

# Hands-On Standards<sup>®</sup>, Common Core Edition

Grade 5

**Hands-On Standards®, Common Core Edition**  
**Grade 5**

hand2mind 78869

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# Introduction

**H**ow do we help students find meaning in mathematics? That is, how do we give students more than a rote script for reciting facts and churning out computations? How do we help students develop understanding?

*Hands-On Standards®, Common Core Edition Grade 5* is an easy-to-use reference manual for teachers who want to help students discover meaning in mathematics. Each of the manual's 27 lessons demonstrates a hands-on exploration using manipulatives. The goal is to help students get a physical sense of a problem—to help students get their hands on the concepts they need to know and to help them “see” the meaning.

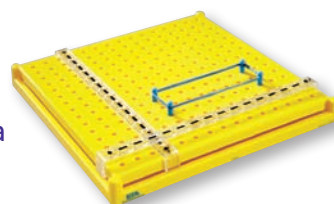
Each lesson in *Hands-On Standards* targets a clearly stated objective. The main part of a lesson offers a story problem that students can relate to and has the students work on the problem using a hands-on approach. Full-color photographs demonstrate the suggested steps. In addition to the main activity, each lesson includes suggested points of discussion, ideas for more exploration, a formative assessment item, and practice pages to help students solidify their understanding. The instructional model is a progression from concrete to abstract.

The book is divided into five sections—Operations and Algebraic Thinking, Number and Operations in Base Ten, Number and Operations—Fractions, Measurement and Data, and Geometry. These correspond to the five content domains for Grade 5 as cited in the *Common Core State Standards for Mathematics*.

Each lesson in this book features one of the following manipulatives:

**AngLegs® • Base Ten Blocks • Deluxe Rainbow Fraction® Circles •  
Folding Number Line • Centimeter Cubes • Color Tiles •  
Deluxe Rainbow Fraction® Squares • Fraction Tower® Equivalency Cubes •  
Snap Cubes® • XY Coordinate Pegboard**

Read on to find out how *Hands-On Standards, Common Core Edition Grade 5* can help the students in your class find meaning in math and build a foundation for future math success!



# A Walk Through a Lesson

Each lesson in *Hands-On Standards*® includes many features, including background information, objectives, pacing and grouping suggestions, discussion questions, and ideas for further activities, all in addition to the step-by-step, hands-on activity instruction. Take a walk through a lesson to see an explanation of each feature.

## Lesson Introduction

A brief introduction explores the background of the concepts and skills covered in each lesson. It shows how they fit into the larger context of students' mathematical development.

## Try It! Arrow

In order to provide a transition from the introduction to the activity, an arrow draws attention to the Try It! activity on the next page. When the activity has been completed, return to the first page to complete the lesson.

## Objective

The **Objective** summarizes the skill or concept students will learn through the hands-on lesson.

## Common Core State Standards

Each lesson has been created to align with one or more of the **Common Core State Standards for Mathematics**.

## Talk About It

The **Talk About It** section provides post-activity discussion topics and questions. Discussion reinforces activity concepts and provides the opportunity to make sure students have learned and understood the concepts and skills.

## Solve It

**Solve It** gives students a chance to show what they've learned. Students are asked to return to and solve the original word problem. They might summarize the lesson concept through drawing or writing, or extend the skill through a new variation on the problem.

LESSON  
1

## Objective

Use the order of operations to simplify expressions.

## Common Core State Standards

■ 5.OA.1 Use parentheses, brackets, or braces in numerical expressions, and evaluate expressions with these symbols.

## Operations and Algebraic Thinking

## Order of Operations

The order of operations makes the language of mathematics more universal. Knowing these rules helps students to communicate more accurately as they gain fluency in manipulating symbolic relationships. The sequence for the order of operations is—

1. Calculate inside parentheses.
2. Multiply and divide in order, from left to right.
3. Add and subtract in order, from left to right.

**Try It!** Perform the Try It! activity on the next page.

## Talk About It

Discuss the Try It! activity.

- **Ask:** Why do the models have different solutions?
- **Ask:** Why is it necessary to follow the order of operations when simplifying an expression?
- Write  $5 + 2 \times 6 - 8$  on the board. **Ask:** How does the value of this expression differ when using the order of operations versus solving from left to right? Explain.

## Solve It

Reread the problem with students. Have students draw a picture of the solution to the problem. Then have them write a short paragraph explaining how to use the order of operations to solve the problem.

## More Ideas

For other ways to teach the order of operations—

- Write  $20 - 12 \div 4$  on the board. Have students use Snap Cubes® to model the expression and compute using the order of operations. Repeat with other expressions.
- Use Two-Color Counters to model the problem  $5 - 3 + 6 \div 2 = 4$ . Have students use the counters to help them decide where parentheses should be inserted into the equation.

## Formative Assessment

Have students try the following problem.

Simplify  $20 - 8 \div 4 \times 2$ .

- A. 1.5      B. 6      C. 9      D. 16

## More Ideas

**More Ideas** provides additional activities and suggestions for teaching about the lesson concept using a variety of manipulatives. These ideas might be suggestions for additional practice with the skill or an extension of the lesson.

## Formative Assessment

**Formative assessments** allow for on-going feedback on students' understanding of the concept.



## Try It!

The **Try It!** activity opens with **Pacing** and **Grouping** guides. The **Pacing** guide indicates about how much time it will take for students to complete the activity, including the post-activity discussion. The **Grouping** guide recommends whether students should work independently, in pairs, or in small groups.

