

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

Numeracy Performance Standards, Grade 6 Prototype

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.

- 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

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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!

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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	<i>Does not meet basic requirements of the task(s) without close, ongoing assistance. Usually unable to explain result.</i>	<i>Satisfies basic requirements for most parts of the task, but some important aspect is flawed or incomplete. Partial explanation.</i>	<i>Satisfies basic requirements for all parts of the task(s); reaches and explains reasonable solution(s). (may be minor flaws)</i>	<i>Thoroughly satisfies requirements of all parts of the task; solution is well-developed and justified; often insightful or innovative.</i>
Concepts and Connections - recognizes the math; applies appropriate concepts [R] [V] [CN] - explains/demonstrates relevant concepts; makes connections [R]	<ul style="list-style-type: none"> Does not recognize or apply basic concepts needed for the task(s) Shows little understanding of relevant concepts; explanations are incomplete or illogical 	<ul style="list-style-type: none"> 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 	<ul style="list-style-type: none"> Recognizes/applies concepts needed for all parts of the task(s) Shows understanding of relevant concepts; explanations are logical and complete 	<ul style="list-style-type: none"> 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]	<ul style="list-style-type: none"> 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) 	<ul style="list-style-type: none"> 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) 	<ul style="list-style-type: none"> 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 	<ul style="list-style-type: none"> 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]	<ul style="list-style-type: none"> Follows 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"> Follows procedures with partial accuracy; some errors or omissions Inconsistent; may be fluent with some procedures but inefficient or not demonstrated in others 	<ul style="list-style-type: none"> Follows procedures accurately with some minor errors or omissions Uses most procedures and mental math strategies fluently; may be inefficient 	<ul style="list-style-type: none"> 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]	<ul style="list-style-type: none"> Does not explain procedures and results clearly Omits required graphics or representations and/or does not construct them appropriately; many omissions; serious flaws 	<ul style="list-style-type: none"> Partially explains procedures; results; parts are confusing, vague, incomplete Constructs most required graphics; representations; parts are seriously flawed/incomplete (e.g., scale inappropriate) 	<ul style="list-style-type: none"> Explains results and procedures clearly using some mathematical language Constructs required graphics and/or representations appropriately; may have minor errors or flaws (e.g., missing labels) 	<ul style="list-style-type: none"> 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.

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Pull it!

Context: This task features ratios and comparison of ratios. Students are asked to assess which of three teams competing in a reality TV show have won a competition. In sorting out which team has won, students must apply proportional reasoning. They are then asked to fairly assign points (from a total of 10 possible points) to the groups and to justify their thinking.

Grade: 6

PLO's: A5 - demonstrate an understanding of ratio, concretely, pictorially, and symbolically [C, CN, PS, R, V]

A6 - demonstrate an understanding of percent (limited to whole numbers) concretely, pictorially, and symbolically [C, CN, PS, R, V]

Process:

Before Pose the following problem at the end of a unit involving ratios.

To situate the learning, consider a brief conversation about team challenges that they may have experienced (at camp, in scouts or guides, on school or sporting teams) or perhaps may have seen on TV.

During Encourage students to include all their thinking and all their calculations. It is important that students record their strategies for solving the problems and comparing the results of each team to determine the winner. Their rationale for assigning points fairly will likewise be important.

After Have students ensure their work is complete, including numbers, words, pictures and any diagrams or tables that may help to illustrate how they solved the problem(s).

Pull it!

There are three teams competing in a challenge on the reality TV show called “Save Me!”. There are 10 points up for grabs for this contest, some for each team.

Teams were told to drag a 500 kg weight as far as they could in 3 minutes.

Their results are included below:

Team name	Number of people	Distance pulled
Team Alpha	3 team members	4.5 m
Team Beta	4 team members	5.0 m
Team Charlie	5 team members	6.0 m

Part 1

Which team do you think should win this contest? How do you know? What math did you use to make your decision? Show all your work.

Part 2

Award the ten points to the teams in a way that is fair. How did you make your decision? What math did you use?

Make sure you answer both parts 1 and 2!

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NOT YET WITHIN EXPECTATIONS

Teacher's Observations

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

- Does not meet basic requirements of the task
- Does not recognize or apply concepts needed
- Shows little understanding of relevant concepts; Explanations are not illogical
- Does not use appropriate strategies
- In one instance, division of decimals is accurate

Pull it!

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Team Charlie	5 team members	6.0 m

At the end of the competition, Team Charlie says they deserve the most points. Team Alpha disagrees.

Which team do you think should win this contest? How do you know? What math did you use to make your decision? Show all your work.

Award the ten points to the teams in a way that is fair. How did you make your decision? What math did you use?

I think team Alpha should win because they have the leastest players and another reason can be that the distance in average can be lower than 4.5m so Team Alpha should win the contest.

$$\begin{array}{r}
 5.166 \\
 3 \overline{)15.5} \\
 \underline{15} \\
 5 \\
 \underline{3} \\
 20 \\
 \underline{18} \\
 20 \\
 \underline{18} \\
 2
 \end{array}$$

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MEETS EXPECTATIONS (MINIMAL LEVEL)

Teacher's Observations

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

- Satisfies requirement for parts of the task, but incomplete
- Applies concepts needed for most parts of the task
- Uses appropriate strategies for part of the task
- Follows some procedures accurately (division)
- Incomplete: does not complete the second part of the task, deciding how many points each group receive – simply notes that 10 cannot divide by 3

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team alpha - each team member pulls 1.5m

$$\begin{array}{r} 1.5 \\ + 1.5 \\ + 1.5 \\ \hline 4.5 \end{array}$$

3:45

Team Beta - each team member pulls 1.25

$$\begin{array}{r} 1.25 \\ + 1.25 \\ + 1.25 \\ + 1.25 \\ \hline 5.00 \end{array}$$

4:5 $\frac{1.25}{5}$

team charlie - each team member pulls 1.2

$$\begin{array}{r} 1.2 \\ + 1.2 \\ + 1.2 \\ + 1.2 \\ + 1.2 \\ \hline 6.0 \end{array}$$

5:6 $\frac{1.2}{6}$

prints = 10 teams = 3
3 = 10

10 can not divide
by 3.

