Eureka Acceleration Tool: Grade 6
Module 4, Topic A

To become mathematically proficient, students **must** access on-grade-level content. This document aims to help teachers who use the Eureka curriculum to ensure readiness for students before and during on-grade-level work, creating opportunities for timely support directly connected to the new learning.

About this Topic

Focus Standards:

6.EE.A.3: Apply the properties of operations to generate equivalent expressions. *For example, apply the distributive property to the expression 3(2 + x) to produce the equivalent expression 6 + 3x; apply the distributive property to the expression 24x + 18y to produce the equivalent expression 6 (4x + 3y); apply properties of operations to y + y + y to produce the equivalent expression 3y.*

Topic Overview per the Eureka Curriculum

Prior to this module, students have worked with numbers and operations from Kindergarten through Grade 5. In Topic A, students further discover and clarify the relationships of the operations using models. From these models, students build and evaluate identities that are useful in solving equations and developing proficiency with solving problems algebraically.

To begin, students use models to discover the relationship between addition and subtraction. In Lesson 1, for example, a model could represent the number three. Students notice that if two are taken away, there is a remainder of one. However, when students replace the two units, they notice the answer is back to the original three. Hence, students first discover the identity $w - x + x = w$ and later discover that $w + x - x = w$.

In Lesson 2, students model the relationship between multiplication and division. They note that when they divide eight units into two equal groups, they find a quotient of four. They discover that if they multiply that quotient by the number of groups, then they return to their original number, eight, and ultimately build the identities $a \div b \cdot b = a$ and $a \cdot b \div b = a$, when $b \neq a$.

Students continue to discover identities in Lesson 3, where they determine the relationship between multiplication and addition. Using tape diagrams from previous modules, students are assigned a diagram with three equal parts, where one part is assigned a value of four. They note that since there are three equal parts, they can add four three times to determine the total amount. They relate to multiplication and note that three groups with four items in each group produces a product of twelve, determining that $3 \cdot g = g + g + g$.

Finally, in Lesson 4, students relate division to subtraction. They notice that dividing eight by two produces a quotient of four. They experiment and find that if they subtract the divisor from the dividend four times (the quotient), they find a remainder of zero. They continue to investigate with other examples and prove that if they continually subtract the divisor from the dividend, they determine a difference, or remainder, of zero. Hence, $12 \div x = 4$ means $12 - x - x - x - x = 0$.

This Eureka Acceleration Tool is considered a "living" document as we believe that teachers and other educators will find ways to improve the document as they use it. Please send feedback to LouisianaTeacherLeaders@la.gov so that we can use your input when updating this guide.

DEPARTMENT of EDUCATION
Louisiana Believes

updated November 2019

Eureka Acceleration Tool: Grade 6
Module 4, Topic A

Overview

Eureka Acceleration Tools include:

1. a diagnostic assessment to help teachers determine the misunderstandings or gaps in mathematical knowledge related to a specific Topic in the Eureka curriculum
2. guidance for teachers to analyze student work on the diagnostic assessment
3. suggested materials for targeted remedial instruction

Note: The use of this guidance is not intended to delay students' engagement with on-grade-level learning. On-grade-level learning should be the focus of instructional time and be treated as an opportunity for students to "finish" learning previous skills and deepen conceptual understanding.

Diagnostic Assessment

The diagnostic assessment is designed to be administered to targeted students prior to beginning instruction on the given Topic. It is broken into parts (Part A, Part B, and so on); each part addresses a different prerequisite standard and contains three problems. If a student correctly answers at least 2 out of the 3 problems, it can be assumed that he/she is ready to engage with the new content of the Topic with little to no support needed prior to engaging with the Topic. The diagnostic assessment is designed in this way so that teachers can determine the "entry point" to remedial instruction and/or opportunities for unfinished learning within the context of the new learning. The entry points and opportunities for unfinished learning will vary between students.

Guidance for Acceleration

The Acceleration Guidance is designed for teacher use. It is also broken into parts (Part A, Part B, and so on) and correlates to the parts on the diagnostic assessment. Each part contains the following:

1. **The focus standard**: The focus standards are strategically chosen to address prerequisite skills and are purposefully arranged in the order that students typically master the skills and knowledge.
2. **Why this is important for current grade level work**: This section describes how the work of the prerequisite standard relates to the standard(s) addressed in the Topic of instruction.
3. **Using the diagnostic assessment to identify gaps**: This section identifies common errors students make on the diagnostic assessment items.
4. **Acceleration Resources for Targeted Instruction**: The resources pinpoint specific Eureka lessons and parts of lessons for teachers to use to address gaps in mathematical knowledge. Using Eureka materials to address acceleration ensures alignment to the standards, consistency in approach to learning, and similarities in strategies for solving problems.