Next, the **Try It!** activity is introduced with a real-world story problem. Students will “solve” the problem by performing the hands-on activity. The word problem provides a context for the hands-on work and the lesson skill.

The **Materials** box lists the type and quantity of materials that students will use to complete the activity, including manipulatives such as Color Tiles and Pattern Blocks.

This section of the page also includes any instruction that students may benefit from before starting the activity, such as a review of foundational mathematical concepts or an introduction to new ones.

### Try It!

20 minutes | Groups of 4

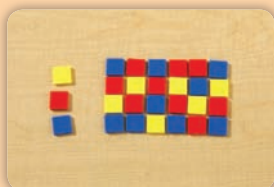
Here is a problem about the order of operations.

Jay brought some juice boxes to soccer practice to share with his teammates. He had 3 single boxes and 4 multi-packs. There are 6 single boxes in each multi-pack. To determine how many boxes of juice Jay brought to practice, evaluate  $3 + 4 \times 6$ .

Introduce the problem. Then have students do the activity to solve the problem. Distribute Color Tiles, paper, and pencils to students. Explain that the order of operations provides rules for simplifying expressions. Discuss the rules.

#### Materials

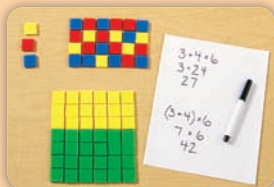
- Color Tiles (100 per group)
- paper (1 sheet per group)
- pencils (1 per group)



1. Write  $3 + 4 \times 6$  on the board. Have students start by laying down 3 tiles. Then have students add a 4-by-6 array. **Ask:** How many tiles are shown in the model?



2. Have students show  $3 + 4$  using a different color of tile for each addend. Then have them build an array to show this quantity times six. **Ask:** How many tiles are shown in the model?



3. **Say:** You built two models. **Ask:** How are they different? Have students write the expressions to represent the models. **Ask:** Which model is correct?

#### Look Out!

Because we read English from left to right, some students may continue to simplify expressions by performing operations in that order. Suggest that students write the order of operations at the top of their papers and then refer to the steps as they simplify expressions. Some students find a mnemonic, such as *Please My Dear Aunt Sally* (Parentheses Multiplication Division Addition Subtraction), helpful in remembering the order.

#### Look Out!

**Look Out!** describes common errors or misconceptions likely to be exhibited by students at this age dealing with each skill or concept and offers troubleshooting suggestions.

## Step-by-Step Activity Procedure

The hands-on activity itself is the core of each lesson. It is presented in three—or sometimes four—steps, each of which includes instruction in how students should use manipulatives and other materials to address the introductory word problem and master the lesson’s skill or concept. An accompanying photograph illustrates each step.

# A Walk Through a Student Page

Each lesson is followed by a corresponding set of student pages. These pages take the student from the concrete to the abstract, completing the instructional cycle. Students begin by using manipulatives, move to creating visual representations, and then complete the cycle by working with abstract mathematical symbols.

## Exercise

**Concrete and Representational** exercises (pictorial representations of the featured manipulative) help students bridge conceptual learning to symbolic mathematics.

## Standards-Based Math Practice

**Abstract** exercises provide standards-based math practice to allow students to deepen their understanding of the featured skill.

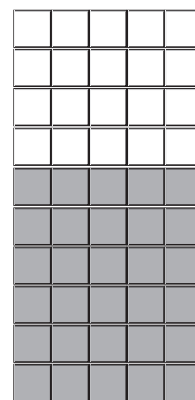
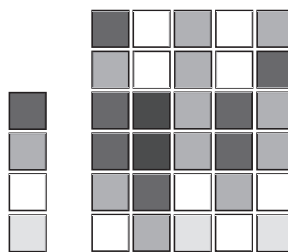
LESSON  
1

Operations and Algebraic Thinking

Answer Key

Use Color Tiles to model each expression. Write expressions for the models. Circle the model that shows the equation  $4 + (6 \times 5) = 34$ . (Check students' work.)

1.



$4 + 6 \times 5 = 34$ ;  $(4 + 6) \times 5 = 50$ ; The model on the left should be circled.

Using Color Tiles, model the expression using the Order of Operations. Sketch the model and write the answer.

2.  $8 + 5 \times 3$

23

Use the Order of Operations to find each answer.

3.  $6 + 4 \times 3$

18

4.  $4 \times 2 + 10$

18

5.  $9 \times 2 \div 6$

3

6.  $7 \times 5 - 10$

25

7.  $6 \div 2 + 4$

7

8.  $3 \times 4 + 9$

21



Extended Response exercises feature an open-ended constructed response question to help teachers gauge student understanding.

**Challenge!** Write the sequence of the Order of Operations. Show an expression where the answer is different when you use the Order of Operations compared to working from left to right. Show an expression where the answer is the same when you use the Order of Operations and when you work left to right. Explain how the second expression works both ways.

Challenge: (Sample) 1. Calculate inside parentheses, 2. Multiply and divide, 3. Add and subtract; The expression  $6 + 4 \times 2$  equals 14 when you use the Order of Operations. When you work left to right, it equals 20, which is not the correct answer.; The expression  $3 \times 5 + 6$  equals 21 using the Order of Operations and when you work left to right; The operations are listed in the correct order for the Order of Operations when you read from left to right.

Answers are provided for teachers  
on the included student pages.

Download clean copies of the student pages by visiting the URL listed.