


# The GRADUATION NUMERACY ASSESSMENT

May 2018  
Dan Kamin  
Math Department Head  
Lord Byng Secondary





**EVERYTHING YOU COULD EVER NEED TO  
KNOW IS HERE:**

<https://curriculum.gov.bc.ca/provincial-assessment/graduation/numeracy>



**THIS IS NOT A MATH EXAM.**

**IT IS A NUMERACY ASSESSMENT.**




# NUMERACY


- For the purpose of the Numeracy Assessment, numeracy is defined as the ability, willingness, and perseverance to interpret and apply mathematical understanding to solve problems in contextualized situations, and to analyze and communicate these solutions in ways relevant to the given context.




# NUMERACY

- For the purpose of the Numeracy Assessment **numeracy** is defined as **the ability**, willingness, and perseverance **to interpret and apply mathematical understanding** to **solve problems** in contextualized situations, and **to analyze and communicate** solutions in ways relevant to the given context.

- 
- The Numeracy Assessment is not tied to a specific math course or grade.
  - Previous Grade 10 Mathematics examinations focused only on the content knowledge within the Grade 10 Mathematics curriculum.
  - The Graduation Numeracy Assessment focuses more on students applying mathematical reasoning, understanding, and insight across ALL SUBJECT AREAS. It evaluates a student's numeracy skills developed over the course of their entire education.

- 
- Students will write the assessment during their graduation years (Grades 10–12)
  - These assessment sessions started in January 2018.

- 
- Students will have two opportunities\*\* to rewrite during their graduation years should they wish to increase their proficiency.
  - Results will appear on Student Transcripts and their best outcome will be recorded on their final transcript.
  - The Numeracy Assessment typically requires two hours to complete; however, students may use a third hour if they require the extra time.



- Results will be reported using a four category proficiency scale and will appear on a student's transcript as a number, representing one of the four categories (emerging-developing-proficient-extending).

Proficiency Scale	Emerging	Developing	Proficient	Extending
	The student demonstrates an initial understanding of the concepts and competencies relevant to the expected learning.	The student demonstrates a partial understanding of the concepts and competencies relevant to the expected learning.	The student demonstrates a complete understanding of the concepts and competencies relevant to the expected learning.	The student demonstrates a sophisticated understanding of the concepts and competencies relevant to the expected learning.
<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	



## WHAT MATH IS NEEDED?

OK, I've just pointed out that it is not a Math exam, but Numeracy.

It still has Math on it. But it's simple mathematics and arithmetic.



## WHAT MATH IS NEEDED?

Students will need mathematical concepts learned from kindergarten to Grade 10, with an emphasis on K–9.

Specifically:

- Number Sense
- Patterns
- Geometry and Measurement
- Data and Probability
- Financial Literacy

These are found in K-8 curriculum.



## WHAT MATH IS NEEDED?

The assessment may also include the following concepts from Grade 9 or 10 Subjects (not only Math):

- Linear Relations
  - Extrapolation of Graphs
- Spatial Proportional Reasoning
- Statistics



