ACHIEVE THE CORE

One-Step Addition and Subtraction Word Problems

2.OA.A.1 Application Mini-Assessment by Student Achievement Partners

OVERVIEW

This mini-assessment explores the important content standard 2.OA.A.1. It is designed for teachers to use either in the classroom, for self-learning, or in professional development settings. This mini-assessment can help educators:

- Appreciate the intricacies of one-step addition and subtraction word problems;
- Build understanding of the expectations of an important standard in CCSSM; and
- Identify strengths and weaknesses in students' understanding of the operations of addition and subtraction and how they can be used to model situations—whether before, during, or after teaching aspects of this material.

The mini-assessment is also designed for ease of scoring and analyzing classroom results. It consists of thoughtfully designed multiple-choice questions. Some questions have more than one right answer; in other cases, the choices are diagrams. Teachers wishing to use the mini-assessment in a more open-ended way can easily do so using the Word version of the document—for example, by deleting the answer choices, or by turning their font color white to match the color of the paper on which the mini-assessment will be printed.

MAKING THE SHIFTS

This mini-assessment promotes strong **focus** in the classroom; addition and subtraction are at the heart of the major work of grade 2.[1] In terms of **coherence**, content standard 2.OA.A.1 builds directly on the earlier-grades standards K.OA.A.1 and 1.OA.A.1. This mini-assessment targets *application*, one of the three elements of **rigor**.

2.OA.A.1
Use addition and subtraction within 100 to solve one- and two-step word problems involving situations of adding to, taking from, putting together, taking apart, and comparing, with unknowns in all positions, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem.

A CLOSER LOOK

Standard 2.OA.A.1 is a good example of how "[t]he Standards are not written at uniform grain size. Sometimes an individual content standard will require days of work, possibly spread over the entire year, while other standards could be sufficiently addressed when grouped with other standards and treated in a shorter time span" (K–8 Publishers' Criteria Spring 2013, p. 18). Addition and subtraction word problems are the work of the entire K–2 grade band, not the subject of a single lesson or unit. The strong focus of the Standards is intended to give teachers and students the time they need.

There are fifteen distinct kinds of single-step addition and subtraction word problem (see Table 1, next page). Students must leave grade 2 with a strong command of addition and subtraction word problems to be prepared for future learning; these sample problem situations will recur in elementary school with fractions, and yet again in middle school with variables. Mastering addition and subtraction situations in a whole-number setting gives students a resource they can draw upon for integrating first fractions, and then variables, into their mathematical repertoires along the way to college readiness.

CONNECTING THE STANDARDS FOR MATHEMATICAL PRACTICE TO GRADE-LEVEL CONTENT

Content standard 2.OA.A.1 is meaningfully connected to Standards for Mathematical Practice MP.2 and MP.4. In analyzing and solving these problems, students reason abstractly and quantitatively (MP.2), making sense of quantities and their relationships. Practice standard MP.4, modeling with mathematics, is involved to some extent whenever students solve word problems with grade-level content, and even more so when they choose addition and subtraction equations to represent problem situations (e.g., question 8); these addition and subtraction equations are mathematical models.

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

	Result Unknown	Change Unknown	Start Unknown
Add To	A bunnies sat on the grass. B more bunnies hopped there. How many bunnies are on the grass now? $A + B = \square$	A bunnies were sitting on the grass. Some more bunnies hopped there. Then there were C bunnies. How many bunnies hopped over to the first A bunnies? $A + \square = C$	Some bunnies were sitting on the grass. B more bunnies hopped there. Then there were C bunnies. How many bunnies were on the grass before? $\square + B = C$
Take From	C apples were on the table. I ate B apples. How many apples are on the table now? $C - B = \square$	C apples were on the table. I ate some apples. Then there were A apples. How many apples did I eat? $C - \square = A$	Some apples were on the table. I ate B apples. Then there were A apples. How many apples were on the table before? $\square - B = A$
	Total Unknown	**Both Addends Unknown[1]**	**Addend Unknown[2]**
Put Together /Take Apart	A red apples and B green apples are on the table. How many apples are on the table? $A + B = \square$	Grandma has C flowers. How many can she put in her red vase and how many in her blue vase? $C = \square + \square$	C apples are on the table. A are red and the rest are green. How many apples are green? $A + \square = C$ $C - A = \square$
	Difference Unknown	**Bigger Unknown**	**Smaller Unknown**
Compare	*"How many more?" version.* Lucy has A apples. Julie has C apples. How many more apples does Julie have than Lucy? *"How many fewer?" version.* Lucy has A apples. Julie has C apples. How many fewer apples does Lucy have than Julie? $A + \square = C$ $C - A = \square$	*"More" version suggests operation.* Julie has B more apples than Lucy. Lucy has A apples. How many apples does Julie have? *"Fewer" version suggests wrong operation.* Lucy has B fewer apples than Julie. Lucy has A apples. How many apples does Julie have? $A + B = \square$	*"Fewer" version suggests operation.* Lucy has B fewer apples than Julie. Julie has C apples. How many apples does Lucy have? *"More" version suggests wrong operation.* Julie has B more apples than Lucy. Julie has C apples. How many apples does Lucy have? $C - B = \square$ $\square + B = C$

Table 1: Addition and Subtraction Situations by Grade Level[2]

Each question on the mini-assessment maps to a situation types in Table 1, as shown below. Numbers below are item numbers. Note, a summative assessment for grade 2 might include more of the non-shaded situation types. This assessment was designed to showcase the variety of types with all 15 types in just 15 questions.