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FULLY MEETS EXPECTATIONS

Teacher's Observations

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

- Satisfies basic requirement for all parts of the task
- Reaches and explains reasonable solution; explanation is logical and complete
- Uses appropriate strategies
- Follows procedures accurately (division)

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$$\begin{array}{r}
 1.2 \\
 5 \overline{) 6.0} \\
 \underline{-0} \\
 1.0
 \end{array}$$

each member pulls 1.2 m. Charlie pulled with 4 member 6.0 pulled with 3 member 2.4

$$\begin{array}{r}
 6.0 \\
 \underline{1.2} \\
 4.8 \text{ m.}
 \end{array}
 \qquad
 \begin{array}{r}
 6.0 \\
 \underline{2.4} \\
 3.6 \text{ m.}
 \end{array}$$

Team Alpha should win the contest.
 I know because if Team Alpha had 5 members they would have pulled 1.5 m further than Team Charlie and Team Beta would have come second because they would have pulled 0.25 m further than Team Charlie.

- Team Alpha - 5 points
- Team Beta - 3 points
- Team Charlie - 2 points

Steps:

To decide I made sure Team Alpha had the most points and then I divide/shared the rest with Team Beta and Team Charlie.

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EXCEEDS EXPECTATIONS

Teacher's Observations

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

- Thoroughly satisfies all parts of the task
- Solution is well-developed and justified
- Shows thorough understanding; explanations are insightful
- Uses appropriate strategies; adds some complexity to the task
- Uses procedures efficiently
- Explains procedures and results precisely; uses mathematical language

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1. Team A = Each individual hypothetically pulls = 1.5 km

$$\begin{array}{r} 1.5 \\ 3 \overline{) 4.5} \\ \underline{3} \\ 15 \\ \underline{15} \\ 0 \end{array}$$

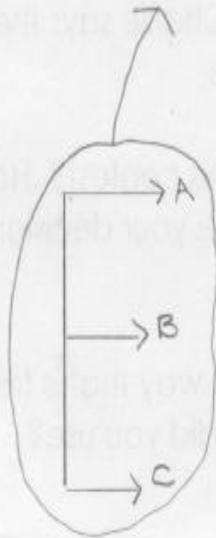
2. B = $\frac{1.25}{4} = \text{pulls } 1.25 \text{ km}$

$$\begin{array}{r} 1.25 \\ 4 \overline{) 5.00} \\ \underline{4} \\ 10 \\ \underline{8} \\ 20 \\ \underline{20} \\ 0 \end{array}$$

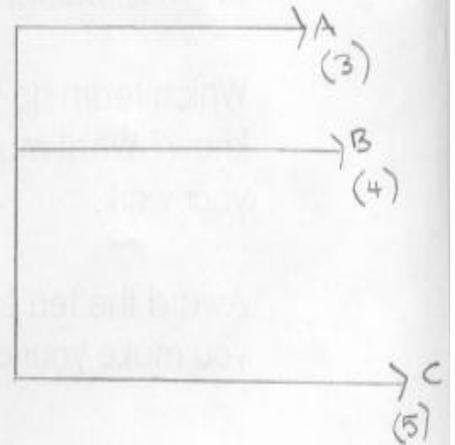
3. C = $\frac{1.20}{5} = \text{pulls } 1.2 \text{ km}$

$$\begin{array}{r} 1.20 \\ 5 \overline{) 6.00} \\ \underline{5} \\ 10 \\ \underline{10} \\ 0 \end{array}$$

4. Statistics: (1 man)



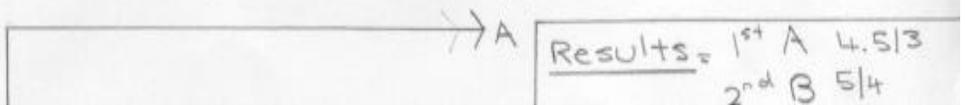
Statistics: (All)



5. Make all teams have 5 people.

$$\begin{array}{c} A \\ 1.5 \\ \times \frac{5}{5} \\ \hline 7.5 \end{array} \rightarrow \begin{array}{c} B \\ 1.25 \\ \times \frac{5}{5} \\ \hline 6.25 \end{array} \rightarrow \begin{array}{c} C \\ 1.2 \\ \times \frac{5}{5} \\ \hline 6 \end{array}$$

Statistics = (5 men)



Points thinking

To divide points= A= 1.5 km $\begin{array}{r} 1.5 \\ +1.25 \\ \hline 3.95 \end{array}$ $\frac{1.5}{3.95} \approx 0.5 = 5 \text{ pts for A}$

B= 1.25 ↓ $\frac{1.25}{3.95} \approx 0.3 = 3 \text{ pts for B}$

C= 1.2 ↓ $\frac{1.2}{3.95}$

And since $5+3=8\text{pts}$
and there's only
10 pts, C must
get 2 pts.

← Therefore. Go to last page ←

or

→ A= 5 pts ←
B= 3 pts
C= 2 pts