

Numeracy Performance Standards Revision

Instructions for Field-Testing

Context

Over the past year, the Ministry has been working with math educators to update the BC Numeracy Performance Standards to ensure that they are aligned with the current curriculum, while continuing to build on the extensive work that many BC districts, schools, teachers, and inquiry groups have already done.

The revised standards will feature:

- One scale for each of grades 1-3; 4-6; 7-9; 10-12, with space to indicate the specific **strands** and **key concepts** that are being assessed in specific cases.
- Tasks/sample sets at each grade (we anticipate having a minimum of two tasks/student sample sets – and at least one of these will feature **number**)

Field-testing Procedures

Some tasks and samples have been developed as prototypes for field-testing. The prototypes start to show what the final product will look like. These tasks and student samples may or may not be selected for the final version of the standards. It is critical that these prototypes be field-tested by students and teachers.

We currently have prototypes available for Grades 1 to 9. Prototypes for Grades 10 to 12 will be forthcoming.

Each prototype includes:

- (1) Quick Scale
 - (2) Designation of the key concepts involved
 - (3) Task description
 - (4) One sample at each of the four levels of performance
 - (5) The teacher's observations for each sample
 - (6) The small 'logo' form of the scale showing which level(s) each aspect was rated as.
- We need teachers and students to try the prototype tasks. For example, using one of the tasks with a class; then using the scale and samples to try to assess the results gives the best possible insight into how they are working. Another example is that a group of teachers get together to work through the prototype at their grade level as a form of Pro-D.

Numeracy Performance Standards, Grade 1 Prototype

- Provide specific, concrete feedback. For example, if you don't agree with the placement of a sample, please be as specific as possible about why and where you think it should be rated. Use the attached *Prototype Feedback Questions* to provide focused feedback.
- Send your comments and any additional student exemplars from your field testing to the Ministry. We'd like to hear from you by **September 30, 2011**.
- These prototypes are being circulated as widely as possible, so please feel free to share them with others.

What's Next?

- We will be working on similar prototypes for grades 10, 11 and 12 and would welcome any contributions.
- We need to keep adding to the task/sample sets for Grades 1 to 9. We aim to have two sets per grade for the published materials eventually. We would welcome task/sample sets, especially in patterns and relations, shape and space, statistics and uncertainty.
- If you have something suitable, please either post it on the Moodle site at <http://www.learnnowbc.ca/educators/default.aspx>, or contact Jiemei Li at Jiemei.Li@gov.bc.ca or Nancy Walt at Nancy.Walt@gov.bc.ca

Numeracy Performance Standards, Grade 1 Prototype

Numeracy Performance Standards Revision

Prototype Feedback Questions

1. What suggestions do you have about the use of the numeracy performance standards? Are these materials easy for teachers to use?
2. Are the rating scales easy to apply to samples of student work? What improvements are needed?
3. Is the task grade/age-appropriate? Provide your opinion and comments.
4. What suggestions do you have for improving the student samples in the prototype? Do you agree with the rating? If not, what is the rating and rationale for the rating?
5. Would you suggest other samples that better exemplify the performance levels?
6. Are these materials helpful to discuss with students and parents? In what ways?
7. Would you like to contribute new tasks/samples?

Please send your comments and materials by **September 30, 2011** to Jiemei Li

- by email at Jiemei.Li@gov.bc.ca
- by mail at: Student Assessment Branch, PO Box 9143 Stn Prov Govt
Victoria, BC V8W 9H1

or post them on the Moodle at <http://www.learnnowbc.ca/educators/default.aspx>

Thank you!

