

*Literacy & Numeracy for Mathematics
Teaching in Ireland
Workshop 1*

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Learning Intentions

- Context for L&N for mathematics teaching in Ireland
- Linking Numeracy model and mathematics
- Examples
- How do we see and understand it in the work of teaching?
- Evaluation

DES:September 2016

ACTION PLAN_{FOR} EDUCATION

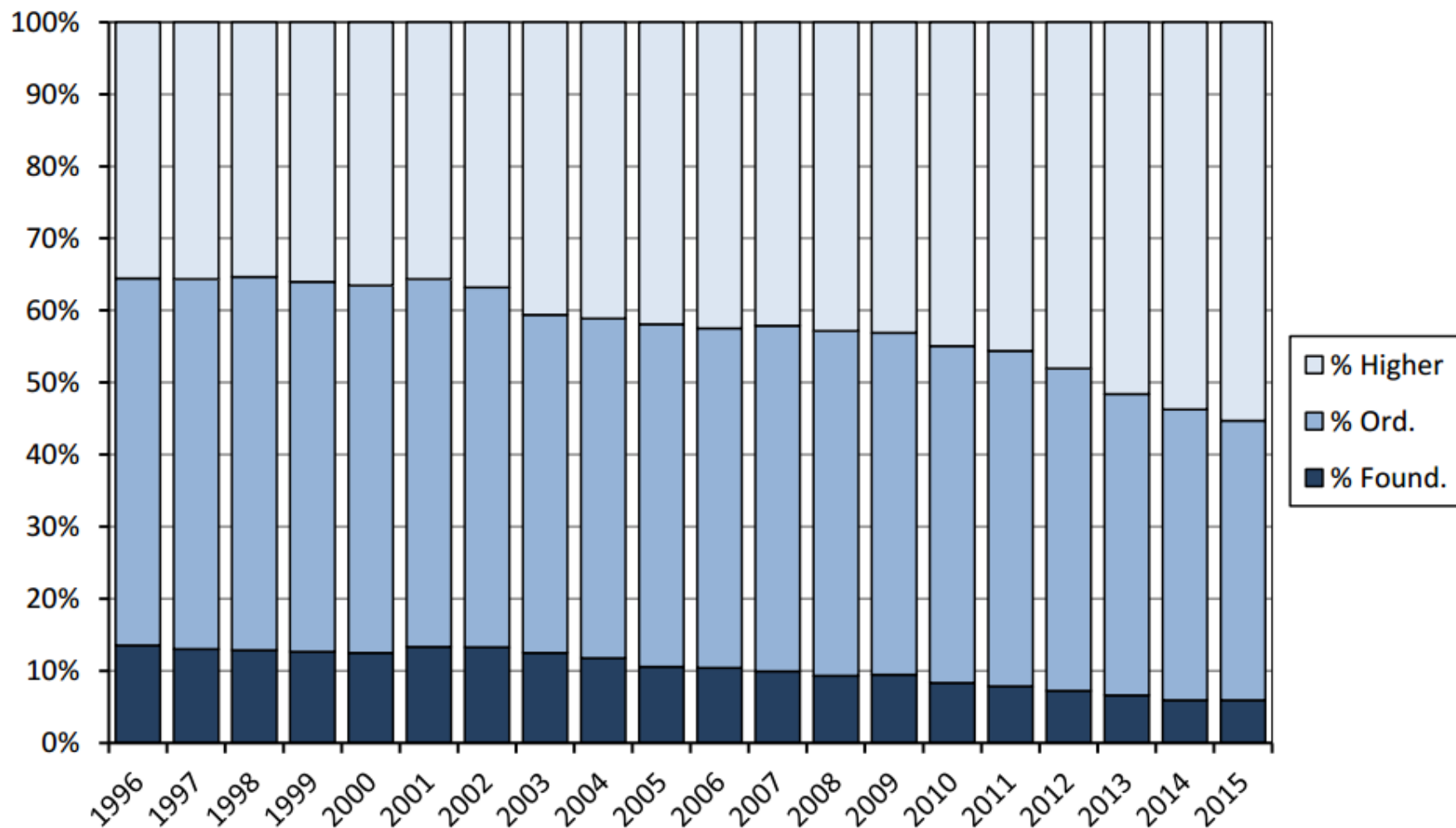
2016-2019

LITERACY AND NUMERACY

ADDITIONAL REVISED/NEW TARGETS FOR IMPROVEMENT, BUILDING ON THE EXISTING TARGETS SET OUT BELOW, WILL BE PUBLISHED IN THE INTERIM REVIEW OF THE LITERACY AND NUMERACY STRATEGY