## WHAT DOES THE ASSESSMENT LOOK LIKE?

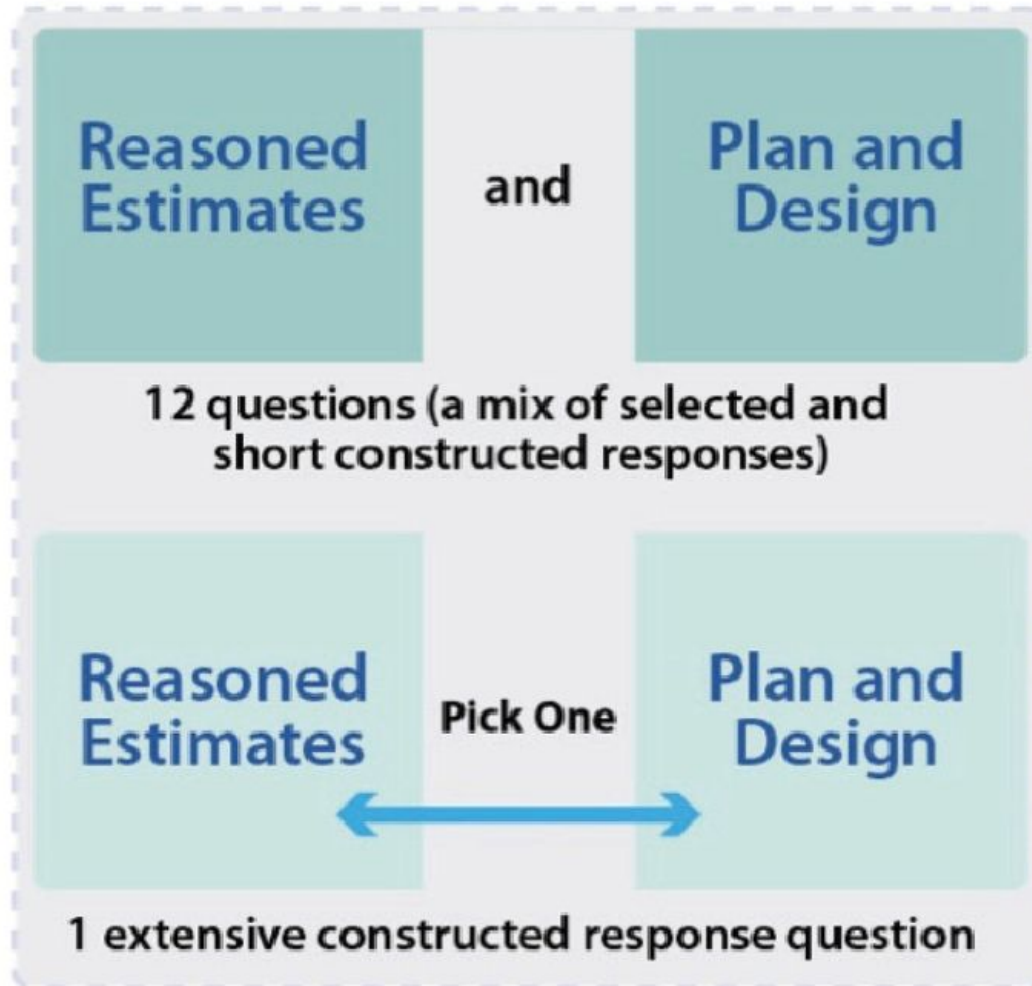
- The assessment has 4 tasks, or scenarios, which each have 6 machine scored questions. That's 24 of these.
- Students do the first two of the 4 tasks. The first two types of tasks will be “Reasoned Estimates and “Plan and Design”
- Then students will choose one of these tasks to do an extended written-response question on one single sided sheet. This is called the “Choice”