Numeracy Performance Standards, Grade 1 Prototype

Quick Scale: Numeracy Performance Standards (Grades 1-3)

Task: _____

Grade _____

Strand	Key concepts required by this task (see IRP p. 16)

	Not Yet Within Expectations	Meets Minimal Expectations	Fully Meets Expectations	Exceeds Expectations
Snapshot <i>Note: the snapshot can be used alone as a holistic scale for marking some assignments</i>	<i>Unable to complete tasks in a reasonable amount of time without one-to-one help. Cannot explain results.</i>	<i>Completes most parts of basic tasks, but without help, work and explanation are flawed and/or incomplete in important ways.</i>	<i>Completes all parts of basic tasks; reaches and explains the results. May have minor flaws.</i>	<i>Completes all parts of basic tasks, including explanations, appropriately, with confidence and ease. Flexible; often innovative.</i>
Concepts and Connections - recognizes/connects mathematics (see relevant and application to problems) [R] [V] [CN] - explains/demonstrates relevant concepts [R]	<ul style="list-style-type: none"> • Needs one-to-one support to recognize and connect mathematical concepts/procedures • Shows very limited understanding of relevant concepts; does not explain or demonstrate 	<ul style="list-style-type: none"> • In simple situations, recognizes/connects concepts/procedures with limited support • Shows partial understanding of relevant concepts; explanations/demonstrations may be vague and incomplete 	<ul style="list-style-type: none"> • In familiar situations, recognizes/connects concepts and procedures needed for all parts of the task(s) • Shows understanding of relevant concepts; explanations are logical and complete 	<ul style="list-style-type: none"> • In various contexts, recognizes/connects concepts/procedures needed for all parts of the task • Shows thorough understanding of relevant concepts/procedures; explanations/demonstrations are precise and show insight
Problem-solving and reasoning -selects and uses appropriate strategies (including visualization; technology) to analyze, solve and create problems [PS] [V] - uses estimation strategies [ME] - verifies and justifies that results are reasonable [R]	<ul style="list-style-type: none"> • Does not use appropriate strategies; needs extensive support • No evidence of estimation strategies (answers are often highly improbable) • Does not verify results or solutions without step-by-step help 	<ul style="list-style-type: none"> • Uses some appropriate strategies • Some evidence of estimation; somewhat effective (some answers reasonable) • Inconsistent in verifying results or solutions (may verify parts; often needs direction) 	<ul style="list-style-type: none"> • Uses appropriate strategies • Uses estimation strategies appropriately; most answers are reasonable • Verifies and justifies results or solutions (may be inefficient; imprecise) 	<ul style="list-style-type: none"> • Uses highly effective, and often innovative, strategies • Uses effective estimation strategies; answers are reasonable (relatively precise) • Verifies and justifies results or solutions with efficiency and precision
Procedures - accurate and precise in recording, substitutions, calculations, units, and symbols [C] - fluent; efficient in applying procedures including mental math [ME]	<ul style="list-style-type: none"> • Uses procedures with Limited accuracy; major errors or omissions • Inefficient; struggles (e.g., false starts; repeats; little evidence of mental math strategies) 	<ul style="list-style-type: none"> • Uses some procedures accurately; some errors or omissions • Inconsistent; may be fluent with some procedures but inefficient or struggle with others 	<ul style="list-style-type: none"> • Uses procedures accurately with some minor errors or omissions • Uses most procedures and strategies fluently; self-corrects; may be inefficient with procedures in places 	<ul style="list-style-type: none"> • Uses procedures with accuracy and precision; very few if any minor errors/omissions • Uses procedures and mental math strategies with ease and efficiency; may find own 'shortcuts'
Representation and Communication - represents numbers required by grade level LOs concretely, pictorially, symbolically [C] [V] - communicates mathematically [C]	<ul style="list-style-type: none"> • Represents a limited range of numbers; does not use a variety of ways; frequent errors/omissions • Unable to explain or demonstrate how to complete the task 	<ul style="list-style-type: none"> • Represents most numbers required in some ways; noticeable errors/omissions • With prompting, partially explains/demonstrates how to complete task 	<ul style="list-style-type: none"> • Represents most numbers required in a variety of ways; some errors or inconsistencies • Explains/demonstrates how to complete task (some math'l language) 	<ul style="list-style-type: none"> • Represents numbers required in a variety of ways; very few/no errors • Clearly explains or demonstrates how to complete task; uses appropriate mathematical language

Used for major tasks, projects, or ongoing observations.

Numeracy Performance Standards, Grade 1 Prototype

Crabs at the Beach

Context

WHERE'S THE MATH?

