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 plan to have a minimum of two tasks/student sample sets – and at least one of these will feature **number**)

In the first phase of the revision, prototypes for Grades 1 to 9 have been field-tested. These prototypes mainly feature number. Currently, we have developed more tasks featuring other strands and they need to be field-tested.

Field-testing Procedures

Tasks for Grades 1 to 9 have been developed for field-testing. This task package includes a task description and the quick scale.

- We need you and your students to try the task and send the students' work to the Ministry.

- We need you to evaluate the task and use the quick scale to score students' work.

- Provide specific, concrete feedback. Use the attached *Feedback Questions* to provide focused feedback.

- Send your comments and students' work from your field testing to the Ministry. We'd like to hear from you by **December 23, 2011**.

- If you have developed any 'student-friendly' materials/tasks, please send them along.

- These tasks are being circulated as widely as possible, so please feel free to share them with others.

If you want to discuss the field testing process, please contact Nancy Walt at Nancy.Walt@gov.bc.ca or Jiemei Li at Jiemei.Li@gov.bc.ca

Please send your comments, student samples and any new materials or tasks by **December 23, 2011** to Jiemei Li

- by email at Jiemei.Li@gov.bc.ca
- by mail at: Curriculum and Assessment, PO Box 9183 Stn Prov Govt Victoria, BC V8W 9H1

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

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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. Is the task grade/age-appropriate? Provide your comments and suggestions for improvement.

3. Are the rating scales easy to apply to student work? What improvements are needed?

4. Do you have student samples to demonstrate the various performance levels? Please send all or a selection of your students' work to the Ministry.

5. Have you developed any 'student-friendly' materials or tasks? Please send them to the Ministry.

Please send your comments and student samples by **December 23, 2011** to Jiemei Li

- by email at Jiemei.Li@gov.bc.ca
- by mail at: Curriculum and Assessment, PO Box 9183 Stn Prov Govt
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Thank you!

Quick Scale: Numeracy Performance Standards (Grades 4-6)
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	*Does not meet basic requirements of the task(s) without close, ongoing assistance. Usually unable to explain result.*	• *Satisfies basic requirements for most parts of the task, but some important aspect is flawed or incomplete. Partial explanation.*	• *Satisfies basic requirements for all parts of the task(s); reaches and explains reasonable solution(s). (may be minor flaws)*	• *Thoroughly satisfies requirements of all parts of the task; solution is well-developed and justified; often insightful or innovative..*
Concepts and Connections - recognizes the math; applies appropriate concepts [R] [V] [CN] - explains/demonstrates relevant concepts; makes connections [R]	• Does not recognize or apply basic concepts needed for the task(s) • Shows little understanding of relevant concepts; explanations are incomplete or illogical	• Recognizes/applies concepts needed for most parts of the task(s) (may not be best choice) • Shows partial understanding of relevant concepts; explanations may be vague; partially incomplete	• Recognizes/applies concepts needed for all parts of the task(s) • Shows understanding of relevant concepts; explanations are logical and complete	• Recognizes/applies a wide range of concepts including those that have not been recently taught; may offer alternatives • Shows thorough understanding; explanations are insightful;
Problem-solving and reasoning -selects and uses appropriate strategies to analyze, solve and create problems [PS] [V] [T] - flexible; perseveres - uses estimation strategies [ME] - verifies and justifies that results are reasonable [R]	• Does not use appropriate strategies; requires extensive support • No flexibility; does not persevere to a solution • Does not verify or justify • Unable to use estimation strategies (answers are often highly improbable)	• Uses some appropriate strategies if problem appears familiar; may need some help • Limited flexibility and perseverance • Needs help to verify or justify; inconsistent • Some evidence of estimation; (some answers reasonable)	• Uses appropriate strategies • Shows some flexibility; in most cases, perseveres to find a solution • With prompting, verifies and justifies • Uses estimation strategies appropriately; most answers are reasonable	• Uses appropriate strategies; often innovative; may add some complexity • Shows flexibility; perseverance to find a solution • Verifies; justifies • Uses effective estimation strategies; answers are reasonable (relatively precise)
Procedures - accurate and precise in recording, substitutions, calculations, units, and symbols [C] - fluent; efficient in applying procedures including mental math [ME]	• Follows procedures with limited accuracy; major errors or omissions • Inefficient; struggles (e.g., false starts; repeats; little evidence of mental math strategies)	• Follows procedures with partial accuracy; some errors or omissions • Inconsistent; may be fluent with some procedures but inefficient or not demonstrated in others	• Follows procedures accurately with some minor errors or omissions • Uses most procedures and mental math strategies fluently; may be inefficient	• Follows procedures with accuracy and precision; very few if any minor errors/omissions • Uses procedures and mental math strategies fluently and efficiently; may find own 'shortcuts'
Representation and Communication -communicates mathematically including mathematical language [C] -includes appropriate graphics; representations (e.g., charts, tables, graphs, diagrams; sketches) [V]	• Does not explain procedures and results clearly • Omits required graphics or representations and/or does not construct them appropriately; many omissions; serious flaws	• Partially explains procedures; results; parts are confusing, vague, incomplete • Constructs most required graphics; representations; parts are seriously flawed/ incomplete (e.g., scale inappropriate)	• Explains results and procedures clearly using some math language • Constructs required graphics and/or representations appropriately; may have minor errors or flaws (e.g., missing labels)	• Explains procedures and results precisely; uses mathematical language • Constructs required graphics and/or representations effectively and accurately

Used for major tasks, projects, or ongoing observations.