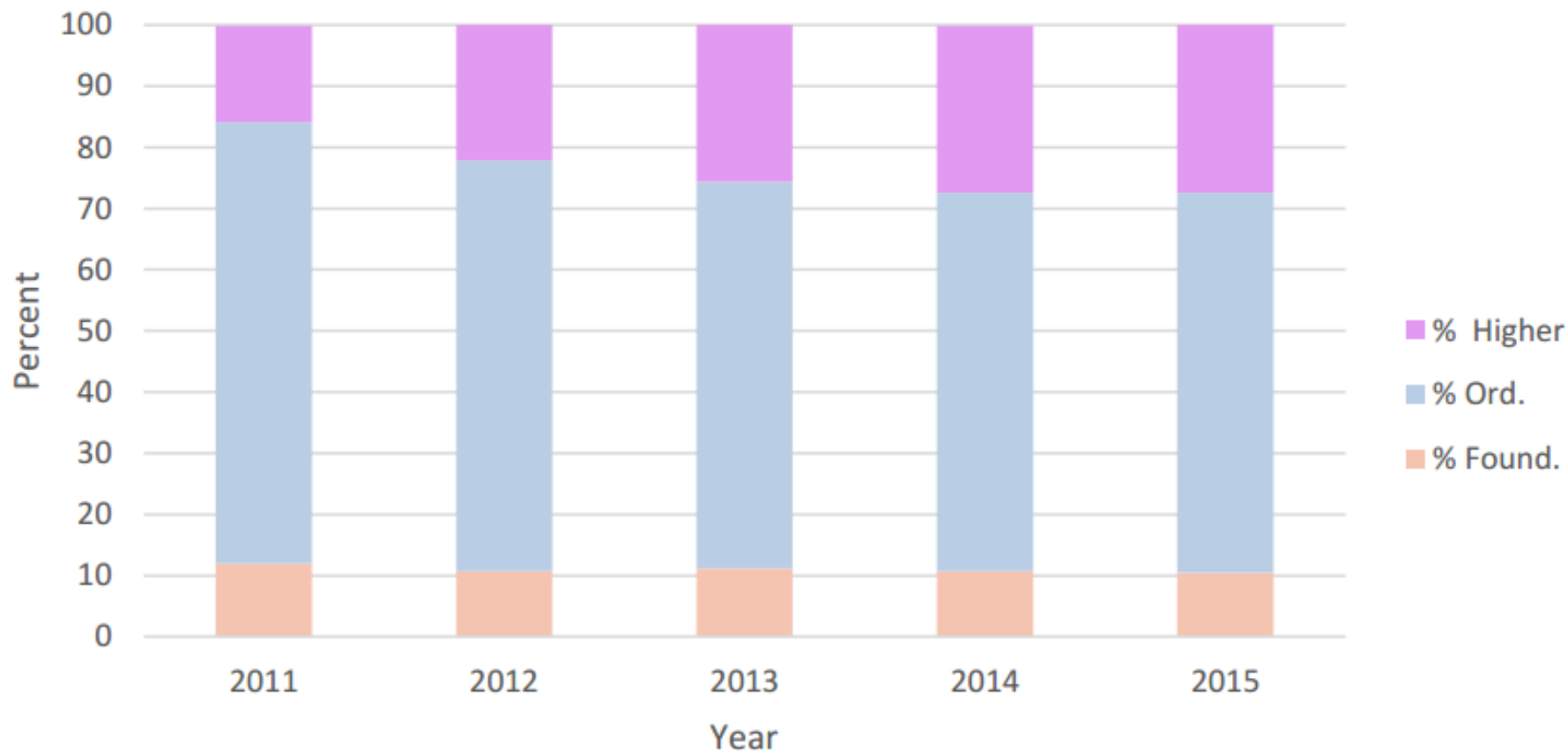
INCREASE THE PERCENTAGE OF STUDENTS TAKING HIGHER LEVEL MATHEMATICS EXAMINATION AT THE END OF JUNIOR CYCLE TO 60% BY 2020, FROM 55% IN 2015