The “Ways to Make” problem helps to reveal the students’ understanding of part-part-whole relationships. Thinking about a number in terms of its parts is an important milestone in the development of early number sense. The ability to think of numbers in terms of part-whole relationships is one of many landmarks in developing more complex understanding about number. Understanding that a quantity can be decomposed into different size parts is fundamental to grasping the concepts of place value. The ability to deal with part-whole relationships allows student to go beyond simple counting to solve problems. Part-part-whole relationships are also an important bridge to addition, subtraction and fraction concepts.

Grade

1

Prescribed Learning Outcomes

A7 demonstrate, concretely and pictorially, how a given number can be represented by a variety of equal groups with or without singles [C, R, V]

A5 compare sets containing up to 20 elements to solve problems using referents and one-to-one correspondence [C, CN, ME, PS, R, V]

Process

Every student should be able to show their understanding of mathematical skills and concepts, and be allowed to represent their understanding through concrete materials, pictures, numbers or words. Providing the opportunities for students to show what they know in a way that makes sense to them is a critical component of assessment.

To help address the diversity of learners in your classroom, consider the following before administering the assessment:

Provide manipulatives or other “thinking tools”

Plan for adjustments of the tasks to meet the needs of diverse learners (e.g. quantities of the numbers that students are working with may need to be adjusted to their needs or individual conferencing may be required to uncover their understanding)

Plan for flexible completion times e.g. early finishers

Plan for students who require additional adult support e.g. students requiring scribing or digital recording

Consider various methods of administering e.g. small groups, one-on-one conferencing etc.

Consider the possibility of having more than one adult during the assessment.

Numeracy Performance Standards, Grade 1 Prototype

Assessing students' thinking requires presenting questions that prompt and extend their thinking. Students may struggle to solve the problem. It is very important that the teacher allow the student to struggle as they work through the problem.

The teacher's role is to ask questions that prompt and extend thinking by:

- providing support and guidance
- helping students build on prior knowledge
- scaffold student thinking

Allow time for students to process their thinking

Thoughtful questions will enable students to communicate their thinking and facilitate their meta-cognition as they work out the problem.

Before

Read to the students a book about the quantity of ten (i.e. *Fish Eyes – A Book You Can Count On* by Lois Ehlert).

- Discuss the book focusing on the different parts of various quantities that are represented on each page (i.e. There are 6 fish on the page. 4 are small and 2 are large.)
- Have the students use manipulatives to represent different quantities to 9 into 2 parts (some being large fish and some small fish).
- Ask the students to explain how they know that the 2 parts they created equal the total quantity.
- Have the students record their solutions pictorially.
- Ask for volunteers to share their strategy used to reach their solution.

Before

- Read the story *One is a Snail Ten is a Crab* by April Pulley Sayre.
- Ask the students to predict what will happen next at various part of the story.
- Discuss the events of the story and the different quantities of feet represented by the various animals on the pages.
- Ask the students to build the quantity of 17 using manipulatives/ten frames.
- Ask them to show the quantity in two parts. Have them identify the quantity of each part and explain how they know that there are still 17 objects.
- Have students work in partners to build various quantities decomposed into 2 parts.
- Ask the students to represent their thinking on paper and share their strategies.

During

NOTE: Teachers may find it beneficial to administer the assessment task to small group of students, rather than the whole class at one time.

– Present the problem to the students:

At the beach I counted 20 crabs. Some were resting by a rock and the others were crawling sideways in the sand. There was not the same number of crabs in the two different groups. How many ways can you arrange the 20 crabs into 2 different sized groups (some by the rock and some crawling in the sand)?