**COMMON  
COMPONENT**



**STUDENT-CHOICE  
COMPONENT**



Questions on computer,  
*responses completed  
on computer*



Questions on computer,  
*responses completed on  
paper response sheet*



## **WHAT DOES THE ASSESSMENT LOOK LIKE?**

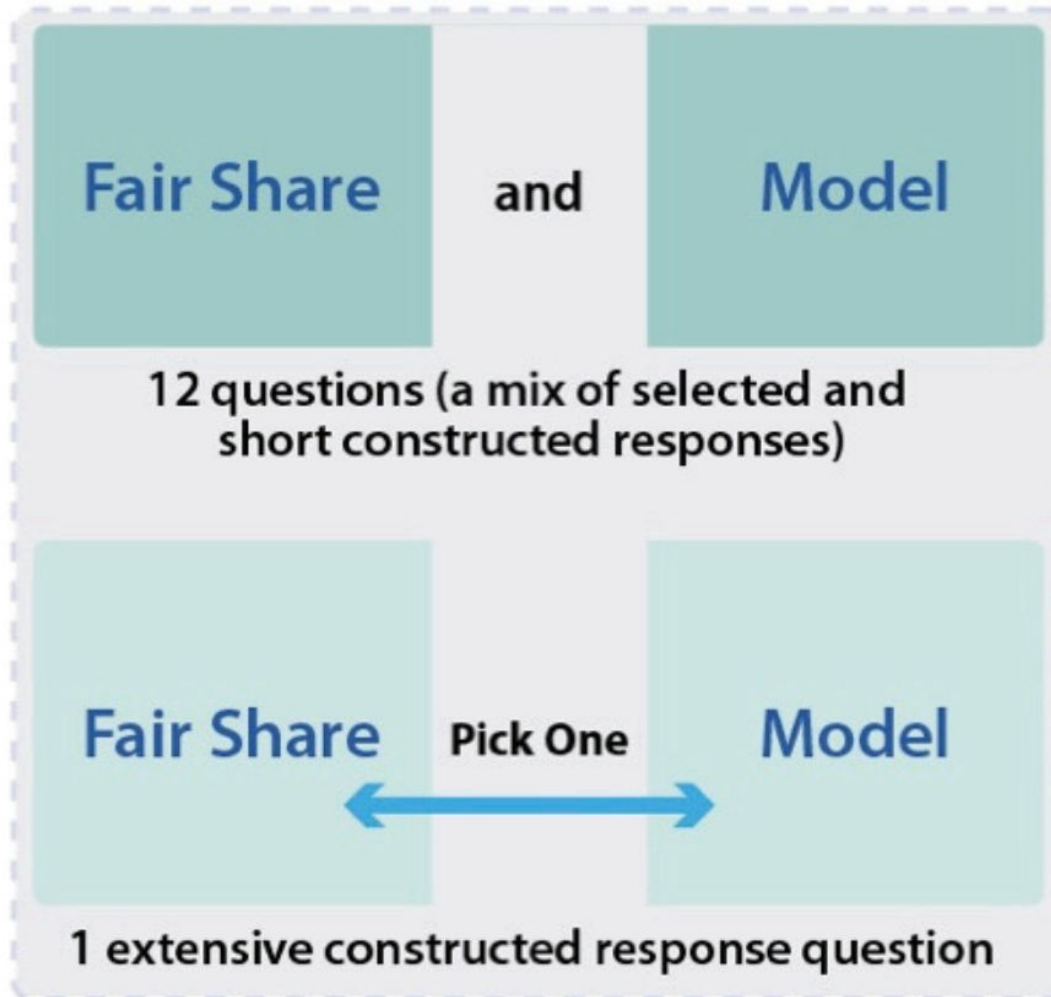
- Then students will continue on to the next pair of tasks. These will be “Fair Share” and “Model” tasks. After these 12 questions, students will choose again, picking one of these tasks to do their second extended written-response question.



**COMMON COMPONENT**



**STUDENT-CHOICE COMPONENT**



Questions on computer  
*responses completed on computer*



Questions on computer  
*responses completed on paper response sheet*





## WHAT DOES THE ASSESSMENT LOOK LIKE?

- The 24 questions that all students do are called the “COMMON” part of the assessment. This will count for 60% of the assessment score.
- The 2 written “CHOICE” parts will count for 40% of the assessment score.



# COMMON COMPONENT

Students will encounter questions incorporating these numeracy processes, and always in this order:

