

# 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](mailto:Nancy.Walt@gov.bc.ca) or Jiemei Li at [Jiemei.Li@gov.bc.ca](mailto: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](mailto: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](mailto:Jiemei.Li@gov.bc.ca)
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Thank you!

## Quick Scale: Numeracy Performance Standards (Grades 7-9)

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
<b>Snapshot</b>	<ul style="list-style-type: none"> <li>Does not meet basic requirements of the task without close, ongoing assistance. No adequate explanation.</li> </ul>	<ul style="list-style-type: none"> <li>Satisfies basic requirements for most parts of the task; some important aspect is flawed or incomplete. Partial explanation.</li> </ul>	<ul style="list-style-type: none"> <li>Satisfies basic requirements for all parts of the task; reaches a reasonable solution. (may be minor flaws.)</li> </ul>	<ul style="list-style-type: none"> <li>Thoroughly satisfies requirements of the task; solution is well-developed and justified; shows insight; often innovative.</li> </ul>
<b>Concepts and Connections</b> - recognizes the math; applies appropriate concepts [R] [V] [CN] - explains/demonstrates relevant concepts; makes connections [R]	<ul style="list-style-type: none"> <li>Does not identify or apply concepts and procedures needed</li> <li>Does not show understanding of relevant concepts; explanations are incomplete or illogical</li> </ul>	<ul style="list-style-type: none"> <li>Identifies/applies concepts/procedures needed for most parts of task (may not be best choice)</li> <li>Shows partial understanding of relevant concepts; explanations may be incomplete</li> </ul>	<ul style="list-style-type: none"> <li>Identifies/applies concepts and procedures needed for all parts of task</li> <li>Shows understanding of relevant concepts; explanations are logical and complete</li> </ul>	<ul style="list-style-type: none"> <li>Identifies/ applies a wide range of concepts and procedures including those that have not been recently taught</li> <li>Shows thorough understanding; explanations are insightful</li> </ul>
<b>Problem-solving and reasoning</b> -selects and uses appropriate strategies to analyze, solve and create problems [PS] [V] [T] - uses estimation strategies [ME] - verifies and justifies that results are reasonable [R]	<ul style="list-style-type: none"> <li>Does not use appropriate strategies to analyze and solve problems</li> <li>No evidence of estimation strategies (answers are often highly improbable)</li> <li>Does not verify results or solutions</li> </ul>	<ul style="list-style-type: none"> <li>Uses some appropriate strategies to analyze and solve problems</li> <li>Some evidence of estimation; may be somewhat ineffective (some answers reasonable)</li> <li>May verify parts of results/solution; often needs direction</li> </ul>	<ul style="list-style-type: none"> <li>Uses appropriate strategies to analyze and solve problems</li> <li>Uses estimation strategies appropriately; most answers are reasonable</li> <li>Verifies and justifies results or solutions (may be inefficient; imprecise)</li> </ul>	<ul style="list-style-type: none"> <li>Uses highly effective, often innovative, strategies to analyze and solve problems</li> <li>Uses estimation strategies effectively; answers are reasonable (high precision)</li> <li>Verifies and justifies results or solutions efficiently; precise</li> </ul>
<b>Procedures</b> - 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"> <li>Limited accuracy in applying procedures.</li> <li>Inefficient; struggles (e.g., false starts; repeats; little evidence of mental math strategies)</li> </ul>	<ul style="list-style-type: none"> <li>Partially accurate; some errors</li> <li>Inconsistent; fluent with some procedures but inefficient or not demonstrated in others</li> </ul>	<ul style="list-style-type: none"> <li>Generally accurate with some minor errors or omissions</li> <li>Follows most procedures appropriately; uses mental math strategies</li> </ul>	<ul style="list-style-type: none"> <li>Accurate and precise; very few if any minor errors/ omissions</li> <li>Uses range of procedures and mental math strategies fluently and efficiently; may find own 'shortcuts'</li> </ul>
<b>Representation and Communication</b> -communicates mathematically including mathematical language [C] -includes appropriate graphics; representations (e.g., charts, tables, graphs, diagrams; sketches) [V]	<ul style="list-style-type: none"> <li>Does not explain procedures and results clearly; key information missing</li> <li>Omits required graphics or representations and/or does not construct them appropriately; many omissions; serious flaws</li> </ul>	<ul style="list-style-type: none"> <li>Partially explains procedures; results; parts are confusing, vague, incomplete</li> <li>Constructs most required graphics; representations; some features are seriously flawed/ incomplete (e.g., not to approximate scale)</li> </ul>	<ul style="list-style-type: none"> <li>Explains results and procedures clearly using some math language</li> <li>Constructs required graphics and/or representations appropriately; may have minor errors or flaws (e.g., missing labels or dimensions)</li> </ul>	<ul style="list-style-type: none"> <li>Explains procedures and results precisely; uses mathematical language</li> <li>Constructs required graphics and/or representations effectively and accurately</li> </ul>