INCREASE THE PERCENTAGE OF STUDENTS TAKING THE HIGHER LEVEL MATHEMATICS EXAMINATION IN LEAVING CERTIFICATE TO 30% BY 2020, FROM 27% IN 2015



However, more recently there has been a significant change in the proportions of the cohort taking the different levels. From 2011 to 2015, the Higher level cohort increased from 45.6% to 55.3%, an increase of over 20%. Over the same period of time, the Ordinary level cohort fell from 46.5% to 38.8%, a decrease of over 15%, while the Foundation level cohort fell from 7.9% to 5.9%, a decrease of 25%.

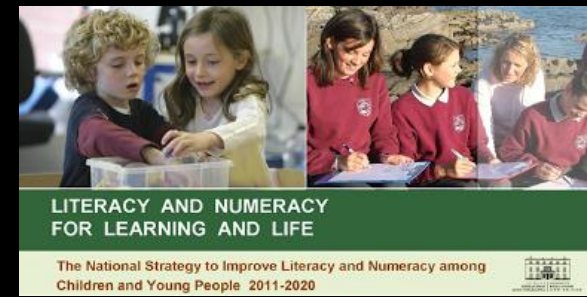
This increase at both Junior and Leaving Certificate level, which is often attributed to the roll-out of the Project Maths initiative and to the “bonus points” awarded for Higher level Mathematics in the CAO system, is a stated policy aim – Literacy and Numeracy for Learning and Life specifies a goal of 60% of Junior Certificate candidates taking Higher level Mathematics by 2020.



The table and graph show that from 2011 to 2015, the Higher level cohort increased from 15.8% to 27.4%, an increase of over 73%. Over the same period of time, the Ordinary level cohort fell from 72.1% to 62.1%, a decrease of almost 14%, while the Foundation level cohort has remained relatively constant at just over 10%.

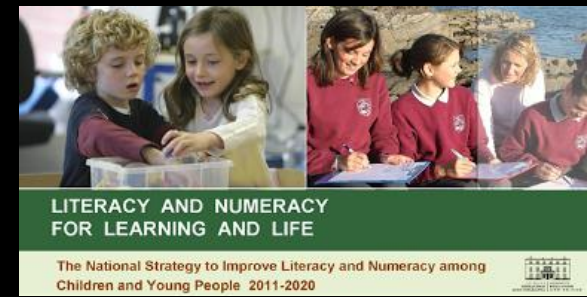
The increase in the number of candidates taking Higher level from 2010 to 2015 has been substantial. This increase, which is often attributed to the roll-out of the Project Maths initiative and to the “bonus points” awarded for Higher level Mathematics in the CAO system, is a stated policy aim – Literacy and Numeracy for Learning and Life¹ specifies a goal of 30% of Leaving Certificate candidates taking Higher level Mathematics by 2020. , p.9

Numeracy Definition



- Numeracy is not limited to the ability to use numbers, to add, subtract, multiply and divide. Numeracy encompasses the ability to use mathematical understanding and skills to solve problems and meet the demands of day-to-day living in complex social settings. To have this ability, a young person needs to be able to think and communicate quantitatively, to make sense of data, to have a spatial awareness, to understand patterns and sequences, and to recognise situations where mathematical reasoning can be applied to solve problems.

