize that they can break up a term like $8x$ and place a parentheses, such as $8x$. Clarify that they may place the parentheses anywhere in the expression.

Access for Multilingual Learners (Activity 3, Synthesis)

MLR7: Compare and Connect. After all strategies have been presented, lead a discussion comparing, contrasting, and connecting the different approaches. Ask,

"*How can you write the original expression in different ways with fewer terms?*"
$-4x - 4$, $-4(x + 1)$, $4(-x - 1)$

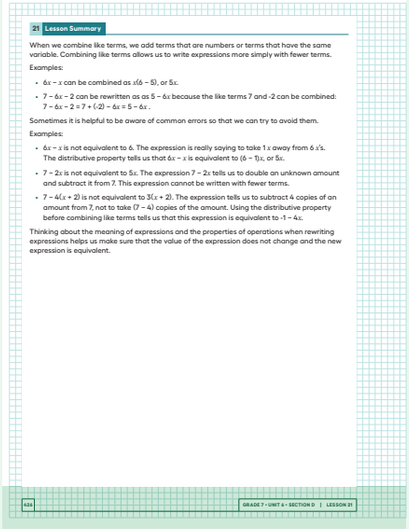
"*Where did you place the parentheses to create an equivalent expression?*"

"*Share other ways you placed parentheses and the resulting expression with fewer terms.*"

"*Why did the different placements of the parentheses lead to the same (or different) outcomes?*"

Advances: Representing, Conversing

Student Workbook



21 Lesson Summary

When we combine like terms, we add terms that are numbers or terms that have the same variable. Combining like terms allows us to write expressions more simply with fewer terms.

Examples:

- $6x - x$ can be combined as $x(6 - 5)$, or $5x$.
- $7 - 6x - 2$ can be rewritten as as $5 - 6x$ because the like terms 7 and -2 can be combined: $7 - 6x - 2 = 7 + (-2) - 6x = 5 - 6x$.

Sometimes it is helpful to be aware of common errors so that we can try to avoid them.

Examples:

- $6x - x$ is not equivalent to 6. The expression is really saying to take 1 x away from 6 x's. The distributive property tells us that $6x - x$ is equivalent to $(6 - 1)x$, or $5x$.
- $7 - 2x$ is not equivalent to $5x$. The expression $7 - 2x$ tells us to double an unknown amount and subtract it from 7. This expression cannot be written with fewer terms.
- $7 - 4(x + 2)$ is not equivalent to $3(x + 2)$. The expression tells us to subtract 4 copies of an amount from 7, not to take $(7 - 4)$ copies of the amount. Using the distributive property before combining like terms tells us that this expression is equivalent to $-1 - 4x$.

Thinking about the meaning of expressions and the properties of operations when rewriting expressions helps us make sure that the value of the expression does not change and the new expression is equivalent.

If desired, use this example to review these concepts. Display the expression $5 - 2(3x - x)$ for all to see. Ask:

"What is a likely mistake someone might make when trying to write an expression that is equivalent to this one?"

Sample responses:

- Subtracting 2 from 5 first, resulting in $3(3x - x)$
- Distributing positive 2, resulting in $5 - 6x - 2x$
- Thinking that $3x - x$ is 3, resulting in $5 - 2(3)$

"How can we avoid these errors while writing an expression that is equivalent to this one?"

Rewrite the subtraction as adding the opposite, for example:

$5 - 2(3x - x)$

$5 + -2(3x + -x)$

$5 + -2 \cdot 3x + -2 \cdot -x$

$5 + -6x + 2x$

$5 + x(-6 + 2)$

$5 + -4x$ or $5 - 4x$

Lesson Summary

When we combine like terms, we add terms that are numbers or terms that have the same variable. Combining like terms allows us to write expressions more simply with fewer terms.

Examples:

- $6x - x$ can be combined as $x(6 - 5)$, or $5x$.
- $7 - 6x - 2$ can be rewritten as as $5 - 6x$ because the like terms 7 and -2 can be combined: $7 - 6x - 2 = 7 + (-2) - 6x = 5 - 6x$.

