ACHIEVE THE CORE

Operations on Rational Numbers

7.NS.A.1 & 7.NS.A.2 Procedural Skill and Conceptual Understanding Mini-Assessment by Student Achievement Partners

OVERVIEW

This mini-assessment is designed to illustrate aspects of standards 7.NS.A.1 and 7.NS.A.2, specifically the expectation that students add, subtract, multiply, and divide rational numbers. This mini-assessment is designed for teachers to use either in the classroom, for self-learning, or in professional development settings to:

- Evaluate students' progress toward some of the skills described by 7.NS.A.1 and 7.NS.A.2 in order to prepare to teach this material or to check for student ability to demonstrate the ability to compute with rational numbers;
- Gain a better understanding of assessing computation with rational numbers; and
- Illustrate CCSS-aligned assessment problems.

MAKING THE SHIFTS

This mini-assessment attends to focus as it addresses addition, subtraction, multiplication, and division of rational numbers, which are at the heart of the grade 7 standards and key components of the major work of the grade.[1] It illustrates coherence across grades as the questions require students to extend their understanding of arithmetic and fractions from elementary grades to add, subtract, multiply, or divide rational numbers. This mini-assessment addresses two of the three elements of rigor. It mainly targets the aspects of standards 7.NS.A.1 and 7.NS.A.2 that address *procedural skill*; there are also some well-structured questions that assess *conceptual understanding*.

A CLOSER LOOK

In the CCSS, procedural skill builds with conceptual understanding. Addressing both of these aspects of rigor, questions 1–8 assess students' procedural skill in performing the four operations with rational numbers, and questions 9–15 provide an opportunity for students to demonstrate conceptual understanding and reasoning using the properties of operations and rational numbers.

The procedural skills called for in 7.NS.A.1 and 7.NS.A.2 represent the culmination of a learning trajectory beginning in Kindergarten, when students first start learning the meaning of addition (K.OA.A). Developing an understanding of the meaning and properties of operations is spread from Kindergarten through grade 6, first with whole numbers and then with fractions and decimals. In grade 6, students' work in the number system expands to include negative numbers as they develop an understanding of the distance between a number and 0. Work in grade 7 synthesizes all of these previously learned concepts and previously developed skills and fluencies as students display full understanding and fluency of operations on all rational numbers.

> **7.NS.A.1.**
> Apply and extend previous understandings of addition and subtraction to add and subtract rational numbers; represent addition and subtraction on a horizontal or vertical number line diagram.

> **7.NS.A.2.**
> Apply and extend previous understandings of multiplication and division and of fractions to multiply and divide rational numbers.

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[1] For more on the Major Work of the grade, see achievethecore.org/focus.

Name:_____Date:_____

Compute.

1. $-2 + 11 = $ _____

2. $\dfrac{8}{12} \times -0.5 = $ _____

3. $\dfrac{3}{-5} + \left(\dfrac{-4}{10}\right) = $ _____

4. $3{,}998 - (-7) = $ _____

5. $-\left(\dfrac{-4/1}{3}\right) = $ _____

6. $-5 \times -8 = $ _____

7. $0.33 - \dfrac{48}{100} = $ _____

8. $-0.4 \div 8 = $ _____

Place a check mark in the box that correctly compares the two values.

	A	*B*	*A > B*	*A < B*
9.	$2 - \dfrac{-4}{3}$	2		
10.	$-1(-6)$	-6		
11.	$1 + \dfrac{-3}{2}$	$1 - \dfrac{-3}{2}$		
12.	$-(3 - 7)$	0		
13.	$-4 - 1.9$	$-4 + 1.9$		
14.	$-\dfrac{5}{2}(3.7)$	0		
15.	$9 + (-2.6)$	$9 - (-2.6)$		

Answers for questions 1–8 are listed and any values equivalent to these numbers should also receive credit.

1. $-2 + 11 = $ **9**

2. $\dfrac{8}{12} \times -0.5 = $ $-\dfrac{4}{12}$

3. $\dfrac{3}{-5} + \left(\dfrac{-4}{10}\right) = $ $-\dfrac{10}{10}$

4. $3{,}998 - (-7) = $ **4,005**

5. $-\left(\dfrac{-4/1}{3}\right) = $ $\dfrac{4}{3}$

6. $-5 \times -8 = $ **40**

7. $0.33 - \dfrac{48}{100} = $ $-\dfrac{15}{100}$

8. $-0.4 \div 8 = $ **-0.05**

The correct answers to questions 9–15 are shown below.

	A	B	A > B	A < B
9.	$2 - \dfrac{-4}{3}$	2	✔	
10.	$-1(-6)$	-6	✔	
11.	$1 + \dfrac{-3}{2}$	$1 - \dfrac{-3}{2}$		✔
12.	$-(3 - 7)$	0	✔	
13.	$-4 - 1.9$	$-4 + 1.9$		✔
14.	$-\dfrac{5}{2}(3.7)$	0		✔
15.	$9 + (-2.6)$	$9 - (-2.6)$		✔