Oide

Making Connections

A Quick Reference Guide to the Links between the Primary and Post Primary Mathematics Curricula

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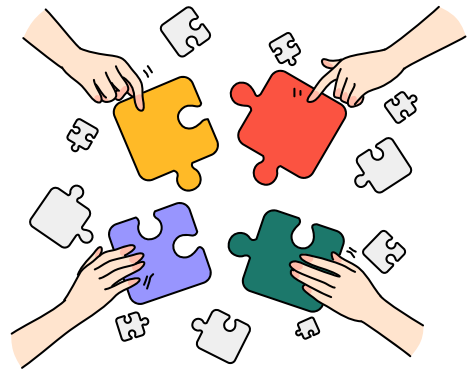
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How to use this guide:

This quick reference guide is intended for use by mathematics teachers when planning for teaching, learning and assessment at Junior Cycle. It provides an overview of the elements and pedagogies outlined in the Primary Mathematics Curriculum.

A bank of resources has been curated that teachers of first year students may find useful to gauge prior knowledge and support active engagement and continuity during the transition from primary to post primary level. These include:

- Video clips from the primary classroom illustrating pedagogies in practice.
- Open ended tasks from stage 3 and stage 4 at primary level.
- Checkpoints to assess prior learning as students transition from primary to post primary.
- Sample activities/learning experiences at key milestones as students progress through primary school.
- Links between the learning outcomes in the Junior Cycle Mathematics specification and the learning outcomes in the Primary School Mathematics curriculum. As such only the pertinent learning outcomes in the Junior Cycle Mathematics specification have been included.



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Primary Mathematics Curriculum - Elements

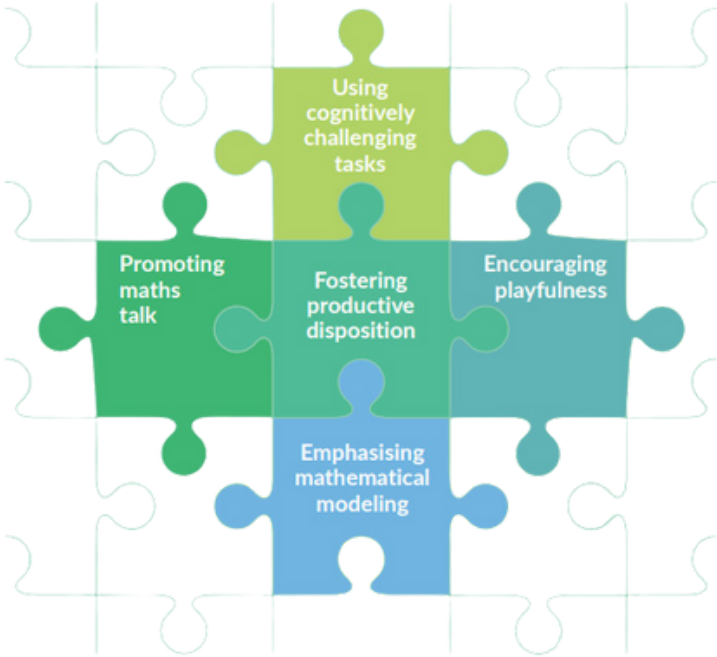
Elements describe the main categories of processes (how children learn) that children engage in as they learn Mathematics. They are categorised into four elements: understanding and connecting; communicating; reasoning and applying; and problem-solving. These are central to the development of children's mathematical proficiency at primary level and are reflected in the elements of the unifying strand at Junior Cycle.

