

1. "Mathematics is a common human activity, increasing in importance in a rapidly advancing, technological society. A greater proficiency in using mathematics increases the opportunities available to individuals. Students need to become mathematically literate in order to explore problem-solving situations, accommodate changing conditions, and actively create new knowledge in striving for self-fulfillment." (Alberta Learning, 1996, p.2)
2. "Mathematics is more than numbers just as reading is more than letters. Literacy involves placing numbers into meaningful context in daily living." (Balas, 1997)
3. "Like literacy, numeracy is not a case of one's either being proficient or not, rather individuals' skills are "situated along a continuum of different purposes and levels of accomplishment with numbers. Numeracy includes a range of skills that are necessary for initial survival in a new country and for functioning as a fully literate person." (Ciancone, 1996)
4. "the ability to think and express oneself effectively in quantitative terms" (The American Heritage Dictionary of the English Language).
5. The Merriam-Webster's Online Dictionary defines numeracy as "the capacity for quantitative thought and expression."
6. "Numeracy not only incorporates the individual's abilities to use and apply mathematical skills efficiently and critically, but also requires the person to be able to interpret and communicate about mathematical information and reasoning processes."(Ontario Literacy Coalition, 2001)
7. "... numeracy is more about the ability to use and apply rather than just knowing." (Hughes, Desforges, Mitchell, & Carre, 2000)

8. "Numeracy is the ability to process, interpret and communicate numerical, quantitative, spatial, statistical, even mathematical, information, in ways that are appropriate for a variety of contexts, and that will enable a typical member of the culture or subculture to participate effectively in activities that they value." (Evans, 2000)

9. "... something about number and computation." (report on research by the Mathematics Council of the Alberta Teachers' Association (2004))

10. "... numeracy tends to be more commonly used in the United Kingdom and Europe while the term mathematical literacy is more commonly used in North America." (Hoogland (2003), citing Jablonka, 2009)

11. "Unlike most other jurisdictions in Canada, British Columbia has used the term numeracy rather than mathematical literacy." (Holdfast Report, 2004)

12. "describe students' capacity to use their mathematical knowledge for informed citizenship." In this way mathematical literacy is "an individual's capacity to use mathematics as a fully functioning member of a society." (Ball & Stacey, 2003)

13. "The mathematics necessary to be an informed voter." (anonymous)

14. "Mathematical literacy is an individual's capacity to identify and understand the role that mathematics plays in the world, to make well-founded mathematical judgments and to engage in mathematics, in ways that meet the needs of that individual's current and future life as a constructive, concerned and reflective citizen." (Organization for Economic Co-Operation and Development, 2003b)

15. "... students' capacities to analyse, reason, and communicate ideas effectively by posing, formulating and solving mathematical problems in a variety of domains and situations." (Organization for Economic Co-Operation and Development, 2003a)

16. "Mathematical Literacy, should enable the learner to become a self-managing person, a contributing worker and a participating citizen in a developing democracy. Mathematical Literacy will ensure a broadening of the education of the learner which is suited to the modern world." (Department of Education (South Africa), 2003)

17. "An aggregate of skills, knowledge, beliefs, dispositions, habits of mind, communication abilities, and problem solving skills that people need in order to engage effectively in quantitative situations arising in life and work. " (from the International Life Skills Survey, Center for Educational Statistics of Statistics Canada, 2001)

18. "Mathematical Literacy is an individual's capacity to identify and understand the role that mathematics plays in the world, to use, apply, analyse, process, interpret and communicate mathematical information, and solve problems involving that information in ways that meet the needs of the individual as a constructive, concerned, reflective and involved citizen." (Holdfast Report, 2004)

19. "Logical thinking, analysis of evidence, and statistical reasoning are far more important for engaged citizenship in the twenty-first century, than traditional algebraic and mathematical skills. The new literacy, from this perspective, is really about reasoning more than arithmetic: assessing claims, detecting fallacies, evaluating risks, weighing evidence." Steen (2000)