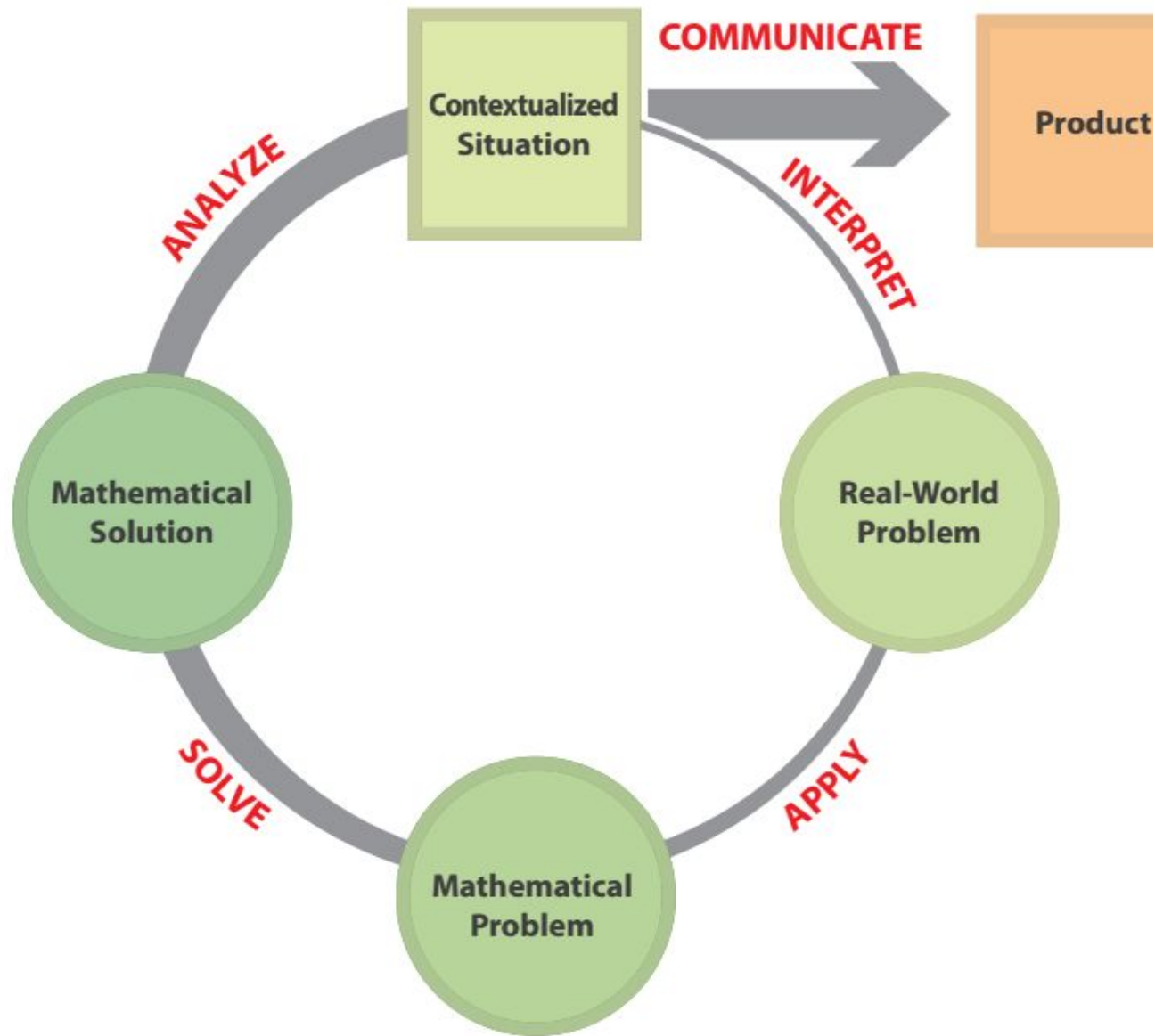
Interpret

Apply

Solve

Analyze

# MATHEMATICAL MODELING CYCLE





## ANALYZE

- Students are able to interpret mathematical solutions in context, such that the solutions make sense within the contextualized situations.
- Students may need to assess the practicality and possible limitations of solutions, identify possible improvements to an approach, or identify alternate situations to which solutions can be applied.
- In doing this, students consider how contextual factors may impact the results. For example, students may reflect on their solutions to assess risks and address social, ethical, and environmental implications.



## COMMUNICATE (CHOICE SECTION ONLY)

- Students will need to clearly and precisely construct valid logical arguments to defend their decisions and assumptions, explain the tools and approaches they used, and present their solutions in context.
- This may require students to make recommendations and use a variety of ways (e.g., tables, graphs, diagrams, equations, symbols) to visibly represent their thinking and solution.



## COMMON SECTION: Types of Questions

The 24 questions in the Common Section are machine scored, but are not only multiple choice. There are two types of questions:

- *Selected Response*, which provide answer choices; or
- *Constructed Response*, which require students to develop answers.

# SELECTED RESPONSE

<b>Types of Questions</b>	<b>Description</b>
Multiple choice	Select, from several choices, a single correct response.
Multiple correct responses multiple choice (check boxes)	Select, from several choices, multiple correct responses.
Matching/sorting	Drag and drop one or several elements to the desired positions.
Highlight	Select a desired response.
Hot spot	Select a desired spot in a figure.


# CONSTRUCTED RESPONSE

<b>Types of Questions</b>	<b>Description</b>
Short	Manipulate or complete a graph (e.g., plot points, draw lines, or move points on a sliding scale), enter a numeric response, or write an equation.
Extensive	Create diagrams, graphs, equations, or expressions and compose sentences to explain response.



22. At time zero, the highlighted cell is burning.

Create an equation to calculate the probability that a fire will spread to cell A after 4 hours.

1	1	2	2	1
1	1	1	2	1
1	0	0		1
1	1	1	0	1
1	2	1	1	1

**A**

Drag and drop the operations and probabilities into the boxes below.



Probability =



# TYPES OF TASKS

- Reasoned Estimates
- Plan and Design
- Fair Share
- Model



## REASONED ESTIMATES

- These tasks require students to make or use estimates across multiple variables in order to build a logical argument for a possible solution (e.g., travelling to Australia).