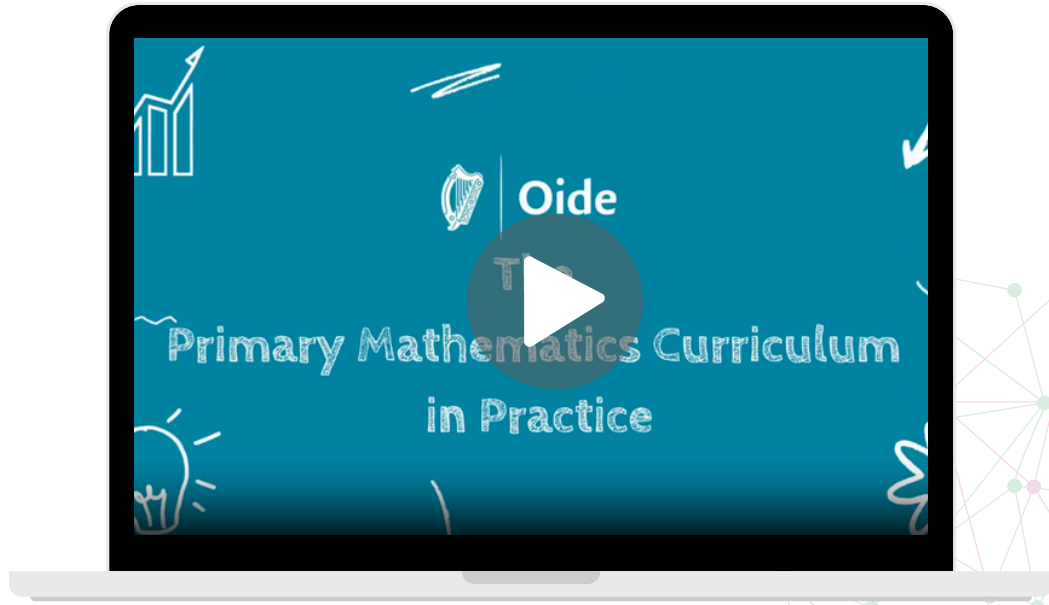


Element of the Unifying Strand, Junior Cycle

Primary Mathematics Curriculum - Pedagogical Practices

'How' children learn is as important as 'what' children learn. Teachers can create opportunities for children to **understand and connect, communicate, reason, and problem-solve** by using the following teaching pedagogies which are detailed in the Primary Mathematics Curriculum (p28-32) A brief overview of the pedagogical practices and links to individual practices within the primary context are available by clicking on the play button and hyperlinks below.





The Let's Talk Framework clip outlines a method to advance mathematical thinking through the lens of Maths Talk while Emphasising Mathematical Modeling explores how students use mathematics to describe a problem context and determine meaningful solutions to a problem.

The Primary Mathematics Curriculum - Maths in Action

The table below includes a collection of videos that showcase real-life examples of pupils engaging with the New Primary Mathematics Curriculum across each of the strands.

Strand	Maths in Action
Number	Mental Maths Talk for Multiplication: Stage 4 Shoe Shopping Calculating Percentage Discount: Stage 4
Measuring	Measuring Perimeter: Stage 3 and 4 Perimeter the Same but Different: Stage 4
Algebra	Growing patterns in algebra: Stage 4
Space and Shape	Measuring Perimeter: Stage 3 and 4 Perimeter the Same but Different: Stage 4 Tessellations and Transformations: Stage 4

Primary Mathematics Curriculum - Sample Open Ended Tasks

The tables below include open tasks from Oide's Primary Mathematics Hub that could be utilised to assess prior learning or to support learning in first year. Click on 3 for Stage 3 and 4 for Stage 4 resources within each strand.

Strand	Open Tasks Stage 3 and 4
Number	3 4
Measure	3 4
Algebra	3 4
Data	4
Shape and space	3 4

Stage	Class
1	Junior and Senior Infants
2	1st and 2nd class
3	3rd and 4th class
4	5th and 6th class



Assessing Prior Learning in First Year - Checkpoints

The table below includes links to a selection of checkpoints which have been adapted from the National Centre for Excellence in the Teaching of Mathematics (NCETM). The tasks might be used as assessment activities, ahead of introducing concepts, to help teachers explore what students already know and identify gaps and misconceptions. Note the checkpoints may are designed to take 10 minutes but may take longer depending on the context.