20. "... mathematical knowledge put to functional use in a multitude of different contexts and a variety of ways that call for reflection and insight. Of course, for such use to be possible and viable, a great deal of fundamental mathematical knowledge and skills (as often taught in schools) are needed. In the linguistic sense, reading literacy cannot be reduced to, but certainly presupposes, a wide vocabulary and a substantial knowledge of grammatical rules, phonetics, orthography, and so forth. In the same way, mathematical literacy cannot be reduced to, but presupposes, knowledge of mathematical terminology, facts, and procedures, as well as skills in performing certain operations, and carrying out certain methods."
(Organization for Economic Co-Operation and Development, 2003b)

21. "We believe that application is at the heart of numeracy. At all levels of learning mathematics pupils need to use and build on what they already know in order to progress further." (Hughes, Desforges, Mitchell, & Carre, 2000)

22. "... to develop in young people the ability to acquire specialized knowledge and skills as and when they need them during the course of their working lives." (Devlin, 2000)

23. "It is important to note that math is not simply about numbers and numerical operations. Mathematics knowledge and skills also include the ability to draw inferences, see relationships and reason logically." (National Research Council 1989)

24. "The outcome of this focus should be numerate pupils who are confident enough to tackle mathematical problems without going immediately to teachers or friends for help"
(Department for Education and Employment – United Kingdom, 1999).

25. "Better numeracy standards occur when teachers:

- Structure their mathematics lessons and maintain a good pace;
- Provide daily oral and mental work to develop and secure pupils' calculation strategies and rapid recall skills;
- Devote a high proportion of lesson time to direct teaching of whole classes and groups, making judicious use of textbooks, worksheets and ICT resources to support teaching, not to replace it;
- Demonstrate, explain and illustrate mathematical ideas, making links between different topics in mathematics and between mathematics and other subjects;
- Use and give pupils access to number lines and other resources, including ICT, to model mathematical ideas and methods;
- Use and expect pupils to use correct mathematical vocabulary and notation;
- Question pupils effectively, including as many of them as possible, giving them time to think before answering, targeting individuals to take account of their attainment and needs, asking them to demonstrate and explain their methods and reasoning, and exploring reasons for any wrong answers;
- Involve pupils and maintain their interest through appropriately demanding work, including some non-routine problems that require them to think for themselves; and,
- Ensure that differentiation is manageable and centred around work common to all the pupils in a class, with targeted, positive support to help those who have difficulties with mathematics to keep up with their peers." (Department for Education and Employment – United Kingdom, 1999).

26. "In keeping with a wide range of jurisdictions across North America and around the world it would appear best to use the term mathematical literacy rather than numeracy, especially in light of the Alberta survey results, which found that most people defined numeracy as *something about number and computation*." (Holdfast Report, 2004)

27. "Steen (2000) identifies a range of goals for numeracy within five different dimensions.

These dimensions are:

- Practical - for immediate use in the routine tasks of life;
- Civic - to understand major public policy issues;
- Professional - to provide skills necessary for employment;
- Recreational - to appreciate games, sports, lotteries;
- Cultural - as part of the tapestry of civilization.

Any definition of mathematical literacy probably needs to consider the above dimensions along with the following:

- The ability to think and express oneself effectively in quantitative terms;
- The capacity for quantitative thought and expression;
- The ability to use and apply mathematical skills efficiently and critically;
- The capacity to use their mathematical knowledge for informed citizenship and as a constructive, concerned and reflective member of society;
- The capacity to identify and understand the role that mathematics plays in the world;
- The ability to make well-founded mathematical judgements;
- The ability to engage in mathematics, in ways that meet the needs of that individual's current and future life; • The ability to analyse, reason, and communicate ideas effectively by posing, formulating and solving mathematical problems related to a variety of situations;
- The capacity to be able to interpret and communicate about mathematical information and reasoning processes;
- The aggregate of mathematical skills, knowledge, dispositions, habits of mind, and problem solving skills in combination with the communication abilities that people need in order to engage effectively in quantitative situations; and
- The recognition of the technological nature of our world." (Holdfast Report, 2004)

28. "Mathematical Literacy contributes to the attainment of the Critical and Developmental Outcomes in that it enables learners to:

