

Unit 5: Rational Numbers 2

Dear Parents/Guardians,


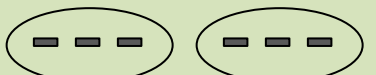
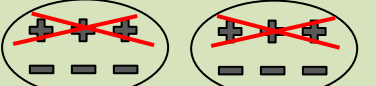

Unit 5 continues with the counter model to develop integer multiplication rules. Students investigate patterns and the inverse relationship between multiplication and division to develop integer division rules. In this lesson, a temperature context from the opening lesson connects to the counter model. In Lesson 2 students use number lines as a way to convince themselves that the integer multiplication and division rules hold for other rational numbers (signed fractions and decimals). In Lesson 3 students make sense of the order of operations conventions and use the order of operations to solve problems involving rational numbers.

The Counter Model

A positive (+) counter represents a value of 1. **+**

A negative (-) counter represents a value of -1. **-**

A “zero pair” is represented by one positive and one negative counter and has a value of zero (0). **+** **-**

$(2) \cdot (3) = 6$  Place two groups of 3 on the mat. positive x positive = positive	$(2) \cdot (-3) = -6$  Place two groups of (-3) on the mat. positive x negative = negative
$(-2) \cdot (3) = -6$  Start with two rows of 3 zero pairs (to keep the value 0). Remove two groups of 3 from the mat. negative x positive = negative	$(-2) \cdot (-3) = 6$  Start with two rows of 3 zero pairs (to keep the value 0). Remove two groups of (-3) from the mat. negative x negative = positive

Relating Multiplication and Division

Students use the relationship between multiplication and division to develop rules for signed division.

Multiplication Fact	Related Division Facts	Division Rule
$(5) \times (8) = 40$	$40 \div (5) = 8$ $40 \div (8) = 5$	positive \div positive = positive
$(3) \times (-4) = -12$	$-12 \div (3) = -4$ $-12 \div (-4) = 3$	negative \div positive = negative negative \div negative = positive
$(-2) \times (7) = -14$	$-14 \div (-2) = 7$ $-14 \div (7) = -2$	negative \div negative = positive negative \div positive = negative
$(-5) \times (-6) = 30$	$30 \div (-6) = -5$ $30 \div (-5) = -6$	positive \div negative = negative



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By the end of the unit, your student should know...

- How to multiply integers using counters and then rules [Lesson 5.1]
- How to divide integers based upon the inverse relationship between multiplication and division [Lessons 5.1 and 5.2]
- How to represent multiplication of rational numbers on a number line [Lesson 5.2]
- How to multiply and divide rational numbers using any method [Lesson 5.2]
- How to use the conventions of the order of operations to evaluate expressions and solve problems [Lesson 5.3]

Additional Resources

- For definitions and additional notes please refer to Student Resources at the end of this unit.
- For more on multiplying integers with counters:
<https://youtu.be/MuZ3Y3PYv2U>
and
<https://youtu.be/Yhoz1g35alw>
- For more on order of operations:
<https://tinyurl.com/khan-order-of-operations>