Part A: 1.OA.B.3
Apply the properties of operation to complete each sentence by filling in the blank, without calculating, to make a true statement.

1. If 1,985 + 12,486 = 14,471, then 12,486 + _____ = 14,471.

2. If 1,985 + 12,486 = 14,471, then 14,471 – 12,486 = _____.

3. If 1,985 + 12,486 = 14,471, then 1,985 + 12,000 + _____ = 14,471.

Part B: 3.OA.B.5
Apply the properties of operation to complete each sentence by filling in the blank, without calculating, to make a true statement.

4. If 195 x 14 = 2,730, then 14 x _____ = 2,730.

5. If 195 x 14 = 2,730, then 2,730 ÷ 14 = _____.

6. If 195 x 14 = 2,730, then 195 x _____ x 2 = 2,730.

Solutions:

1. 1,985
2. 1,985
3. 486
4. 195
5. 195
6. 7

Part A Focus: 1.OA.B.3: Apply properties of operations to add and subtract. *Examples: If 8 + 3 = 11 is known, then 3 + 8 =11 is also known. (Commutative property of addition.) To add, 2 + 6 + 4, the second two numbers can be added to make a ten, so 2 + 6 + 4 = 2 + 10 = 12. (Associative property of addition.)*

Why this is important for current grade level work: In Topic A, students will use the commutative property of addition and their understanding of subtraction as an unknown addend problem as the foundation for understanding the relationship between inverse operations of addition and subtraction to generate equivalent expressions. For example, if 8 +3 = 11 and 3 + 8 = 11 then 11 - 8 = 3 and 11 - 3 = 8. Students will discover that arithmetic properties hold true with variables and will apply the properties to write expressions and equations with variables to record equivalent expressions with inverse and repeated operations. Later in the unit, students will use this foundation to manipulate expressions and solve equations with variables.	**Acceleration Resources for Targeted Instruction:** adapted from: 1st Grade, Module 2, Topic A, Teacher Companion Student Activity Sheet
Using the Diagnostic Assessment to identify gaps: **Problems 1--3:** Look for students who find the missing number by calculating instead of applying the properties of operations. This can be viewed as an opportunity for unfinished learning as the new content may help students solidify the understanding they lack. Problem 1 focuses on the commutative property, Problem 2 focuses on the relationships between addition and subtraction, and Problem 3 focuses on the associative property.	

Part B Focus: 3.OA.B.5: Apply properties of operations as strategies to multiply and divide. *Examples: If 6 x 4 = 24 is known, then 4 x 6 = 24 is also known. (Commutative property of multiplication.) 3 x 5 x 2 can be found by 3 x 5 = 15 then 15 x 2 = 30 or 5 x 2 = 10 then 10 x 3 =30. (Associative property of multiplication.) Knowing that 8 x 5 = 40 and 8 x 2 = 16, one can find 8 x 7 as 8 x (5 + 2) = (8 x 5) + (8 x 2) = 40 + 16 = 56 (Distributive Property)*

Why this is important for current grade level work: In Lessons 2-4 of Topic A, students will combine their understanding of the commutative property of multiplication and understanding of division as an unknown-factor problem to discover relationships between inverse operations of multiplication and division and division as repeated subtraction. For example, if 8 + 8 + 8 = 24, then 3 x 8 = 24. Furthermore, if 24 ÷ 3 = 8 and 24 ÷ 8 = 3, then 24 -3 - 3 - 3 - 3 - 3 - 3 - 3 = 0 and 24 - 8 - 8 - 8 = 0. Students will define these properties using variables, which will lay the foundation for manipulating expressions and solving equations with variables later in the module.	**Acceleration Resources for Targeted Instruction:** adapted from: 3rd Grade, Module 3, Topic E Teacher Companion Student Activity Sheet
Using the Diagnostic Assessment to identify gaps: **Problems 4-6:** Look for students who find the missing number by calculating instead of applying the properties of operations. This can be viewed as an opportunity for unfinished learning as the new content may help students solidify the understanding they lack. Problem 4 focuses on the commutative property, Problem 5 focuses on the relationship between multiplication and division, and Problem 6 focuses on the associative property.	