- Use mathematical process skills to identify, pose and solve problems creatively and critically;
- Work collaboratively in teams and groups to enhance mathematical understanding;
- Organise, interpret and manage authentic activities in substantial mathematical ways that demonstrate responsibility and sensitivity to personal and broader societal concerns;
- Collect, analyse and organize quantitative data to evaluate and critique conclusions;
- Communicate appropriately by using descriptions in words, graphs, symbols, tables and diagrams;
- Use mathematical literacy in a critical and effective manner to ensure that science and technology are applied responsibly to the environment and to the health of others;
- Demonstrate that a knowledge of mathematics assists in understanding the interrelatedness of systems and how they affect each other;
- Be prepared to use a variety of individual and co-operative strategies in learning;
- Engage responsibly with quantitative arguments relating to local, national and global issues;
- Be sensitive to the aesthetic value of mathematics;
- Explore the importance of mathematical literacy for career opportunities;
- Realise that mathematical literacy contributes to entrepreneurial success.

Learners working toward Mathematical Literacy should be able to:

- Use numbers with understanding to solve real-life problems in different contexts including the social, personal and financial;
- Use mathematically-acquired skills to perform with understanding financially-related calculations involving personal, provincial and national budgets;
- Model relevant situations using suitable functions and graphical representation to solve related problems;
- Describe, represent and analyse shape and space in two dimensions and three dimensions using geometrical skills;
- Engage critically with the handling of data (statistics and chance), especially in the manner in which these are encountered in the media and in presenting arguments;
- Use computational tools competently (a scientific calculator is taken as the minimum)." (Holdfast Report, 2004)

29. "... empowers people by giving them tools to think for themselves, to ask intelligent questions of experts, and to confront authority confidently. These are the skills required to thrive in the modern world." (The Quantitative Literacy Design Team, 2001)

30. "... quantitative literacy involves mathematics acting in the world. Typical numeracy challenges involve real data and uncertain procedures but require primarily elementary mathematics. The test of numeracy, as of any literacy, is whether a person naturally uses appropriate skills in many different contexts." (The Quantitative Literacy Design Team, 2001)

31. "... numeracy is not just one among many subjects but an integral part of all subjects." ((The Quantitative Literacy Design Team, 2001)

32. "Numerate: imply *at homeness*, which is the ability to make use of mathematical skills which enables an individual to cope with the practical demands of everyday life." (The Quantitative Literacy Design Team, 2001)

33. "... an ability to have some appreciation and understanding of information which is presented in mathematical terms." (The Quantitative Literacy Design Team, 2001)

34. "Quantitative literacy is the knowledge and skills required to apply arithmetic operations, either alone or sequentially, using numbers embedded in printed material (e.g. balancing a checkbook, completing an order form)." (The Quantitative Literacy Design Team, 2001)

35. "Quantitative literacy: an aggregate of skills, knowledge , beliefs, dispositions, habits of mind, communication capabilities, and problem solving skills that people need in order to engage effectively in quantitative situations arising in life and work." (The Quantitative Literacy Design Team, 2001)

36. "The elements of quantitative literacy:

- Confidence with mathematics – be comfortable with quantitative ideas and at ease in applying quantitative methods ... the opposite of "math anxiety"; it makes numeracy as natural as ordinary language.
- Cultural appreciation – understand the nature and history of mathematics, its role in scientific inquiry and technological progress, and its importance for comprehending issues in the public realm.
- Interpreting data – to be able to [reason] with data, [read] graphs, [draw] inferences, and [recognize] sources of error. This perspective focuses on the data rather than the formulas or relationships.
- Logical thinking – to be able to [analyze] evidence, [reason] carefully, [understand] arguments, [question] assumptions, [detect] fallacies, and [evaluate] risks. These individuals "accept little at face value; they constantly look beneath the surface, demanding appropriate information to get at the essence of issues.
- Making decisions – to be able to [use] mathematics to make decisions and solve problems in everyday life. Mathematics is not something done only in mathematics class but a powerful tool for living, as useful and ingrained as reading and speaking.
- Mathematics in context – to be able to [use] mathematical tools in specific settings where the context provides meaning.
- Number sense – [to have] accurate intuition about the meaning of numbers, confidence in estimation, and common sense in employing numbers as a measure of things.
- Practical skills – [to know] how to solve quantitative problems that a person is likely to encounter at home or at work. [These individuals] are adept at using elementary mathematics in a wide variety of common situations.
- Prerequisite knowledge – [to have] the ability to use a wide range of algebraic, geometric, and statistical tools that are required in many fields of postsecondary education.
- Symbol sense – [to be] comfortable using algebraic symbols and at ease in reading and interpreting them, and exhibiting good sense about the syntax and grammar of mathematical symbols." (The Quantitative Literacy Design Team, 2001)