Used for major tasks, projects, or ongoing observations.

# Numeracy Performance Standards – Grade 9 Task

## Heart Rate

### Context

In this task, students are asked to design and execute an experiment on the effect of exercise on heart rate. They will collect data, plot it on a graph and interpret the results to make conclusions. While the final graph is not linear, sections of the graph will be. As well as discussion about data collection and analysis, interesting conversations that give evidence of students' understanding of linear relations are likely to arise from this interesting and engaging experiment.

### Prescribed Learning Outcome:

#### Grade 9

- D3 develop and implement a project plan for the collection, display, and analysis of data by:
- formulating a question for investigation
  - choosing a data collection method that includes social considerations
  - collecting the data
  - displaying the collected data in an appropriate manner
  - drawing conclusions to answer the question [C, PS, R, T, V]
- B1 generalize a pattern arising from a problem-solving context using linear equations & verify by substitution [C, CN, PS, R, V]
- B2 graph linear relations, analyse the graph, and interpolate or extrapolate to solve problems [C, CN, PS, R, T, V]

### Process

**Before** Pose this problem at the end of a unit data management. Students should also have previously worked with linear relations.

Ask students to record their resting heart rate over a period of 30 seconds. Have them compare their results with others seated nearby. Ask for their hypotheses on why these numbers differ. Ask students to consider what factors affect heart rate and record some of them on the board.

Explain that students will have the opportunity to conduct an experiment in class to assess the effect of exercise on heart rate. Distribute the student planning sheet and run through the criteria with students. Have students work in partners.

**During** Encourage students to talk together and compare their results with different groups as they perform their experiments. Have them keep rough notes throughout the data collection and analysis to inform their final write up.

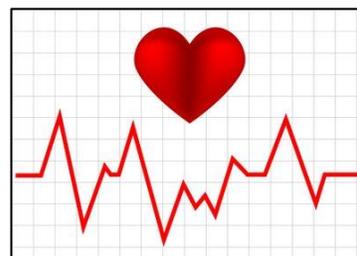
As students work, ask questions about their thinking. *(What are you noticing so far? How does this data support your hypothesis/conclusions? What factors may have influenced your findings? How might you change this experiment to answer your questions? What does the shape of the graph mean?)*

**After** Have students ensure their work is complete, and that each part of the assignment is finished. Before submitting their work, have students exchange their experiment and its write-up with a partner for “inspection”. Partners should ask clarifying questions and give advice for improvement where appropriate.

Consider enacting some of the students’ follow-up experiments and graphing the results.

Name \_\_\_\_\_

## Heart Rate: Student Assignment



Design an experiment to test the effect of exercise on heart rate.

The experiment must be one that you can complete in class.

Here is a list of things to include:

1. Record your question.
2. Describe the experiment. What variables will you assess and change?
3. What do you expect to happen in your experiment? List your predictions.
4. Do the experiment with a partner. Record the data.
5. Create a table for your data. Graph your data.
6. What can you conclude from your graph? What does it mean?
7. What expression can you write to match the data you have collected?
8. What did you learn about the effect of exercise on heart rate?
9. Check your prediction. Were you surprised?

10. How could you check your results?
11. Who might be interested in the results of this experiment? Why?
12. What other variables influence heart rate?
13. How might you change your experiment to include some of these?