In a Nutshell



- Think and Communicate Quantitatively
- Make Sense of Data
- Have Spatial Awareness
- Understand Patterns and Sequences
- Problem Solve

Mapping Numeracy to Mathematics

**Think and communicate
quantitatively**

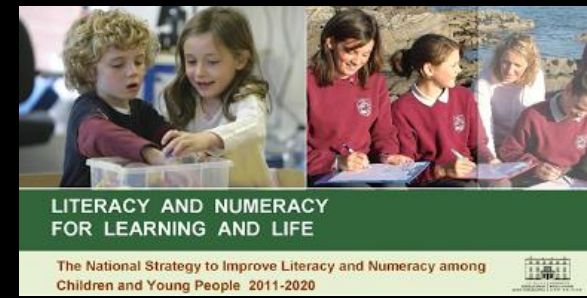
Make sense of data

Have spatial awareness

**Understand patterns and
sequences**

Solve problems

Literacy Definition



Literacy includes the capacity to read, understand and critically appreciate various forms of communication including spoken language, printed text, broadcast media, and digital media.

Numeracy is communicating mathematics

- *the ability to understand and use mathematics as a means of communication (Penny)*

Mapping Problem Solving to Literacy and Numeracy

communicate mathematics verbally and in written form

explain findings

justify conclusions

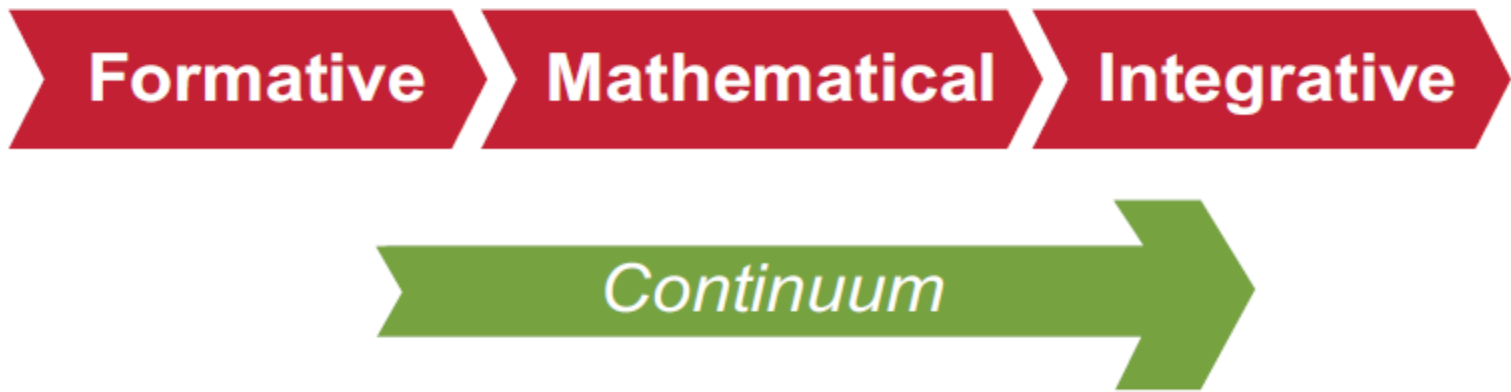
explore patterns and formulate conjectures

apply their knowledge and skills to solve problems in
familiar and unfamiliar contexts

analyse information presented verbally and translate it into
mathematical form

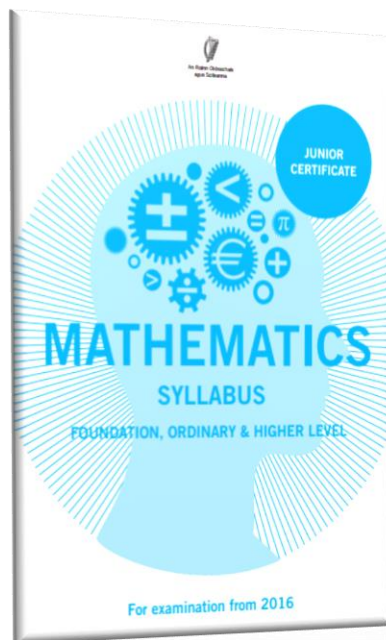
devise, select and use appropriate mathematical models,
formulae or techniques to process information and to draw
relevant conclusions.