Numeracy Performance Standards, Grade 1 Prototype

- Clarify the problem with the students. Make sure that they are clear on the expectations.
- Explain to the students that they can use anything in the classroom to help them find solutions.
- Encourage them to find as many possible ways to arrange the 20 crabs into 2 groups which are not the same quantity.
- Ask the students to record their solutions on the Student Page. Remind them that they may use pictures, numbers or words to show and explain their thinking.
- As the students finish, have them explain their thinking to you.
- **If necessary**, conference with the student and scribe what the student says.
- Refer to the ‘Assessment Rubric’ to guide your inquiries.
- You may need to ask the students prompting questions/statements to help uncover their strategies and thinking processes:

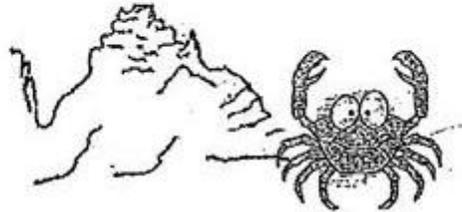
1. How do you know?
2. How did you start solving this problem?
3. Tell me what you are thinking.
4. Show me what you know.
5. What do you see in your head?
6. What questions did you ask yourself?
7. Why do you think that?
8. Could there be a different answer?
9. What strategies did you use to ...?
10. How does your strategy make sense to you?
11. What tools help you?

After

- **Conduct a ‘SHOW AND SHARE’ sessions, encouraging the students to share their strategies/thinking and to explain their reasoning to complete the task.**
 - Refer to the ‘Assessment Rubric’ to guide your inquiries.
 - Consider about the following questions before recording information on the Assessment Rubric:
 1. How well did the student understand the question?
 2. What strategies did the student use to solve the problem?
 3. How much support did the student require?
 4. How did the student represent and communicate their thinking?
 5. How well did the students reason or justify the solution?
 6. In what way/s did the student make connections to other mathematical concepts or real life situations?

Numeracy Performance Standards, Grade 1 Prototype

At the beach I counted 20 crabs. Some were resting by a rock and the others were crawling sideways in the sand. There was not the same number of crabs in the two different groups. How many different ways can you arrange the 20 crabs into 2 different sized groups?



Numeracy Performance Standards, Grade 1 Prototype

NOT YET WITHIN EXPECTATIONS

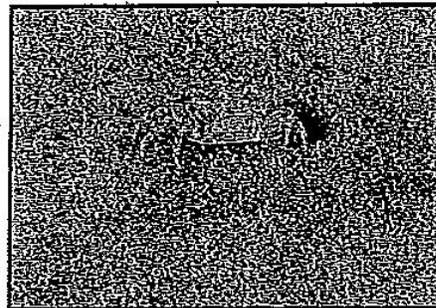
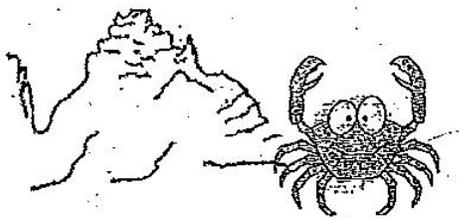
Teacher's Observations

The student did not complete the task within a reasonable amount of time, even with teacher prompting. The written response does show some understanding of "20", but was guided by the teacher (e.g., if there were 16 at the rock, how many could be in the sand?).

- Unable to explain or demonstrate relevant concept.
- Does not use appropriate strategies; needs extensive support.
- Struggles with procedures (follows teacher's lead.).
- Does not represent numbers in a variety of ways.

	NYM	MM	FM	Ex
OVERALL				
Snapshot				
Concepts				
Connections				
Prob-Solving				
Reasoning				
Procedures				
Represent'n				
Commun				

At the beach I counted 20 crabs. Some were resting by a rock and the others were crawling sideways in the sand. There was not the same number of crabs in the two different groups. How many different ways can you arrange the 20 crabs into 2 different sized groups?



$$4 + 16 =$$

Numeracy Performance Standards, Grade 1 Prototype

MEETS EXPECTATIONS (MINIMAL LEVEL)

Teacher's Observations

The student needed some prompting. He had difficulty explaining and needed prompts from the teacher.

- Recognizes concepts needed with limited support
- Uses some appropriate strategies
- Some errors or omissions in combining two numbers to make 20
- With prompting, able to partially explain the task and results.

	NYM	MM	FM	Ex
OVERALL				
Snapshot				
Concepts Connections				
Prob-Solving Reasoning				
Procedures				
Represent'n Commun				

At the beach I counted 20 crabs.