Acceleration Guidance:
Grade 6 Eureka Module 4, Topic A

Appendix

Eureka Acceleration Tools

Prerequisite Support Lesson for Grade 6, Module 4, Topic A

Part A: Using the Associative and Commutative Properties of Addition

Adapted from Eureka Lesson: Grade 1, Module 2, Topic A, Lessons 2 and 6

Use Prior to: 6th Grade, Module 4, Topic A, Lesson 1

Standard: 1.OA.B.3

Apply properties of operations to add and subtract. *Examples: If 8 + 3 = 11 is known, then 3 + 8 =11 is also known. (Commutative property of addition.) To add, 2 + 6 + 4, the second two numbers can be added to make a ten, so 2 + 6 + 4 = 2 + 10 = 12. (Associative property of addition.)*

Purpose: In Topic A, students will use the commutative property of addition and their understanding of subtraction as an unknown addend problem as the foundation for understanding the relationship between inverse operations of addition and subtraction to generate equivalent expressions. For example, if 8 + 3 = 11 and 3 + 8 = 11, then 11 – 8 = 3 and 11 – 3 = 8. Students will discover that arithmetic properties hold true with variables and will apply the properties to write expressions and equations with variables to record equivalent expressions with inverse and repeated operations. Later in the unit, students will use this foundation to manipulate expressions and solve equations with variables.

Note: The focus of this mini lesson is to familiarize students with the associative and commutative properties of addition. Emphasize to students that use of these properties allows them to manipulate the numbers to easily add and subtract.

- Associative Property of Addition: When adding, regrouping the addends will result in the same sum.
- Commutative Property of Addition: When adding, re-ordering the addends will result in the same sum.
- Work through each section of the Example Problems with the students before allowing them to attempt the Problem Set independently.

Example Problems

Circle the numbers that make 10 or groups of ten. Rewrite and complete the number sentence.

Remind students that making 10 can simplify the addition process. In the first example, discuss how 7 and 3 are circled because they make 10. Now they can rewrite the number sentence as 10 + 5 = 15. Even though the problems increase with complexity as the numbers increase, making 10 or groups of 10 will simplify the addition process. Instruct students to circle the numbers that make 10 or multiples of ten and then add to find the answer. Discuss how re-ordering (commutative property) the numbers does not change the sum, but makes the problem easier to add.

1) 7 + 5 + 3 = _____

10

10 + 5 = 15

2) 9 + 2 + 1 = _____

10 + 2 = 12

3) 14 + 8 + 6 = _____

20 + 8 = 28

4) 2 + 4 + 18 = _____

20 + 4 = 24

5) 41 + 4 + 9 = _____

50 + 4 = 54

6) 4 + 3 + 26 = _____

30 + 3 = 33

Break apart one of the numbers to make a 10 or a multiple of 10. Complete the number sentence. Demonstrate in Example Problem 7 how 5 is broken apart or decomposed in order to add 1 to 9 to make 10. By regrouping the numbers (associative property), the addition problem becomes easier to solve. Ask students if it is easier to make 5 a ten or 9 a ten and explain why. Consider showing students both ways so they can see that it is easier to add one to 9 to make ten than it is to add 5 to 5 to make ten. The idea is that we want to simplify the process, not complicate it. Again, the problems increase in complexity as the numbers increase, but the students should focus on making tens. Discuss how, when adding numbers, regrouping the numbers does not change the sum.

7) 5 + 9 = _____
(4 + 1) + 9 = _____
4 + (9 + 1) = _____
4 + 10 = 14

8) 3 + 9 = _____
(2 + 1) + 9
2 + (1 + 9)
2 + 10 = 12

9) 19 + 4 = _____
19 + (1 + 3)
(19+ 1) + 3
20 + 3 = 23

10) 39 + 7 = _____
39 + (1 + 6)
(39 + 1) + 6
40 + 6 = 46

11) 6 + 29 = _____
(5 + 1) + 29
5 + (1 + 29)
5 + 30 = 35

12) 59 + 8 = _____
59 + (1 + 7)
(59 + 1) + 7
60 + 7 = 67

Solve each equation without calculating.

Again, remind students that re-ordering the numbers results in the same sum. Use the example, if they know 8 + 3 = 11 then they also know that 3 + 8 = 11. This also helps with subtraction, if they know that 8 + 3 = 11, then they know that 11 – 8 = 3 and that 11 – 3 = 8. Ask them which property supports this idea (commutative – re-ordering the addends does not change the sum when adding).

13) If 16 + 29 = 45, then 29 + 16 = 45, and 45 – 16 = 29, and 45 – 29 = 16

14) If 367 – 124 = 243, then 243 + 124 = 367, and 367 – 243 = 124, and 367 – 243 = 124

Problem Set

Allow students to use the concepts learned in the Example Problems to complete the Problem Set on their own. Check for understanding as students work through the problems. Students who have grasped the concept well may be able to do the math in their heads instead of writing out the process.