Each checkpoint has an optional question marked ?. This will provide further thinking for those students who have completed the rest of the activities on the slide. The sample below is linked to specific learning outcomes from the Junior Cycle and is collated into slide decks that reflect the four strands listed. The full collection of checkpoints is available to download directly from the NCETM website or by clicking here

Strand	Resources
Number	Checkpoints
Algebra and functions	
Geometry and trigonometry	
Statistics and probability	

The Primary Mathematics Curriculum - Progression Continua

The progression continua included in the Primary Mathematics Toolkit and hyperlinked below outline **a sample** learning trajectory of Mathematics at primary level across the elements within each strand. They suggest a series of learning experiences, which children might engage with as they develop and deepen their mathematical knowledge, skills and dispositions. This resource could prove useful when designing/curating tasks to engage students during their transition to post primary. It is worth noting that not every child will have reached progression continua K, in fact the majority will not have. The continua compliment the learning outcomes and underlying mathematical concepts of the curriculum. They could be used as a tool locate where a child or group of children are in relation to **a sample** learning trajectory, however they are not intended to replace the Primary Mathematics Curriculum (2023).

Strand	Progression continua
Data and Chance	Data Chance
Measures	Measuring Time Money
Number	Uses of number Numeration and counting Place value and base ten Sets and operations Fractions

Strand	Progression continua
Shape and Space	Spatial awareness and location Shape Transformation
Algebra	Patterns rules and relationships Expressions and equations

Connecting the Learning Outcomes

Hyperlinks have been embedded to the mathematically relevant learning outcomes in the Primary Mathematics Curriculum as outlined in the Primary Mathematics Toolkit. This link also details the mathematical concepts or key ideas that underpin each learning outcome. These key ideas may provide useful entry and reference points during planning, teaching and assessment and may also serve to remind teachers of key mathematical knowledge at each stage.

Learning outcomes from the Junior Cycle Mathematics specification are listed in the column on the left. Possible links to the Primary Mathematics Curriculum (2023) learning outcomes are listed in the column on the right. (Learning outcomes are repeated across some strands where some other possible links can be made)

Junior Cycle Mathematics Specification Learning outcome Students should be able to:	Primary Mathematics Curriculum Learning Outcome Through appropriately playful and engaging learning experiences, children should be able to:
AF.2 investigate situations in which letters stand for quantities that are variable so that they can: c. use the concept of equality to generate and interpret equations.	• articulate, represent and solve mathematical si through the use of expressions and equation letter-symbols. Algebra Stage 4: Expression and equations

Click here for the mathematical concepts underpinning each learning outcome on the New Primary Curriculum.

It should be noted that this document is not intended to replace the Primary Mathematics Curriculum (2023) documents or the Mathematics specification at Junior Cycle. It is important that post primary teachers of Mathematics also refer to the Mathematics specification and the Framework for Junior Cycle (2015) when planning for teaching, learning and assessment.

Junior Cycle Mathematics Specification Learning outcome Students should be able to:	Primary Mathematics Curriculum Learning Outcome Through appropriately playful and engaging learning experiences, children should be able to:
N.1 investigate the representation and arithmetic operations so that they can: a.represent the operations of addition, subtraction, multiplication and division in N, Z and Q using models including the number line, decomposition and accumulating groups of equal size.	• understand and apply flexibly the four operations; and the relationships between operations. Number Stage 3: Sets and Operations • build upon, select and make use of a range of operation strategies. Number Stage 4: Sets and Operations
N.1 investigate the representation and arithmetic operations so that they can: b.perform the order of operations of addition, subtraction, multiplication and division and understand the relationship between these operations and the properties commutative, associative and distributive in N, Z and Q **and in R/Q, including operating on surds.**	• understand and apply flexibly the four operations; and the relationships between operations. Number Stage 3: Sets and Operations • build upon, select and make use of a range of operation strategies. Number Stage 4: Sets and Operations