	Result Unknown	Change Unknown	Start Unknown
Add To	3	10	2
Take From	1	11	7
	Total Unknown	**Both Addends Unknown**	**Addend Unknown**
Put Together/ Take Apart	4	5	13
	Difference Unknown	**Bigger Unknown**	**Smaller Unknown**
Compare	12	9	14
	8	6	15

[2] From page 9 of the Progressions for the Common Core State Standards in Mathematics, Draft K–5 Progression on Counting and Cardinality and Operations and Algebraic Thinking; see http://ime.math.arizona.edu/progressions/.

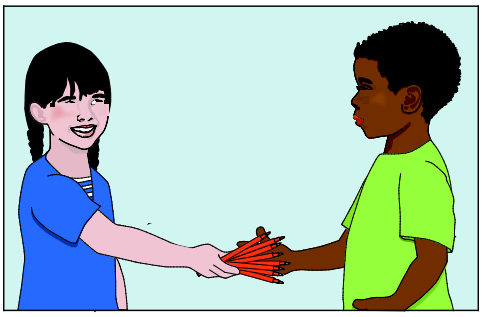
Name: _____ **Date:** _____

1. Tara had 37 red pens. She gave Jim 8 of her red pens.

   How many red pens does Tara have now?

   a. 29
   b. 35
   c. 39
   d. 45

2. Tara gave Jim 8 red pens. Now he has 11 red pens.



   How many red pens did Jim have before?

   a. 1
   b. 3
   c. 5
   d. 19

3. Tara has 7 blue pens. Then she buys 18 more blue pens.

   How many blue pens does Tara have now?

   a. 11
   b. 15
   c. 25
   d. 26

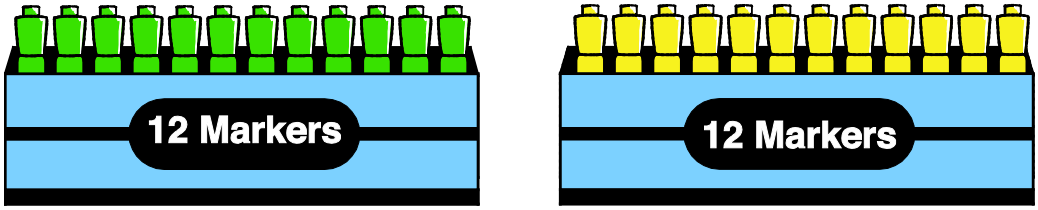
4. Jim has 11 red pens and 29 blue pens.

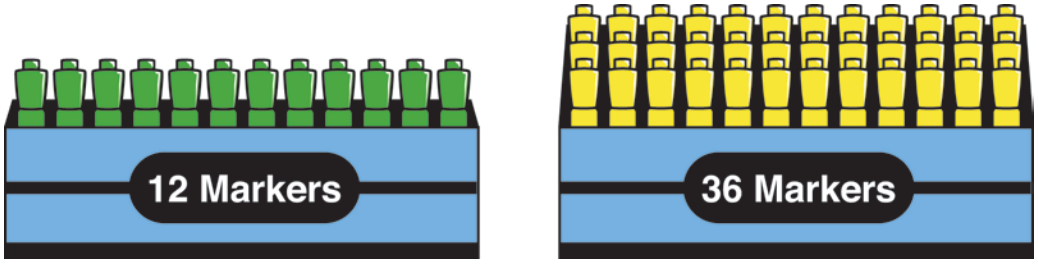
   How many pens does Jim have?