37. "Mathematics literacy: an individual's capacity to identify and understand the role that mathematics plays in the world, to make well-founded mathematical judgements and to engage in mathematics in ways that meet the needs of that individual's current and future life as a constructive, concerned and reflective citizen." (The Quantitative Literacy Design Team, 2001)

38. "Mathematics in action." (The Quantitative Literacy Design Team, 2001)

39. "To possess skills such as arithmetic skills (simple mental arithmetics, estimating arithmetic calculations, etc.), interpreting data and draw inferences from data, computer skills (using spreadsheets, recording data, extrapolating data, etc.), modeling skills (to formulate problems, seek patterns, draw conclusions, etc.), statistics skills (understand variability, correlation, causation, etc.), understand probability (understand "coincidences", evaluate risks, etc.), and reasoning skills (make inferences, check hypotheses, make generalizations, etc.)." (The Quantitative Literacy Design Team, 2001)

40. "Numeracy has no special content of its own, but inherits its content from its context." (The Quantitative Literacy Design Team, 2001)

41. "In teaching quantitative literacy, content is inseparable from pedagogy and context is inseparable from content." (The Quantitative Literacy Design Team, 2001)

42. "... quantitative literacy is not only about arithmetic and higher mathematics but also about a general skill (or habit of mind) that is required in many subjects across the curriculum." (Cohen, 2001)

43. "The concept of quantitative literacy is rooted in the connection between mathematics and reason. ... quantitative literacy is tied to two rather different concepts – numeracy and reason." (Richards, 2001)

44. "Literacy implies an integrated ability to function seamlessly within a given community of practice. ... it is profoundly social, and is therefore a moving target because its contents depend on a particular social context" (Ewell, 2001)

45. "... literacies are for the most part practiced invisibly and subconsciously by members of a community, not pulled out selectively and applied deliberately to a particular set of circumstances. In practicing quantitative literacy, therefore, we would expect that an individual would not consciously say "Oh, this is mathematics" and enter a different ("learned") way of thinking and acting. Instead, he or she would simply act competently without invoking a disciplinary context at all." (Ewell, 2001)

46. "Quantitative literacy is presumably practiced together with other literacies in most actual circumstances, whereas mathematics as a discipline can be practiced on its own." (Ewell, 2001)

47. " as a literacy, quantitative literacy is not practiced in isolation nor can it be separated from a particular social context." (Ewell, p.48)

48. "... the predilection and ability to make use of various modes of mathematics thought and knowledge to make sense of situations we encounter as we make our way through the world." (Schoenfeld, 2001)

49. "... the ability to understand and reason with numerical information. That ability enables people to be comfortable with numerical data and to use them in meaningful ways, in particular to make well-reasoned decision." (Manaster, 2001)

50. "... [with quantitative literacy], numbers are descriptors of characteristics of the objects being studied, in mathematics numbers themselves are the objects of study" (Manaster, 2001)

51. "Students should see their mathematical skills as tools that are important to use on a daily basis. They should be as comfortable with the language of mathematics as with the language of English. The threads of mathematics should be present and exploited in every course in the high school curriculum. Logical thinking is as important in history and social science as it is in mathematics and science." (Stith, 2001)

52. "When students can see the connection between school mathematics and the mathematics of real life." (Stith, 2001)

53. "Without quantitative literacy, people cannot fully understand what is in the everyday news, what is in everyday life." (Usiskin, 2001)

54. "... more mathematics and science with not automatically lead to numeracy. Quantitative illiteracy cannot be overcome by introducing more subject matter." (Cuban, 2001)

