

Unit 4: Rational Number Addition and Subtraction



Dear Parents/Guardians,

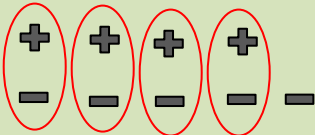
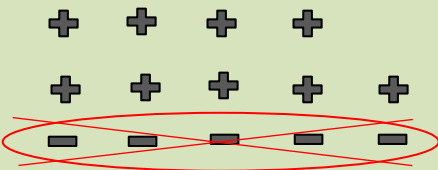
In Unit 4, different representations drive the development of rules to add and subtract rational numbers. In Lesson 1, students use a counter model to investigate adding integers to agree on rules that make sense for this operation. Lesson 2 continues with the counter model to develop rules for subtracting integers. In these lessons, a temperature context from the opening lesson connects to the counter model. In Lesson 3, students use number lines to expand their knowledge of addition and subtraction to other rational numbers (signed fractions and decimals).

The Counter Model

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

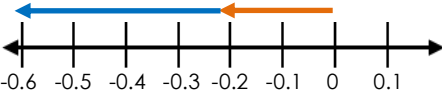
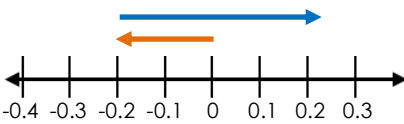
A negative (-) counter represents a value of -1. 

A "zero pair" is represented by one positive and one negative counter and has a value of zero (0).  

Addition	Subtraction
$4 + (-5) = -1$ 	$4 - (-5) = 9$ 
<p>Start with a value equal to zero.</p> <p>Create a value of 4.</p> <p>Add 5 negative counters.</p> <p>Notice 4 zero pairs.</p> <p>1 negative counter remains, or -1.</p>	<p>Start with a value of 0.</p> <p>Create a value of 4.</p> <p>Since there aren't 5 negative counters to subtract, we can choose to create an extra 5 zero pairs. The value remains 4, yet we now have 5 positive counters to remove.</p> <p>Subtract (remove) 5 negative counters (-5).</p> <p>9 positive counters remain.</p> <p>Notice that $4 - (-5)$ is equivalent to $4 + 5$.</p>

Addition and Subtraction on a Number Line

Students use vectors to demonstrate addition and subtraction of rational numbers on number lines. Each vector represents a number by length and direction.

Addition	Subtraction
$-0.2 + (-0.4) = -0.6$ 	$-0.2 - (-0.4) = 0.2$ 
<p>Start at 0.</p> <p>Move to the left 0.2.</p> <p>Move to the left 0.4 more.</p> <p>The ending point is -0.6.</p>	<p>Start at 0.</p> <p>Move to the left 0.2.</p> <p>Move to the opposite of left 0.4.</p> <p>Therefore, move to the right 0.4.</p> <p>The ending point is 0.2.</p> <p>Notice that $-0.2 - (-0.4)$ is equivalent to $-0.2 + 0.4$.</p>



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

- How to add integers using representations and rules [Lesson 4.1]
- How to subtract integers using representations and rules [Lesson 4.2]
- How to represent addition and subtraction of rational numbers on a number line [Lesson 4.3]
- How to add and subtract rational numbers using any viable method [Lesson 4.3]

Additional Resources

- For definitions and additional notes please refer to Student Resources at the end of this unit.
- For more on plotting integers on a number line: <http://youtu.be/kvPxr7HA6Sc>
- For more on adding and subtracting integers: <https://youtu.be/hGVm2xs0HEA> and <https://youtu.be/pU2zPf846L4>