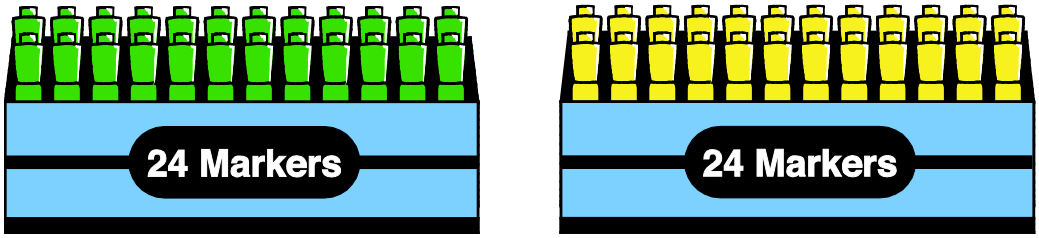
   a. 17
   b. 30
   c. 38
   d. 40

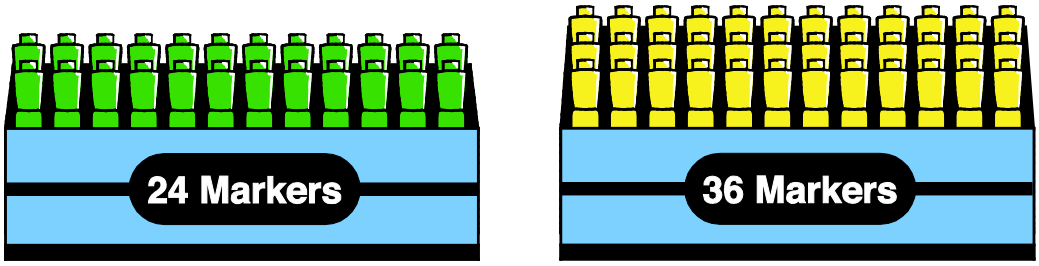
5. Tara needs to buy 48 markers.

   Which **two** packs could Tara buy? (Choose two answers.)

a. 

b. 

c. 

d. 

6. Molly's class has 3 fewer students than Sam's class. Molly's class has 25 students.

How many students are in Sam's class?

a. 22
b. 23
c. 27
d. 28

7. Since the first day of school, 4 students have left Sam's class. Sam's class now has 25 students.

   How many students were in Sam's class on the first day of school?

   a. 23
   b. 24
   c. 28
   d. 29

8. 43 students are playing tag at recess. 25 students are playing soccer.

   Which **two** equations can be used to find how many fewer students are playing soccer than playing tag?

   a. 25 + ? = 43
   b. ? – 25 = 43
   c. 43 + 25 = ?
   d. 43 – 25 = ?

9. 18 students in Bill's class buy pizza. In Ying's class, 8 more students buy pizza than in Bill's class.

   How many students in Ying's class buy pizza?

   a. 10
   b. 16
   c. 26
   d. 28

10. There were 32 students in Ying's class eating lunch. Then, more students joined Ying's class. Now there are 86 total students eating lunch.

    How many students joined Ying's class?

    a. 44
    b. 45
    c. 52
    d. 54

11. There were 74 apples at the start of lunch. After the second graders ate some, 24 apples remained.

    How many apples were eaten?

    a. 5
    b. 40
    c. 50
    d. 98

12. On Friday, 46 students bought ice cream and 53 students bought popcorn.

    How many more students bought popcorn?

    a. 3
    b. 7
    c. 13
    d. 17

13. There are 16 girls in Mrs. Aken's class, and 28 total students.

    Which equation can you use to find the number of boys in the class?

    a. 16 – ? = 28
    b. 16 + ? = 28
    c. 16 – 28 = ?
    d. 16 + 28 = ?

14. Mrs. Baca's class has 14 fewer students than Mr. Cole's class. Mr. Cole's class has 31 students.

    Which equation shows the number of students in Mrs. Baca's class?

    a. ▼ – 14 = 31
    b. ▼ + 31 = 14
    c. ▼ + 14 = 31
    d. 31 + 14 = ▼

15. David's book has 26 more pages than Elam's book. There are 48 pages in David's book.

    Choose **two** equations that you can use to find the number of pages in Elam's book.

    a. 48 = ◊ + 26
    b. ◊ – 26 = 48
    c. 48 + 26 = ◊
    d. 48 – 26 = ◊

Score Sheet: This score sheet will help you analyze your students' answers. Circle the student's choice, then count the totals and look for patterns in the responses. If a student consistently has the same errors, then you may want to consider investigating the student's thinking and giving the student extra practice on those aspects of the topic.

The difficulty of the situation type is indicated by dots placed next to each question number:

- ( ) No dot: An easier situation type, generally first introduced in Kindergarten.
- (•) Single dot: An intermediate situation type, generally first introduced in Grade 1 and mastered in Grade 1 or Grade 2.
- (••) Double dot: A harder situation type, generally introduced in Grade 2 and mastered by or before the end of that year.

Note, a summative assessment for grade 2 might include more of the harder situation types (••). This assessment was designed to showcase the variety of types with all 15 types in just 15 questions.

Student Name: _____

		Incorrect Answer		
			Incorrect Computation	
Question	**Correct Answer**	**Incorrect Situation Model**	Place-value Computation / Multi-Digit Operation	"Facts" (i.e., single-digit sums and related differences)
1	A	C D		B
2 ••	B	D		A C
3	C	A	B	D
4	D	A	B	C
5	B C			A D
6 ••	D	A B		C
7 ••	D	A B		C
8 •	A D	B C		
9 •	C	A	B	D
10 •	D		A B	C
11 •	C	D	A	B
12 •	B		D	A C
13 •	B	A C D		
14 •	C	A B D		
15 ••	A D	B C		
Totals:				
Possible:	15			

Concerns (circle all that apply): Incorrect Situation Model

Incorrect Computation: Multi-digit "Facts"