The Concept of Numeracy



Increasing Sophistication

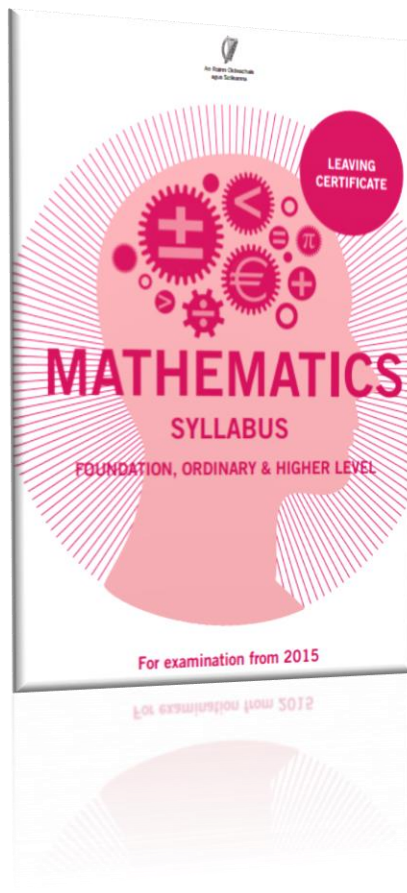
JC Aims:



Junior Certificate Mathematics aims to

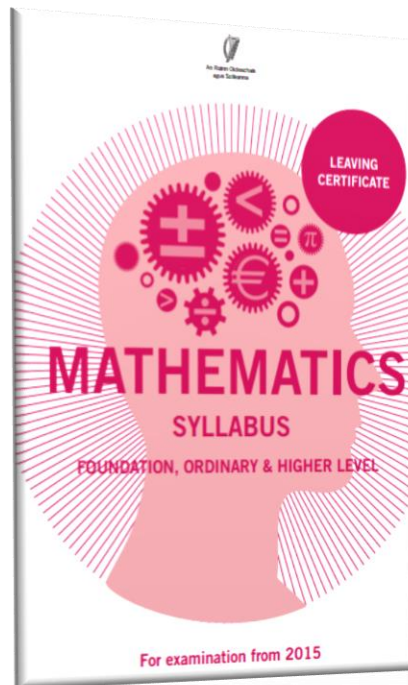
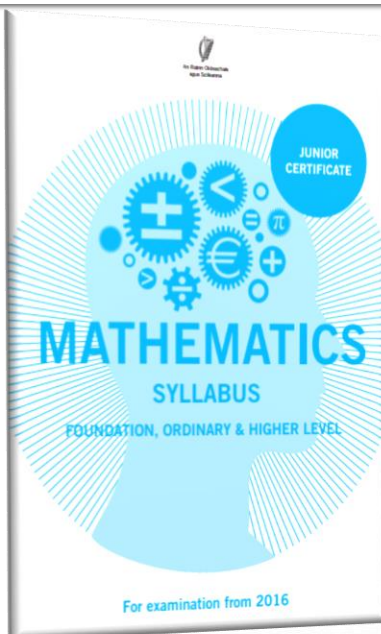
- develop the mathematical knowledge, skills and understanding needed for continuing education, for life and for work
- develop the skills of dealing with mathematical concepts in context and applications, as well as in solving problems
- support the development of literacy and numeracy skills
- foster a positive attitude to mathematics in the learner.

LC Aims:



Leaving Certificate Mathematics aims to develop mathematical knowledge, skills and understanding needed for continuing education, life and work. By teaching mathematics in contexts that allow learners to see connections within mathematics, between mathematics and other subjects, and between mathematics and its applications to real life, it is envisaged that learners will develop a flexible, disciplined way of thinking and the enthusiasm to search for creative solutions.

JC&LC Objectives



The objectives of Junior Certificate Mathematics are that learners develop mathematical proficiency, characterised as

- *conceptual understanding*—comprehension of mathematical concepts, operations, and relations
- *procedural fluency*—skill in carrying out procedures flexibly, accurately, efficiently, and appropriately
- *strategic competence*—ability to formulate, represent, and solve mathematical problems in both familiar and unfamiliar contexts
- *adaptive reasoning*—capacity for logical thought, reflection, explanation, justification and communication
- *productive disposition*—habitual inclination to see mathematics as sensible, useful, and worthwhile, coupled with a belief in diligence, perseverance and one's own efficacy.

