This is a sample (first page) of the Assessment Overview found in the Teacher's Guide for each MiC Unit.

Overview

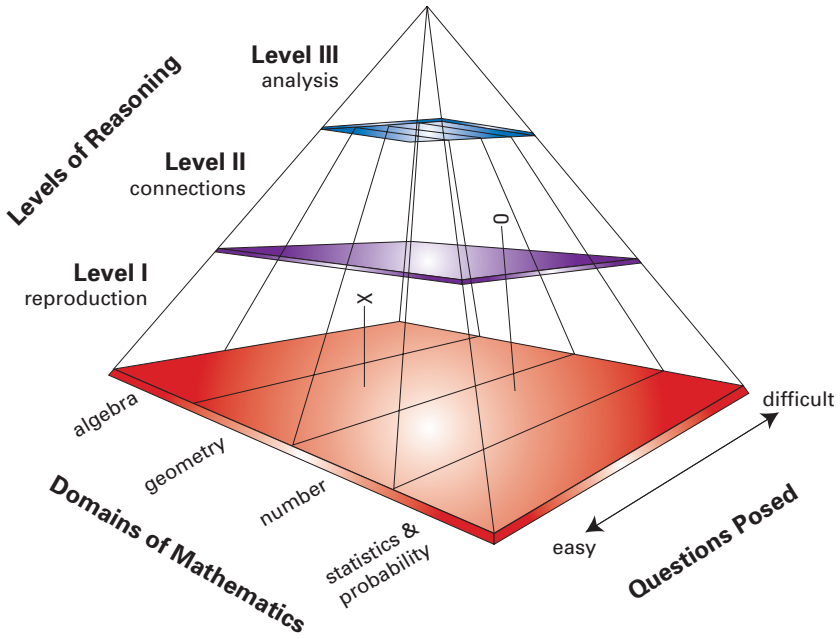
Student Assessment in Mathematics in Context

As recommended by the NCTM *Principles and Standards for School Mathematics* and research on student learning, classroom assessment should be based on evidence drawn from several sources. An assessment plan for a *Mathematics in Context* unit may draw from the following overlapping sources:

- **observation—As students work individually or in groups, watch for evidence of their understanding of the mathematics.**
- **interactive responses—Listen closely to how students respond to your questions and to the responses of other students.**
- **products—Look for clarity and quality of thought in students' solutions to problems completed in class, homework, extensions, projects, quizzes, and tests.**

Assessment Pyramid

When designing a comprehensive assessment program, the assessment tasks used should be distributed across the following three dimensions: mathematics content, levels of reasoning, and difficulty level. The Assessment Pyramid, based on Jan de Lange's theory of assessment, is a model used to suggest how items should be distributed across these three dimensions. Over time, assessment questions should "fill" the pyramid.



This is a sample (second page) of the Assessment Overview found in the Teacher's Guide for each MiC Unit.

Overview

Levels of Reasoning

Level I questions typically address:

- recall of facts and definitions and
- use of technical skills, tools, and standard algorithms.

As shown in the pyramid, Level I questions are not necessarily easy. For example, Level I questions may involve complicated computation problems. In general, Level I questions assess basic knowledge and procedures that may have been emphasized during instruction. The format for this type of question is usually short answer, fill-in, or multiple choice. On a quiz or test, Level I questions closely resemble questions that are regularly found in a given unit substituted with different numbers and/or contexts.

Level II questions require students to:

- integrate information;
- decide which mathematical models or tools to use for a given situation; and
- solve unfamiliar problems in a context, based on the mathematical content of the unit.

Level II questions are typically written to elicit short or extended responses. Students choose their own strategies, use a variety of mathematical models, and explain how they solved a problem.

Level III questions require students to:

- make their own assumptions to solve open-ended problems;
- analyze, interpret, synthesize, reflect; and
- develop one's own strategies or mathematical models.

Level III questions are always open-ended problems. Often, more than one answer is possible and there is a wide variation in reasoning and explanations. There are limitations to the type of Level III problems that students can be reasonably expected to respond to on time-restricted tests.

