

Unit 13 — Negative Numbers

TB: Textbook

WB: Workbook

Lesson	Objectives	Materials	Resources	
Chapter 1: Addition and Subtraction				3 days
13.1 Addition and Subtraction	<ul style="list-style-type: none"> • Review negative integers. • Add a negative integer to a positive integer. • Add a negative integer to another negative integer. • Solve word problems involving addition of negative integers. • Subtract a negative integer from a greater integer. • Subtract a greater integer from a negative integer. • Solve problems involving subtraction of negative integers. 	<ul style="list-style-type: none"> • Appendix 13.1 • Coins • Counters • Dice 	TB: pp. 162–169 WB: pp. 145–147	
Chapter 2: Multiplication and Division				3 days
13.2a Multiplication and Division	<ul style="list-style-type: none"> • Multiply negative integers with positive integers. • Solve problems involving multiplying negative integers with positive integers. • Multiply negative integers with negative integers. • Solve problems involving multiplying negative integers. • Divide negative integers. • Solve problems involving dividing negative integers. 		TB: pp. 170–174 WB: pp. 148–149	
13.2b Practice A	<ul style="list-style-type: none"> • Solve problems involving negative numbers. 		TB: pp. 175–177	

Chapter 1

Addition and Subtraction

Students have learned the idea of negative integers in *Primary Mathematics (Standards Edition) Grade 4*. In *Primary Mathematics (Standards Edition) Grade 5*, students learned addition of negative integers and subtraction of positive integers from negative integers. In this unit, students extend their knowledge of negative integers to include multiplication and division. Students also deal with algebraic equations and graphs of functions, which involve negative numbers.

In this chapter, students extend their addition and subtraction skills of negative integers. In particular, students are introduced to subtracting negative integers from negative integers.

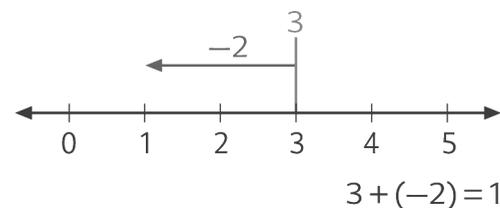
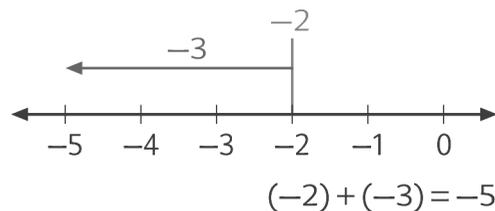
The opening activity (p. 162) reviews the idea of negative numbers by having students consider positive and negative integers in relation to the number zero.

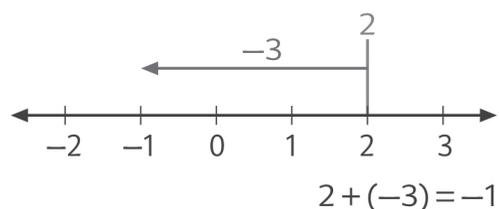
The main mathematical idea students learn in this chapter is the addition and subtraction of negative integers. Students learn how to add negative integers to positive integers, add negative integers to negative integers, subtract negative integers from positive integers, subtract negative integers from negative integers and subtract positive integers from negative integers.

The first teaching activity (p. 163) helps students understand the addition of negative integers by drawing upon their prior understanding of addition of positive integers. Students begin with a known fact ($2 + 3$). By decreasing the number added to 2 by one each time, students are guided to see the effect on the sum. This is how students make sense that the sum $2 + 0$ is one more than $2 + (-1)$ since -1 is one less than 0. By the same reasoning, $2 + (-2)$ is one less than $2 + (-1)$ because -2 is one less than -1 .

In the same manner, the value of $3 + 2$ is used as a starting point to find the value of $3 + (-1)$ and $3 + (-2)$. With the knowledge of $3 + (-2)$, the values of $(-2) + 3$, $(-2) + 2$, $(-2) + 1$, $(-2) + 0$ and $(-2) + (-1)$ are found.

By representing the addition of negative integers to another integer on a number line, the concept of addition as counting on (a change) is conveyed to the students. The number line represents the abstract operation visually.





The first two consolidation tasks (pp. 164–165) give students concrete situations to develop their understanding of the abstract operation. The meaning of addition as a change (an increase is a positive change and a decrease is a negative change) is reinforced using concrete situations. The illustrations of the dam and the thermometer scale include embedded number lines. The two tasks include all variations of addition involving integers: $2 + 1$, $3 + (-4)$, $(-1) + 4$ and $(-2) + (-3)$.

The subsequent three consolidation tasks (p. 165) are straightforward exercises. The variations include adding a positive integer to a negative integer, adding a negative integer to a positive integer, and adding a negative integer to a negative integer. Number lines are used to illustrate these operations visually.

The second teaching activity (p. 166) helps students understand the subtraction of negative integers by drawing upon their prior understanding of subtraction of positive integers. Students begin with a known fact ($2 - 1$). By decreasing the number subtracted from 2 by one, students are guided to see the effect on the difference. This is how students make sense that $2 - 0$ is one more than $2 - 1$ since 0 is one less than 1. By the same reasoning, $2 - (-1)$ is one more than $2 - 0$ because -1 is one less than 0. This reasoning is used to help students figure out the values of $2 - (-2)$, $2 - (-3)$ and $2 - (-4)$.

By reasoning that 2 is one more than 1, students infer that the value of $2 - (-4)$ is one more than the value of $1 - (-4)$. This line of reasoning is used to help students see that if $1 - (-4) = 5$, then $0 - (-4) = 4$ and $(-1) - (-4) = 3$. Similar reasoning is used to explain $(-4) - 2$ and $(-4) - (-2)$.

In this chapter, by representing the subtraction of negative integers with another integer on a number line, the concept of subtraction as difference is conveyed to the students. The number line represents the abstract operation visually. It also uses the students' prior knowledge that if a is greater than b then the difference $a - b$ is positive. Similarly, if a is less than b then the difference $a - b$ is negative.

Consolidation tasks 6 and 7 (pp. 167–168) give students concrete situations to develop their understanding of the abstract operation. The meaning of subtraction as a difference is reinforced using the context of temperature difference and distance between points on a line.

Consolidation tasks 8 and 9 (p. 169) are straightforward exercises. The variations include subtracting a positive integer from a negative integer and subtracting a negative integer from a negative integer. Number lines are used to facilitate the understanding of the operation.

Consolidation tasks 10 and 11 (p. 169) provide some independent practice. The last consolidation task (p. 169) requires student to demonstrate a conceptual understanding of the difference between two negative integers.