Circle the numbers that make 10 or groups of ten. Rewrite and complete the number sentence.

1) 3 + 6 + 7 = _____
10 + 6 = 16

2) 2 + 4 + 8 = _____
10 + 4= 14

3) 17 + 5 + 3 = _____
20 + 5 = 25

4) 9 + 6 + 51 = _____
60 + 6 = 66

5) 62 + 7 + 8 = _____
70 + 7 = 77

6) 5 + 8 + 75 = _____
80 + 8 = 88

Break apart one of the numbers to make 10. Complete the number sentence.

7) 7 + 9 = _____
(6 + 1) + 9
6 + (1 + 9)
6 + 10 = 16

8) 8 + 9 = _____
(7 + 1) + 9
7 + (1 + 9)
7 + 10 = 17

9) 49 + 6 = _____
49 + (1 + 5)
(49 + 1) + 5
50 + 5 = 55

10) 29 + 3 = _____
29 + (1 + 2)
(29 + 1) + 2
30 + 2 = 32

11) 9 + 79 = _____
(8 + 1) + 79
8 + (1 + 79)
8 + 80 = 88

12) 39 + 4= _____
39 + (1 + 3)
(39 + 1) + 3
40 + 3 = 43

Solve the following problems.

a. 2 + 8 = 10	b. 8 + 2 = 10	c. 10 - 2 = 8
d. 3 + 9 = 12	e. 12 - 9 = 3	f. 9 + 3 = 12
g. 19 + 6 = 25	h. 20 + 5 = 25	i. 19 + 8 = 27
j. 145 + 215 = 215 + 145	k. 1,264 + 225 = 225 + 1,264	l. 39 + 7 = 40 + 6
m. 128 + 6 = 130 + 4	n. 478 + 124 = 478 + 100 + 124	o. 389 + 537 = 537+ 389

Describe the associative property of addition in your own words.

Possible Answer: The associative property of addition states that, when adding numbers, regrouping the addends will result in the same sum.

Describe the commutative property of addition in your own words.

Possible Answer: The commutative property of addition states that, when adding numbers, re-ordering the addends will result in the same sum.

Name: _____

Eureka Acceleration Tools

Prerequisite Support Lesson for Grade 6, Module 4, Topic A

Part A: Using the Associative and Commutative Properties of Addition

Example Problems

Circle the numbers that make 10 or groups of ten. Rewrite and complete the number sentence.

1) 7 + 5 + 3 = _____

10

2) 9 + 2 + 1 = _____

3) 14 + 8 + 6 = _____

4) 2 + 4 + 18 = _____

5) 41 + 4 + 9 = _____

6) 4 + 3 + 26 = _____

Break apart one of the numbers to make a 10 or a multiple of 10. Complete the number sentence.

7) 5 + 9 = _____
(4 + 1) + 9 = _____
4 + (9 + 1) = _____
4 + 10 = _____

8) 3 + 9 = _____

9) 19 + 4 = _____

10) 39 + 7 = _____

11) 6 + 29 = _____

12) 59 + 8 = _____

Solve each equation without calculating.

13) If 16 + 29 = 45, then 29 + ____ = 45, and 45 – 16 = ____, and 45 – 29 = ____

14) If 367 – 124 = 243, then 243 + ____ = 367, and 367 – ____ = 124, and 367 – 243 = ____

Problem Set

Circle the numbers that make 10 or groups of ten. Rewrite and complete the number sentence.

1) 3 + 6 + 7 = _____

2) 2 + 4 + 8 = _____

3) 17 + 5 + 3 = _____

4) 9 + 6 + 51 = _____

5) 62 + 7 + 8 = _____

6) 5 + 8 + 75 = _____

Break apart one of the numbers to make 10. Complete the number sentence.

7) 7 + 9 = _____

8) 8 + 9 = _____

9) 49 + 6 = _____

10) 29 + 3 = _____

11) 9 + 79 = _____

12) 39 + 4= _____

Solve the following problems.

a. 2 + ____ = 10	b. 8 + 2 = ____	c. 10 - ____ = 8
d. 3 + 9 = ____	e. 12 - 9 = ____	f. ____ + 3 = 12
g. 19 + 6 = ____	h. 20 + ____ = 25	i. 19 + 8 = ____
j. 145 + 215 = ____ + 145	k. 1,264 + 225 = 225 + ____	l. 39 + 7 = 40 + ____
m. 128 + 6 = 130 + ____	n. 478 + 124 = 478 + 100 + ____	o. 389 + 537 = ____ + 389

Describe the associative property of addition in your own words.

_____

Describe the commutative property of addition in your own words.