Birthday Cake – Measurement (Area & Perimeter)

Context

Measurements of perimeter and area have been addressed in Grades 3 and 4 respectively. In grade 5, the relationship of these measurements is analyzed and considered. This 2-part task provides an opportunity for the students demonstrate their understanding of the relationship by creating the maximum area with a set perimeter. By designing and decorating their own birthday cake the students will find that utilizing the existing outside border will enable them to create the maximum area. This task can be used either before (assessment for learning) or after (assessment of learning) the students have studied finding perimeter and/or area of different rectangles. *Part 1 can be used as a Grade 4 task.*

Prescribed Learning Outcome:

Grade 5
C1   design and construct different rectangles given either perimeter or area, or both (whole numbers) and draw conclusions [C, CN, PS, R, V]

Grade 4
C3   demonstrate an understanding of area of regular 2-D shapes by recognizing that area is measured in square units determining and recording area (cm^2 or m^2) [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.
Assessing student thinking requires posing questions that prompt and extend their thinking.
Students may struggle to solve the problem.

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

- providing support and guidance
- helping students build on prior knowledge
- scaffolding the student's thinking

Before

MATERIALS:

- colour tiles
- unfix cubes
- cm cubes
- grid paper

Discuss and clarify the terms perimeter and area.

Using colour tiles model a regular rectangle with a perimeter of 12 units (4 x 3).

Label the dimensions and identify and label the area

Leaving the model for reference, model another regular rectangle of 12 units (2 x 6).

Have students distinguish the area and perimeter of these rectangles.

During

Present task (Part 1):
- Refer to the created rectangles as cakes.
- Clarify what a border edge of a cake would be.
- Stress that there is 72 cm to make the border edging of the cake.
- Have students complete task.

Present task (Part 2): (could be another lesson)
- Read instructions together.
- Examine pictures to help understand the criteria of minimum of 2 interior rectangles.
- Model the minimum of 2 interior rectangles on a chosen cake.
- Stress that there is 72 cm of icing that has to be all used up to outline all of the rectangles.

Clarify the problem with the students. Make sure that they are clear on the expectations.

Provide various materials including colour tiles, unifix /multi-link cubes etc. for students to use in creating rectangles.

Provide multiple copies of grid paper for students to use.

Ask the students to record their possible solutions on the Student Page.

If necessary, conference with the student and scribe what the student says.

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' session, encouraging the students to share their strategies/thinking and to explain their reasoning to complete the task.

Share and discuss the different cakes made.

Discuss the size (area) of the cakes in relation with their respective perimeters.
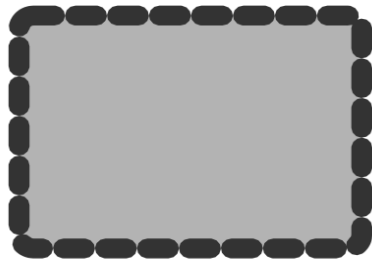
Ask students:
- o "What do you notice about the total areas for the smaller rectangles compared to the area of the full sized cake?"

Your Birthday Cake

You are designing the size and layout for your rectangular birthday cake.

You have 2 tubes of icing. Each tube holds enough icing to make a border of 72 cm.

PART 1: What size is your cake?

Draw the <u>different</u> rectangular cakes you could decorate using **all** 72 cm of icing in one of the tubes for the border. Remember: Each cake will be a rectangle with a border of 72 cm.

Write the dimensions and **find the area** for each of the cakes. Write the area inside each of the cakes.

Choose **one** of the cakes that you will decorate. Explain why you choose this particular cake to decorate. (Use pictures, words and numbers to help explain your thinking.)

PART 2: Your Design

Design the cake you chose to decorate in Part 1 with rectangles that have the maximum combined area possible.

The design needs to:

- include at **least** 2 other rectangles (not including the outside cake border):
  - a rectangular shaped banner, "Happy Birthday ..."
  - a rectangular frame for a picture
- use **all** 72 cm of icing of the second tube for the borders of these rectangular designs
- use as much of the cake surface as possible.

Remember to label the dimensions and area for each rectangle.

Explain how you know that you have found the maximum area possible using all 72 cm of icing for the borders. (Use pictures, words and numbers to help explain your thinking.)

Grid Paper (0.5 cm)