Numeracy Model

Goos, Geiger, and Dole

Table 1: Description of elements of the numeracy model

Element of model	Description of element
Mathematical knowledge	Mathematical concepts and skills; problem solving strategies; estimation capacities.
Contexts	Capacity to use mathematical knowledge in a range of contexts, both within schools and beyond school settings.
Dispositions	Confidence and willingness to use mathematical approaches to engage with life-related tasks; preparedness to make flexible and adaptive use of mathematical knowledge.
Tools	Use of material (models, measuring instruments), representational (symbol systems, graphs, maps, diagrams, drawings, tables, ready reckoners) and digital (computers, software, calculators, internet) tools to mediate and shape thinking.
Critical orientation	Use of mathematical information to: make decisions and judgements; add support to arguments; challenge an argument or position.

Task

Map JC&LC Objectives to
Numeracy Model

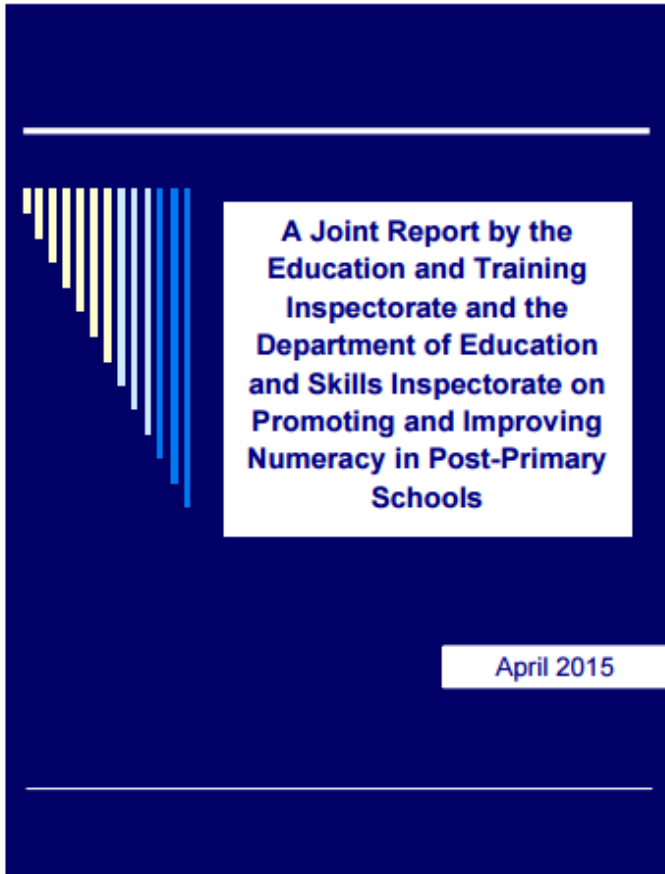
Task

Examples

Objectives/Numeracy Model in
JCHL summative assessment
questions

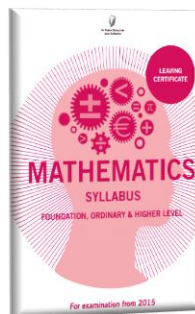
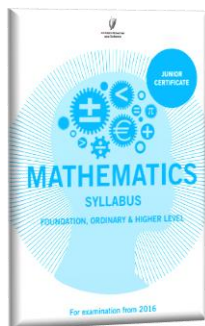
Joint Report: Numeracy

- Numeracy is what you develop when you learn mathematics well (Anita Staker p.2)



MQI

Improve literacy and numeracy standards in our young people in the mathematics classroom



Coimisiún na Scrúduithe Stáit
State Examinations Commission

Junior Certificate Examination 2016

Mathematics



Coimisiún na Scrúduithe Stáit
State Examinations Commission

Leaving Certificate Examination 2016

Mathematics

Evaluation

- Thank You
- Go raibh maith
agaibh