_____

Eureka Acceleration Tools

Prerequisite Support Lesson for Grade 6, Module 4, Topic A

Part B: Using the Associative and Commutative Properties of Multiplication

Adapted from Eureka Lesson: Grade 3, Module 3, Topic E, Lessons 1 and 9

Use Prior to: 6th Grade, Module 4, Topic A, Lesson 2

Standard: 3.OA.B.5

Apply properties of operations as strategies to multiply and divide. *Examples: If 6 x 4 = 24 is known, then 4 x 6 = 24 is also known. (Commutative property of multiplication.) 3 x 5 x 2 can be found by 3 x 5 = 15 then 15 x 2 = 30 or 5 x 2 = 10 then 10 x 3 =30. (Associative property of multiplication.) Knowing that 8 x 5 = 40 and 8 x 2 = 16, one can find 8 x 7 as 8 x (5 + 2) = (8 x 5) + (8 x 2) = 40 + 16 = 56 (Distributive Property)*

Purpose: In Lessons 2-4 of Topic A, students will combine their understanding of the commutative property of multiplication and understanding of division as an unknown-factor problem to discover relationships between inverse operations of multiplication and division and division as repeated subtraction. For example if 8 + 8 + 8 = 24, then 3 x 8 = 24. Furthermore, if 24 ÷ 3 = 8 and 24 ÷ 8 = 3, then 24 – 3 – 3 – 3 – 3 – 3 – 3 – 3 – 3 = 0 and 24 – 8 – 8 – 8 = 0. Students will define these properties using variables, which will lay the foundation for manipulating expressions and solving equations with variables later in the module.

Notes: The focus of this mini lesson is to familiarize students with the associative and commutative properties of multiplication. Emphasize to students that the use of these properties allows them to manipulate the numbers to easily multiply and divide.

- Associative Property of Multiplication: When multiplying, regrouping the factors will result in the same product.
- Commutative Property of Multiplication: When multiplying, re-ordering the factors will result in the same product.
- Work through each section of the Example Problems with the students before allowing them to attempt the Problem Set independently.

Example Problems

1. Use the array to write two multiplication sentences and two division sentences.

   Use this problem to demonstrate how changing the order of the factors (commutative property) does not change the product. Also, point out that if students know that 2 x 3 = 6, then they know that 6 ÷ 3 = 2, and that 6 ÷ 2 = 3. Tell students that this array represents 2 threes and it represents 3 twos. Remind students that this is an example of the commutative property of multiplication.

   O O O
   O O O

   2 x 3 = 6 6 ÷ 2 = 3

   3 x 2 = 6 6 ÷ 3 = 2

2. Fill in the blanks to make the number sentences true.

Demonstrate to the students the various ways to represent the commutative property. The first three problems are fairly simple as the order of the factors changes. The next three may seem difficult at first. If the students struggle, draw the array and model how the array represents 5 eights, by circling 5 groups of 8, and then model how the array represents 8 fives by circling 8 groups of 5. The last three increase with complexity, as students will have to determine how to make the equation balanced. If students can recognize that 3 x 9 is 9 threes, then they will realize that 10 threes minus 1 three will result in 9 threes.

a. 2 x 7 = 7 x 2	b. 6 x 3 = 3 x 6	c. 5 x 4 = 4 x 5
d. 5 eights = 8 fives	e. 4 nines = 9 fours	f. 7 sixes = 6 sevens
g. 3 x 9 = 10 threes – 1 three 3 x 9 = 27	h. 10 fours – 1 four = 9 x 4 10 fours – 1 four = 36	i. 8 x 4 = 5 fours + 3 fours 8 x 4 = 32

3. Fill in the multiplication chart.

Instruct students to find the product of 6 and 3 by placing their finger on the row labeled 3, and then sliding it to the right until it is also in the column labeled 6. The number in the square where the row and column meet is the product. Ask them what the product of 3 and 6 is (18). Now instruct the students to locate the product of 6 and 3. Instruct them to place their finger on the row labeled 6, and then slide their finger to the right until it is in the column labeled 3. Ask for the product, reminding them about the commutative property. If 3 times 6 is 18, then 6 times 3 is 18. Instruct the students to write 18 in this box. If needed, show the students more examples. Then, have students complete the rest of the chart, reminding them that if they struggle in finding a fact, they can use the rest of the chart and the commutative property to help find the product.