## PLAN AND DESIGN

- These tasks may require students to analyze time, space, cost, and people in order to make a recommendation (e.g., shipping several containers).



## FAIR SHARE

- These tasks require students to decide how to best share something fairly (e.g., giving out bonuses).



# MODEL

- These tasks require students to come up with a model or strategy, given a data set; and then to apply this model or strategy to a new data set and, if necessary, to refine the model (e.g., ranking criteria).



# CONTEXTS

The numeracy tasks on the Graduation Numeracy Assessment will focus on these 4 areas:

- **PERSONAL**
- **CAREER,**
- **SOCIETAL,**
- **SCIENTIFIC**



## **PERSONAL**

These tasks focus on one's self, family, or peer group. For example, tasks may be situated in personal health, finance, scheduling, travel, sports, etc.

## **CAREER**

These tasks focus on employment. Problems may involve measuring, costing and ordering of materials, accounting, scheduling, etc.





## **SOCIETAL**

These tasks focus on one's community. Problems may involve elections, media, government, public policies, demographics, statistics, economics, etc.

## **SCIENTIFIC**

These tasks focus on the environment, science, and technology. Problems may focus on the environment, ecology, agriculture, medicine, weather, health, etc.

# Student-Choice Component



Questions on computer,  
*responses completed on paper response sheet*

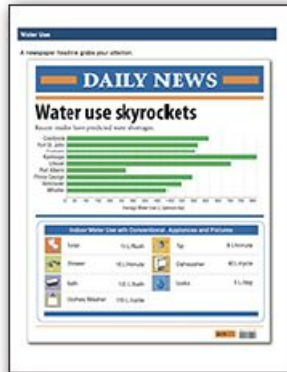
Choose the numeracy task for which you would like to complete an extensive constructed response question. These questions are a logical progression from where the tasks are headed.

Think carefully; once you make your choice you must complete this question.

Topic

1

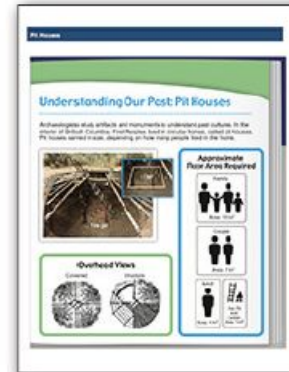
### Water Use

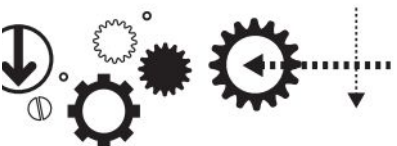


Topic

2

### Pit Houses





# Numeracy Assessment Rubric

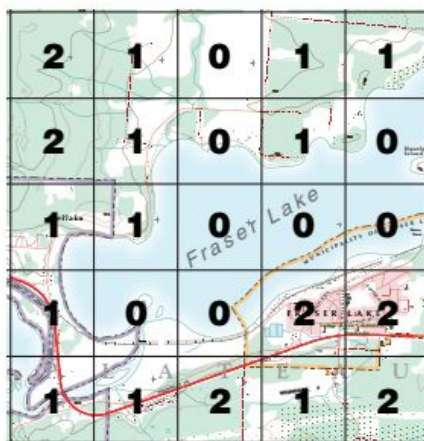
1	2	3	4
<p><i>The student demonstrates an inadequate understanding of the situation. The strategy is ineffective. The solution may contain fundamental mathematical errors. The reasoning is missing or irrelevant; the logic does not reference the problem.</i></p>	<p><i>The student demonstrates a basic understanding of the situation. The strategy is unclear and/or incomplete. The solution may contain mathematical errors. The reasoning is unclear; but the logic correctly references some aspects of the problem.</i></p>	<p><i>The student demonstrates an adequate understanding of the situation. The strategy is sensible but has some inconsistencies. The solution may contain minor mathematical errors. The reasoning is evident, and the logic references most aspects of the problem.</i></p>	<p><i>The student demonstrates a proficient understanding of the situation. The strategy is effective and comprehensive. The solution may contain minor mathematical errors that do not affect the demonstration of proficiency. The reasoning is clear and the logic references all aspects of the problem.</i></p>
<p><b>NR</b> No response (answer page is blank).</p>	<p><b>0</b> Information simply recopied from the problem.          Diagrams or calculations are unrelated to the problem.          Response does not address the purpose of the task.          An incorrect mathematical solution with no work shown.          Inappropriate response (contains profanity, inappropriate diagram or language).          All work is erased or crossed out.          Any zero score must include rationale and be approved by the section head.</p>		



