



# ASSESSING STUDENT UNDERSTANDING

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- How do students demonstrate conceptual understanding and mastery of basic skills?
- What represents depth of understanding?

# Similar Goals at Every Level

Educators and parents - and students themselves - want students to develop understanding of basic concepts, computational skills, and problem solving strategies at high levels of accomplishment.

That is, they want students to be able to use mathematics to solve problems they encounter in daily living with reasonable solutions, clear explanations, and accurate computations.

This is true whether the students are 7 or 17 and the numbers are less than 10 or more than a million.

# Computing Accurately

For example...

What do you you know about a student's understanding of division if he or she accurately computes this equation?

$$17 \div 4 =$$

Is there anything else you want to know about the student's thinking?

# A More In-depth Assessment

The task that follows is modeled after a New Standards Project task (Sharing 25) and illustrates assessment of conceptual understanding as well as accuracy of computation.

(The idea for this discussion comes from *Elementary Performance Standards*, volume 1, pages 66-67, National Center on Education and the Economy and the University of Pittsburgh, 1997)

# Sharing 17 in Four Situations

Four friends want to “share 17” as equally as possible. Your task is to show or explain how to “share 17” in each situation.

- Four friends shared 17 balloons as equally as possible.
- Four friends shared 17 fruit bars as equally as possible.
- Four friends shared \$17 as equally as possible.

# Sample Student Responses

- Four friends shared 17 balloons as equally as possible.  
*three people get 4 and one person gets 5*
- Four friends shared 17 cookies as equally as possible.  
*every person gets 4 cookies and one fourth of the last cookie*
- Four friends shared \$17 as equally as possible.  
*all four people get \$4.25*

# What Does this Example Suggest?

When assessments are used to examine the depth of students' understanding, tasks need to focus on conceptual understanding, computational accuracy, and reasonableness of answers to realistic situations.

Used formatively, assessments that focus on multiple evidences of learning allow teachers to provide additional experiences as needed related to concept development, accuracy with basic computation skills, and applications of the mathematics being studied.

# For Consideration and Discussion

What makes assessing conceptual understanding more difficult?

Why does assessing students' understanding formatively (that is, as you move through an instructional sequence) create greater opportunities for long-term student success?

**Steps to Take:** Consider working in small groups to create formative assessments with only four questions that focus on only one mathematics concept but have questions that check for computational fluency, check for conceptual understanding, and check for appropriate application in different contexts.