Sometimes it is helpful to be aware of common errors so that we can try to avoid them.

Examples:

- $6x - x$ is not equivalent to 6. The expression is really saying to take 1 x away from 6 x's. The distributive property tells us that $6x - x$ is equivalent to $(6 - 1)x$, or $5x$.
- $7 - 2x$ is not equivalent to $5x$. The expression $7 - 2x$ tells us to double an unknown amount and subtract it from 7. This expression cannot be written with fewer terms.
- $7 - 4(x + 2)$ is not equivalent to $3(x + 2)$. The expression tells us to subtract 4 copies of an amount from 7, not to take $(7 - 4)$ copies of the amount. Using the distributive property before combining like terms tells us that this expression is equivalent to $-1 - 4x$.

Thinking about the meaning of expressions and the properties of operations when rewriting expressions helps us make sure that the value of the expression does not change and the new expression is equivalent.

Cool-down

Subtracting Linear Expressions

5 min

Student Task Statement

Write an equivalent expression with fewer terms. Explain or show your reasoning.

$$(16x + 5) - 4(3 + 2x)$$

$8x - 7$ (or equivalent)

Sample reasoning: Using the distributive property gets $16x + 5 - 12 - 8x$ and then combining like terms gets $8x - 7$.

Responding To Student Thinking

Press Pause
By this point in the unit, there should be some student mastery of equivalent expressions that involve subtraction. If students struggle, plan to make time to revisit related work in the optional activities referred to here. See the Course Guide for ideas to help students re-engage with earlier work.

Grade 7, Unit 6, Lesson 20, Activity 2
Making Sides Equal

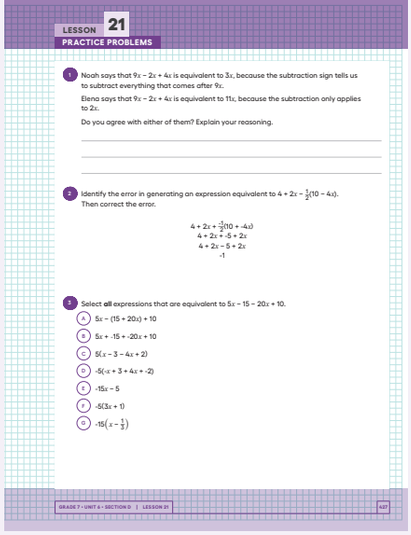
Grade 7, Unit 6, Lesson 21, Activity 3
Grouping Differently

Lesson 21

Practice Problems

6 Problems

Student Workbook



LESSON 21
PRACTICE PROBLEMS

1. Noah says that $9x - 2x + 4x$ is equivalent to $3x$, because the subtraction sign tells us to subtract everything that comes after $9x$.
Elena says that $9x - 2x + 4x$ is equivalent to $11x$, because the subtraction only applies to $2x$.
Do you agree with either of them? Explain your reasoning.

2. Identify the error in generating an expression equivalent to $4 + 2x - \frac{1}{2}(10 - 4x)$. Then correct the error.

$4 + 2x + \frac{-1}{2}(10 + -4x)$
$4 + 2x + -5 + 2x$
$4 + 2x - 5 + 2x$
-1

3. Select **all** expressions that are equivalent to $5x - 15 - 20x + 10$.
   - A. $5x - (15 + 20x) + 10$
   - B. $5x + -15 + -20x + 10$
   - C. $5(x - 3 - 4x + 2)$
   - D. $-5(-x + 3 + 4x + -2)$
   - E. $-15x - 5$
   - F. $-5(3x + 1)$
   - G. $-15\left(x - \frac{1}{3}\right)$

GRADE 7 • UNIT 4 • SECTION D | LESSON 21 427

Problem 1

- Noah says that $9x - 2x + 4x$ is equivalent to $3x$, because the subtraction sign tells us to subtract everything that comes after $9x$.
- Elena says that $9x - 2x + 4x$ is equivalent to $11x$, because the subtraction only applies to $2x$.