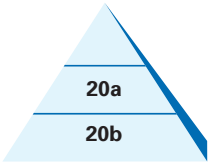
The instructional decisions a teacher makes as he or she progresses through a unit may influence the level of reasoning required to solve problems. If a method of problem solving required to solve a Level III problem is repeatedly emphasized during instruction, the level of reasoning required to solve a Level II or III problem may be reduced to recall knowledge, or Level I reasoning. A student who does not master a specific algorithm during a unit but solves a problem correctly using his or her own invented strategy may demonstrate higher-level reasoning than a student who memorizes and applies an algorithm.

The "volume" represented by each level of the Assessment Pyramid serves as a guideline for the distribution of problems and use of score points over the three reasoning levels.

These assessment design principles are used throughout *Mathematics in Context*. The Goals and Assessment charts that highlight ongoing assessment opportunities—on pages xvi and xvii of each Teacher's Guide—are organized according to levels of reasoning.

In the Lesson Notes section of the Teacher's Guide, ongoing assessment opportunities are also shown in the Assessment Pyramid icon located at the bottom of the Notes column.

Assessment Pyramid



Interpret the work of other students.

Find all factors for a number from 1 to 100.

Notice the sample of the first page of the Unit Test from the unit *Expressions and Formulas* as well as the Solution and Scoring Guide provided for that page.

Name _____ Date _____

Expressions and Formulas Unit Test

Page 1 of 4

Use additional paper as needed.

1. a. Compute 28 − (2 + 9) and 28 − 2 + 9.

b. Explain why the two answers are different.

c. Rewrite the calculation 15 × 6 + 20 × 5 using parentheses, so that the answer is 550.

2. Design an arithmetic tree that makes these problems easier to solve. Show your work for each problem.

a. 37 + 19 + 12 + 3 + 21 + 8

b. $\frac{1}{8} + \frac{3}{10} + \frac{1}{10} + \frac{7}{8} + \frac{3}{5}$

c. 3.7 + 4.5 − 2.5 + 2.3 + 10

Fast Cab

The meters in the cars of Fast Cab Company calculate the cost of a ride using the following formula.

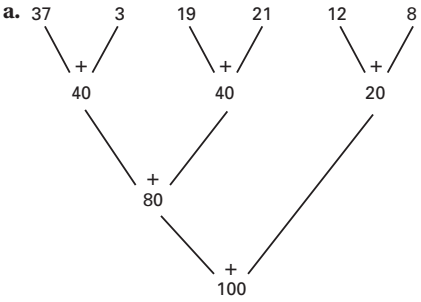
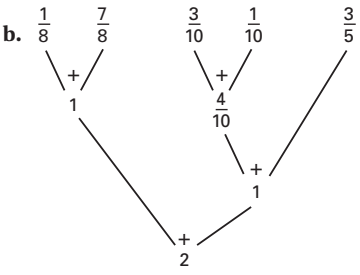
total price (in dollars) = 3.50 + 1.50 × number of miles

3. a. Explain what the numbers used in the formula mean.

b. Write the formula as an arrow string.

This is a sample of the Solution and Scoring Guide provided for the first page of the Unit Test from the unit *Expressions and Formulas*.

Expressions and Formulas Unit Test Solution and Scoring Guide

Possible student answer	Suggested number of score points	Problem level
1. a. $28 - (2 + 9) = 28 - 11 = 17$ $28 - 2 + 9 = 26 + 9 = 35$	**2**	**I**
b. Sample student answers: • The order of the operations is different for both computations, because of the parentheses. • In the first computation, you have to calculate 2 + 9 first, because of the parentheses, and subtract the result from 28. In the second computation, you subtract 2 and add 9.	**1**	**I**
c. $(15 \times 6 + 20) \times 5$ or $((15 \times 6) + 20) \times 5$	**1**	**I**
2. Different solutions are possible. Only one example of each is shown. Check the results of the computations. **a.**  **b.** 	**3** (Give a half point for each arithmetic tree that shows matching of "easy pairs" to compute.) (Give a half point for a correct answer.)	**I / II** **I / II**