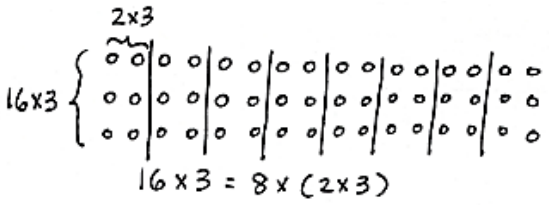
×	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
1	1	2	3	4	5	6	7	8	9	10
2	2	4	6	8	10	12	14	16	18	20
3	3	6	9	12	15	18	21	24	27	30
4	4	8	12	16	20	24	28	32	36	40
5	5	10	15	20	25	30	35	40	45	50
6	6	12	18	24	30	36	42	48	54	60
7	7	14	21	28	35	42	49	56	63	70
8	8	16	24	32	40	48	56	64	72	80
9	9	18	27	36	45	54	63	72	81	90
10	10	20	30	40	50	60	70	80	90	100

4. Decompose the larger factor, regroup, multiply.

This next section utilizes the associative property of multiplication. Students will use arrays to see that larger numbers can be decomposed into two factors, and then those factors can be regrouped with the other factor and multiplied to easily solve the problem. Two examples are shown below to demonstrate how 16 can be decomposed into 8 x 2 or 4 x 4. In the first example, first demonstrate how 16 is broken down to (8x2), then how the 3 and 2 are grouped together. Emphasize how much easier it is to regroup and multiply 3 and 2 to equal 6 and then to multiply 6 by 8 to equal 48, as opposed to multiplying 3 by 16. Notice the first array, which began as 3 rows of 16. The array now shows how the numbers were regrouped to show 8 groups of (2 x 3). The array in the second example shows 4 groups of (4 x 3). Students will probably prefer the first example since 4 x 12 may seem more difficult to solve.

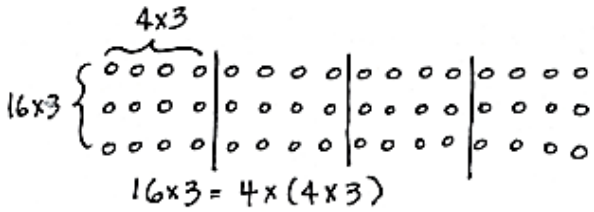
Example 1: 16 x 3

(8 x 2) x 3
8 x (3 x 2)
8 x 6 = 48



or

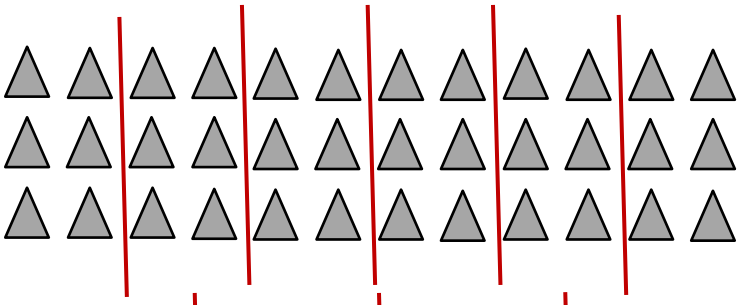
(4 x 4) x 3
4 x (4 x 3)
4 x 12 = 48



Example 2: 3 x 12

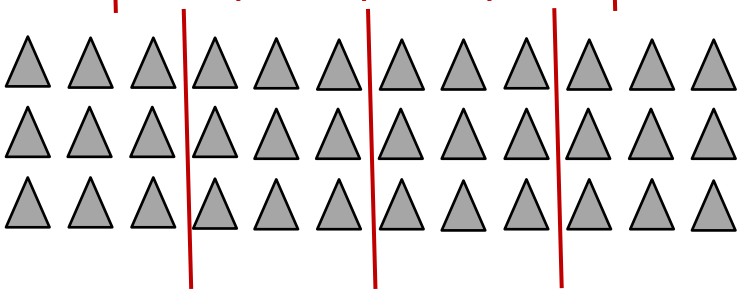
- Ask students which number to decompose into two smaller factors (12)
- Ask students what they plan to rewrite 12 as. (3 x 4 or 6 x 2).
- Have students rewrite the number sentence in the space below. Then instruct them to regroup the factors to make the multiplication problem easier to solve. (See below)
- Instruct students to use the array to demonstrate how they regrouped the numbers.

3 x (6 x 2)
(3 x 2) x 6
6 x 6 = 36



OR

3 x (3 x 4)
(3 x 3) x 4
9 x 4 = 36



You Try: Decompose the larger factor, regroup, multiply. Use arrays if necessary.