55. "... mathematics focuses on climbing the ladder of abstraction, while quantitative literacy clings to context. Mathematics asks students to rise above context, while quantitative literacy asks students to stay in context. Mathematics is about general principles that can be applied in a range of contexts; quantitative literacy is about seeing every context through a quantitative lense." (Hughes-Hallett, 2001)

56. "the ability to identify quantitative relationships in a range of contexts" (Hughes-Hallett, 2001)

57. "involves insight as well as algorithms [...] involves reflection, judgment, and above all, experience." (Hughes-Hallett, 2001)

58. "... efforts to intensify attention to the traditional mathematics curriculum do not necessarily lead to increased competency with quantitative data and numbers. While perhaps surprising to many in the public, this conclusion follows from a simple recognition—that is, unlike mathematics, numeracy does not so much lead upwards in an ascending pursuit of abstraction as it moves outward toward an ever richer engagement with life's diverse contexts and situations." (Orrill, 2001)
59. "Numeracy can be defined as the combination of mathematical knowledge, problem solving and communication skills required by all persons to function successfully within our technological world." (BCAMT)
60. "Numeracy is the willingness and ability to apply and communicate mathematical understanding and procedures in novel and meaningful problem solving situations." (BC SD43)
61. "Numeracy is not only an awareness that mathematical knowledge and understandings can be used to interpret, communicate, analyze, and solve a variety of novel problem solving situations, but also a willingness and ability to do so." (BC SD 57)
62. "Numeracy refers to the application of mathematical understanding in daily activities at school, at home, at work, and in the community. It involves both using mathematical skills and knowing how mathematics can be used to solve problems. Just as there is more to literacy than teaching the rules and procedures of language, there is more to numeracy than teaching the rules and procedures of mathematics. Numerate individuals not only "know" mathematics, but understand it in personally meaningful terms. They feel competent and confident about their ability to draw on the necessary knowledge and apply it in new and relevant ways." (BC Performance Standards, 2002)

63. "Numeracy is a proficiency which is developed mainly in mathematics but also in other subjects. It is more than an ability to do basic arithmetic. It involves developing confidence and competence with numbers and measures. It requires understanding of the number system, a repertoire of mathematical techniques, and an inclination and ability to solve quantitative or spatial problems in a range of contexts. Numeracy also demands understanding of the ways in which data are gathered by counting and measuring, and presented in graphs, diagrams, charts and tables." (UK Standards)
64. "Being numerate is about having the disposition and competence to use mathematics to solve practical problems outside mathematics and as a tool for learning beyond the mathematics classroom." (Australian Curriculum Framework)
65. "Numeracy is the knowledge and skills required to effectively manage and respond to the mathematical demands of diverse situations." (International Adult Literacy and Skills Survey)
66. "Numeracy is the mathematics for effective functioning in one's group and community, and the capacity to use these skills to further one's own development and of one's community." (Beazley, 1984).
67. "Numeracy involves abilities that include interpreting, applying and communicating mathematical information in commonly encountered situations to enable full, critical and effective participation in a wide range of life roles." (Queensland Department of Education, 1994)

68. "To be numerate is more than being able to manipulate numbers, or even being able to 'succeed' in school or university mathematics. Numeracy is a critical awareness which builds bridges between mathematics and the real-world, with all its diversity." (Johnston, 1994).

69. "Numerate behaviour is observed when people manage a situation or solve a problem in a real context; it involves responding to information about mathematical ideas that may be represented in a range of ways; it requires the activation of a range of enabling knowledge, factors and processes." (ALL Numeracy Team, 2002)

70. "Numeracy is fluency with math facts." (BC SDxx)

71. "What is numeracy?"

- "At homeness" with numbers
- Appreciation of mathematics
- Confidence in math
- Reasoning skills
- Mental math ability
- Use symbols
- Sense of numbers
- Use mathematical models
- Interpret data
- Read and interpret graphs
- Likewise, numeracy is more than knowing about numbers and number operations...it's more than being able to solve for "x"...So we also wouldn't say that a student who can graph a line or solve an equation is necessarily numerate." (Association for Career and Technical Training)