Some were resting by a rock and the others were crawling sideways in the sand.

There was not the same number of crabs in the two different groups.

How many different ways can you arrange the 20 crabs into 2 different sized groups?



Numeracy Performance Standards, Grade 1 Prototype

FULLY MEETS EXPECTATIONS

Teacher's Observations

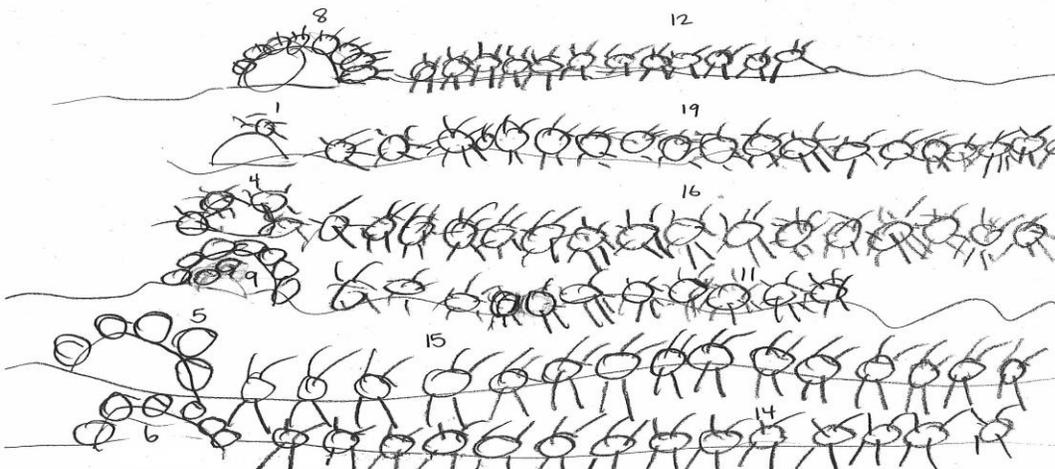
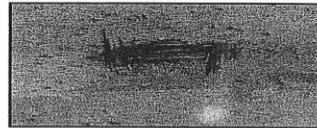
The student completed all parts of the task, and found several ways to combine two groups of crabs to make 20.

- Shows understanding of relevant concepts; gives a logical oral explanation.
- Uses appropriate strategies.
- Uses procedures accurately and fluently
- Explains how to do the task.

	NYM	MM	FM	Ex
OVERALL				
Snapshot				
Concepts				
Connections				
Prob-Solving Reasoning				
Procedures				
Represent'n Commun				

Grade 1 – Problem Solving Assessment – Student Page

At the beach I counted 20 crabs. Some were resting by a rock and the others were crawling sideways in the sand. There was not the same number of crabs in the two different groups. How many different ways can you arrange the 20 crabs into 2 different sized groups?



Numeracy Performance Standards, Grade 1 Prototype

EXCEEDS EXPECTATIONS

Teacher's Observations

The student completed the task with confidence and ease, finding several different ways to solve the problem. She explained her strategies in an interview.

- Shows thorough understanding of relevant concepts; oral explanation was precise and thoughtful (“I saw some kids did $10+10$ but I knew that wouldn't work because the groups would be even.”).
- Uses highly effective strategies
- Uses procedures with accuracy and precision
- Represents numbers in a variety of ways
- Clearly explains how to complete the task

	NYM	MM	FM	Ex
OVERALL				
Snapshot				
Concepts				
Connections				
Prob-Solving				
Reasoning				
Procedures				
Represent'n				
Commun				

At the beach I counted 20 crabs.
Some were resting by a rock and the others were crawling sideways in the sand.
There was not the same number of crabs in the two different groups.
How many different ways can you arrange the 20 crabs into 2 different sized groups?

Handwritten solutions and representations:

- $9+11=20$
- $20+0=20$
- 20 is even
- $10 = 20$
- 20 words
- 20 Bins
- 20 Birds
- 15
- 5
- $= 20$
- $= 20$
- 4
- $4+16=20$