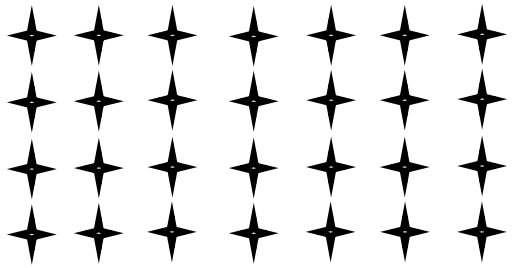
Depending on the level of the student, they can either try some of these on their own or continue practicing the problems together. Arrays are not necessary, but can used as a visual representation.

a. 15 x 3 (3 x 5) x 3 5 x (3 x 3) 5 x 9 = 45	b. 18 x 2 (6 x 3) x 2 6 x (3 x 2) 6 x 6 = 36	c. 14 x 3 (2 x 7) x 3 7 x (2 x 3) 7 x 6 = 42
d. 4 x 16 4 x (2 x 8) (4 x 2) x 8 8 x 8 = 64	e. 5 x 18 5 x (2 x 9) (5 x 2) x 9 10 x 9 = 90	f. 2 x 15 2 x (3 x 5) (2 x 3) x 5 6 x 5 = 30

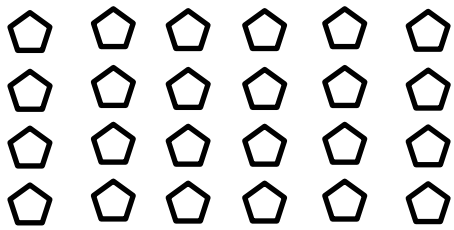
Problem Set

Allow the students to practice the Problem Set independently. Check for understanding as they work the problems.

Use the array to write two different multiplication sentences and two different division sentences.



28 = 4 x 7
28 = 7 x 4
4 = 28 ÷ 7
7 = 28 ÷ 4



24 = 6 x 4
24 = 4 x 6
6 = 24 ÷ 4
4 = 24 ÷ 6

1. Match the expressions

3 × 6	7 threes
3 sevens	6 threes
2 eights	9 × 5
5 × 9	8 × 2

2. Complete the equations.

a. 2 sixes = 6 twos

Which equals 12.

b. 3 × 6 = 6 threes

Which equals 18.

c. 4 × 8 = 8 × 4

Which equals 32.

d. 4 × 7 = 7 × 4

Which equals 28.

e. 5 twos + 2 twos = 7 × 2

Which equals 14.

f. 5 fives + 1 five = 6 × 5

Which equals 30.

3. Place parentheses in the equations to simplify and solve.

   a. 3 x 14 = 3 x (2 x 7)

      3 x 14 = (3 x 2) x 7

      3 x 14 = 42

   b. 3 x 12 = 3 x (3 x 4)

      3 x 12 = (3 x 3) x 4

      3 x 12 = 36

4. Decompose the larger factor, regroup, multiply. The way the larger factor is broken down may vary.

a. 4 x 18 4 x (2 x 9) (4 x 2) x 9 8 x 9 = 72	b. 5 x 24 5 x (2 x 12) (5 x 2) x 12 10 x 12 = 120	c. 21 x 4 (3 x 7) x 4 7 x (3 x 4) 7 x 12 = 84
d. 35 x 2 (5 x 7) x 2 7 x (5 x 2) 7 x 10 = 70	e. 45 x 2 (5 x 9) x 2 9 x (5 x 2) 9 x 1 = 90	f. 5 x 16 5 x (2 x 8) (5 x 2) x 8 10 x 8 = 80
g. 20 x 7 (2 x 10) x 7 10 x (2 x 7) 10 x 14 = 140	h. 21 x 3 (7 x 3) x 3 7 x (3 x 3) 7 x 9 = 63	i. 24 x 2 (8 x 3) x 2 8 x (3 x 2) 8 x 6 = 48

Name: _____

Eureka Acceleration Tools

Prerequisite Support Lesson for Grade 6, Module 4, Topic A

Part B: Using the Associative and Commutative Properties of Multiplication

Example Problems

1. Use the array to write two multiplication sentences and two division sentences.

O O O
O O O

_____ x _____ = _____ _____ ÷ _____ = _____

_____ x _____ = _____ _____ ÷ _____ = _____

2. Fill in the blanks to make the number sentences true.

a. 2 x 7 = 7 x ____	b. 6 x 3 = ____ x 6	c. 5 x ____ = 4 x 5
d. 5 eights = ____ fives	e. 4 nines = 9 ____	f. 7 ____ = 6 sevens
g. 3 x 9 = 10 threes - ____ three 3 x 9 = ____	h. 10 fours – 1 four = ____ x 4 10 fours – 1 four = ____	i. 8 x 4 = 5 fours + ____ fours 8 x 4 = ____

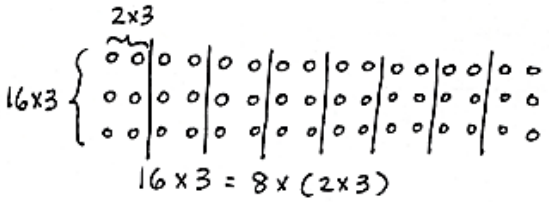
3. Fill in the multiplication chart.