Do you agree with either of them? Explain your reasoning.

Elena is correct

Sample reasoning: Rewriting addition as subtraction gives us $9x + -2x + 4x$, which shows that the subtraction symbol in front of the $2x$ applies only to the $2x$ and not to the terms that come after it.
$9x - 2x + 4x = x(9 - 2 + 4) = x(11) = 11x$

Problem 2

Identify the error in generating an expression equivalent to $4 + 2x - \frac{1}{2}(10 - 4x)$. Then correct the error.

$4 + 2x + \frac{-1}{2}(10 + -4x)4 + 2x + -5 + 2x4 + 2x - 5 + 2x-1$

The error is in the last step

Sample reasoning: The second $2x$ was subtracted instead of being added. This would be correct if there were parentheses around $5 + 2x$. The last step should be $4x - 1$.

Problem 3

Select **all** expressions that are equivalent to $5x - 15 - 20x + 10$.

A. $5x - (15 + 20x) + 10$

B. $5x + -15 + -20x + 10$

C. $5(x - 3 - 4x + 2)$

D. $-5(-x + 3 + 4x + -2)$

E. $-15x - 5$

F. $-5(3x + 1)$

G. $-15\left(x - \frac{1}{3}\right)$

Problem 4

from Unit 6, Lesson 14

The school marching band has a budget of up to $750 to pay for 15 new uniforms and competition fees that total $300. How much can they spend on each uniform?

a. Write an inequality to represent this situation.

$15x + 300 \leq 750$ (or equivalent)

b. Solve the inequality and describe what it means in the situation.

$x \leq 30$

They can spend at most $30 on each uniform.

Problem 5

from Unit 6, Lesson 16

Solve the inequality that represents each story. Then interpret what the solution means in the story.

a. Each time Elena earns $9, she gives x dollars to charity. Elena believes this will happen 7 times this month. She wants to be sure she keeps at least $42 from this month's earnings. $7(9 - x) \geq 42$

$x \leq 3$

Sample reasoning: Elena can give $3 or less to charity for every $9 she earns.

b. Lin buys a candle that is 9 inches tall and burns down $\frac{3}{7}$ inch per minute. She wants to let the candle burn down until it is less than 6 inches tall. $9 - \frac{3}{7}x < 6$

$x > 7$

Sample reasoning: Elena needs to let the candle burn for more than 7 minutes.

Problem 6

from Unit 4, Lesson 3

A certain shade of light blue paint is made by mixing $1\frac{1}{2}$ quarts of blue paint with 5 quarts of white paint. If you need a total of 16.25 gallons of this shade of light blue paint, how much of each color should you mix? (1 gallon = 4 quarts)

You should mix $3\frac{3}{4}$ gallons of blue paint with $12\frac{1}{2}$ gallons of white paint.

Student Workbook


21 Practice Problems

4 from Unit 6, Lesson 14
The school marching band has a budget of up to $750 to pay for 15 new uniforms and competition fees that total $300. How much can they spend on each uniform?
a. Write an inequality to represent this situation.
b. Solve the inequality and describe what it means in the situation.

5 from Unit 6, Lesson 16
Solve the inequality that represents each story. Then interpret what the solution means in the story.
a. Each time Elena earns $9, she gives x dollars to charity. Elena believes this will happen 7 times this month. She wants to be sure she keeps at least $42 from this month's earnings. $7(9 - x) \geq 42$
b. Lin buys a candle that is 9 inches tall and burns down $\frac{3}{7}$ inch per minute. She wants to let the candle burn down until it is less than 6 inches tall. $9 - \frac{3}{7}x < 6$

6 from Unit 4, Lesson 3
A certain shade of light blue paint is made by mixing $1\frac{1}{2}$ quarts of blue paint with 5 quarts of white paint. If you need a total of 16.25 gallons of this shade of light blue paint, how much of each color should you mix? (1 gallon = 4 quarts)

Learning Targets
+ I am aware of some common errors when writing equivalent expressions, and I can avoid them.
+ When possible, I can write an equivalent expression that has fewer terms.