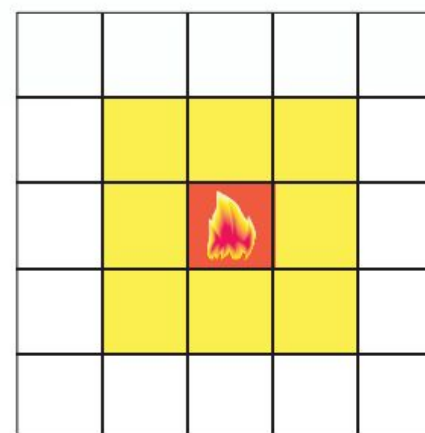
# NORTH REGION Fire Fighting Training Manual

## Forest Fires: How They Spread

The map below is a fire grid. It describes the likelihood of a fire spreading to different cells.



Fire may spread from one cell into neighbouring cells as shown:



 Burning cell     Neighbouring cell

Each cell has the following fire-spread rating reflecting the probability that fire will spread to that cell from a neighbouring cell:

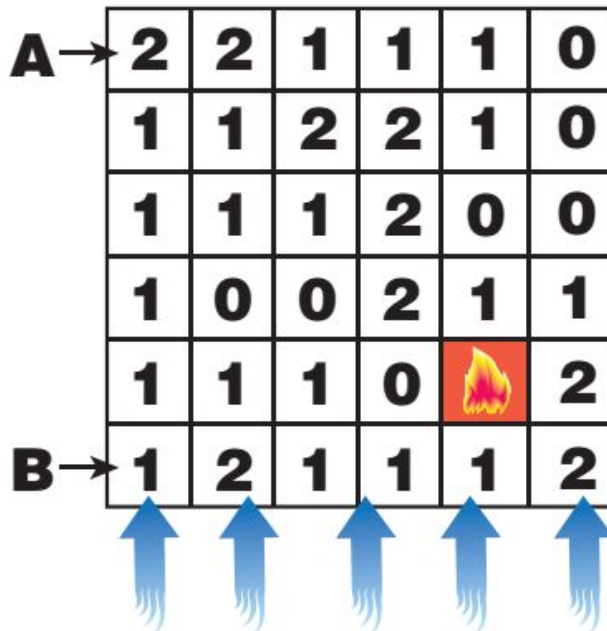
Fire-Spread Rating	Probability of Spreading
<b>0</b>	Fire has a 0% chance of spreading into it from neighbouring cells
<b>1</b>	Fire has a 50% chance, or probability of 0.5, of spreading into it from neighbouring cells
<b>2</b>	Fire has an 80% chance, or probability of 0.8, of spreading into it from neighbouring cells

26. At time zero, the highlighted cell is burning and there is a strong, constant wind blowing from the south. There are people living in the areas within cell A and cell B.

What is the minimum time it would take the fire to reach cells A and B?

What is the likelihood of the fire spreading to cells A and B within that time?

Explain and justify your solution.

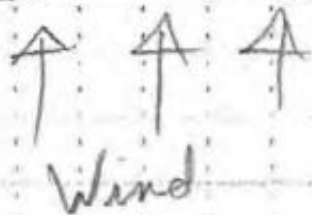


This question is to be answered on paper.

A	2	2	1	1	1	0
	1	1	2	2	1	0
0 hour	1	1	1	2	0	0
	1	0	0	2	1	1
	1	1	1	0		0
B	1	2	1	1	1	2

2 hours

A						
B						



6 hours

A						
B						

4 hours

A						
B						

8 hours

A						
B						

Answer:

Cell B would probably be fine, but cell A would have less than 8 hours.



# PRE-EXAM ACTIVITIES

There are pre-assessment activities for students to explore ahead of time, such as the **sample assessment**, and the short **videos** explaining the five numeracy processes.

VERY MUCH RECOMMENDED!





## PRE EXAM ACTIVITIES

Some math teachers have taken it upon themselves to educate their students about the Numeracy Assessment.

It is NOT the classroom math teacher's responsibility to do this.

It is NOT part of any specific math course.

It is, YES, a school wide responsibility from elementary grades onward to instill practice and skills necessary for students to be numerate.



[dkamin@vsb.bc.ca](mailto:dkamin@vsb.bc.ca)