×	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
1	1	2	3	4	5	6	7	8	9	10
2		4	6	8	10	12	14	16	18	20
3			9	12	15	18	21	24	27	30
4				16	20	24	28	32	36	40
5					25	30	35	40	45	50
6						36	42	48	54	60
7							49	56	63	70
8								64	72	80
9									81	90
10										100

4. Decompose the larger factor, regroup, multiply.

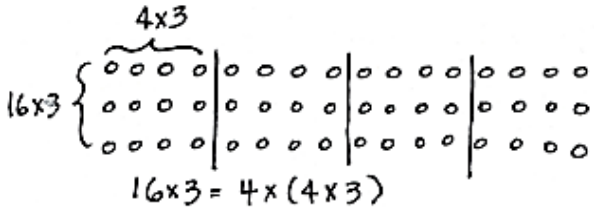
Example 1: 16 x 3

(8 x 2) x 3
8 x (3 x 2)
8 x 6 = 48

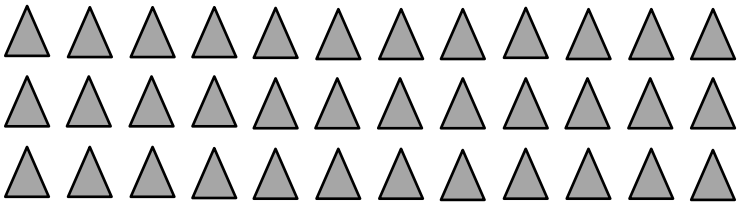


or

(4 x 4) x 3
4 x (4 x 3)
4 x 12 = 48



Example 2: 3 x 12

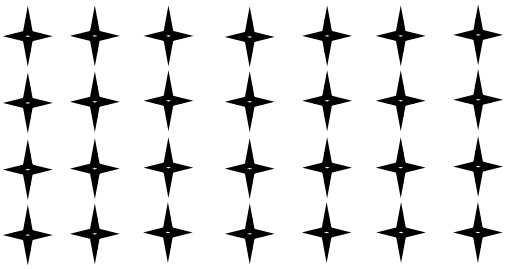


You Try: Decompose the larger factor, regroup, multiply. Use arrays if necessary.

a. 15 x 3	b. 18 x 2	c. 14 x 3
d. 4 x 16	e. 5 x 18	f. 2 x 15

Problem Set

1. Use the array to write two different multiplication sentences and two different division sentences.

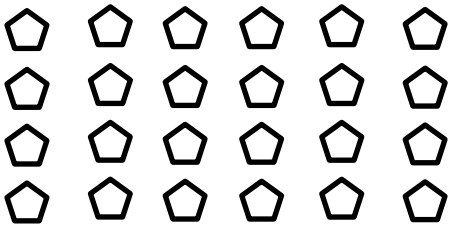


_____ = _____ × _____

_____ = _____ × _____

_____ = _____ ÷ _____

_____ = _____ ÷ _____



_____ = _____ × _____

_____ = _____ × _____

_____ = _____ ÷ _____

_____ = _____ ÷ _____

2. Match the expressions

3 × 6	7 threes
3 sevens	6 threes
2 eights	9 × 5
5 × 9	8 × 2

3. Complete the equations.

a. 2 sixes = _____ twos

Which equals 12.

b. _____ × 6 = 6 threes

Which equals _____.

c. 4 × 8 = _____ × 4

Which equals _____.

d. 4 × _____ = _____ × 4

Which equals 28.

e. 5 twos + 2 twos = _____ × _____

Which equals _____.

f. _____ fives + 1 five = 6 × 5

Which equals _____.

4. Place parentheses in the equations to simplify and solve.
   a. 3 x 14 = 3 x (2 x 7)

      3 x 14 = 3 x 2 x 7

      3 x 14 = ____

   b. 3 x 12 = 3 x (3 x 4)

      3 x 12 = 3 x 3 x 4

      3 x 12 = ____

5. Decompose the larger factor, regroup, multiply.

a. 4 x 18	b. 5 x 24	c. 21 x 4
d. 35 x 2	e. 45 x 2	f. 5 x 16
g. 20 x 7	h. 21 x 3	i. 24 x 2