Junior Cycle Mathematics Specification Learning outcome Students should be able to:	Primary Mathematics Curriculum Learning Outcome Through appropriately playful and engaging learning experiences, children should be able to:
N.1 investigate the representation and arithmetic operations so that they can: c. explore numbers written in the form a^b so that they can I. flexibly translate between whole numbers and index representation of numbers II. use and apply generalisations such as $a^p a^q = a^{p+q}$; $(a^p)/(a^q) = a^{p-q}$; $(a^p)^q = a^{pq}$; and $n^{1/2} = \sqrt{n}$, for $a \in Z$, and p, q, p–q, $\sqrt{n} \in N$ **and for a, b, $\sqrt{n} \in R$, and p, q $\in Q$** **III. use and apply generalisations such as $a^0 = 1$; $a^{p/q} = \sqrt[q]{a^p} = (\sqrt[q]{a})^p$; $a^{-r} = 1/(a^r)$; $(ab)^r = a^r b^r$; and $(a/b)^r = (a^r)/(b^r)$, for a, b $\in$ R; p, q $\in$ Z; and r $\in$ Q** IV. generalise numerical relationships involving operations involving numbers written in index form V. correctly use the order of arithmetic and index operations including the use of brackets	• represent mathematical structures in multiple ways, including verbal expressions, diagrams and symbolic representations. Algebra Stage 4: Patterns, rules and relationships

Junior Cycle Mathematics Specification Learning outcome Students should be able to:	Primary Mathematics Curriculum Learning Outcome Through appropriately playful and engaging learning experiences, children should be able to:
N.1 investigate the representation and arithmetic operations so that they can: d. calculate and interpret factors (including the highest common factor), multiples (including the lowest common factor) and prime numbers.	• build upon, select and make use of a range of operation strategies. Number Stage 4: Sets and Operations
N.1 investigate the representation and arithmetic operations so that they can: e. present numerical answers to the degree of accuracy specified, for example, correct to the nearest hundred, to two decimal places or to three significant places.	• transfer knowledge of the base ten system in number to monetary contexts and use for purposes of calculation. Measures Stage 3: Money • build upon, select and make use of a range of operation strategies Number Stage 4: Sets and Operations

Junior Cycle Mathematics Specification Learning outcome Students should be able to:	Primary Mathematics Curriculum Learning Outcome Through appropriately playful and engaging learning experiences, children should be able to:
N.1 investigate the representation and arithmetic operations so that they can: f. convert the number p in decimal form to the form $a \times 10^n$, where $1 \leq a < 10$, $n \in Z$, $p \in Q$ and $p \geq 1$ and $0 < p < 1$	• represent mathematical structures in multiple ways, including verbal expressions, diagrams and symbolic representations. Algebra Stage 4: Patterns, rules and relationships
N.2 investigate equivalent representations of rational numbers so that they can: a. flexibly convert between fractions, decimals and percentages.	• investigate how decimals and percentages (and fractions) can be compared, ordered and expressed in related terms. Number Stage 4: Place value and base ten

Junior Cycle Mathematics Specification Learning outcome Students should be able to:	Primary Mathematics Curriculum Learning Outcome Through appropriately playful and engaging learning experiences, children should be able to:
N.2 investigate equivalent representations of rational numbers so that they can: b. use and understand ratio and proportion.	• investigate proportionality and ratios of quantities (sets). Number Stage 4: Fractions
N.2 investigate equivalent representations of rational numbers so that they can: c. solve money related problems including those involving bills, VAT, profit or loss, % profit or loss (on the cost price), cost price, selling price, compound interest for not more than 3 years, income tax (standard rate only), net pay (including other deductions of specified amounts), value for money calculations and judgements, **mark up (profit as a % of the cost price) margin (profit as a % of selling price), compound interest, income tax and net pay (including other deductions).**	• solve and pose practical tasks to investigate and make informed judgements about transactions and financial plans. Measures Stage 4: Money

Junior Cycle Mathematics Specification Learning outcome Students should be able to:	Primary Mathematics Curriculum Learning Outcome Through appropriately playful and engaging learning experiences, children should be able to:
N.3 investigate situations involving proportionality so that they can: b. solve problems involving proportionality including those involving currency conversion and those involving speed, distance and time.	• solve and pose practical tasks to investigate and make informed judgements about transactions and financial plans. Measures Stage 4: Money • solve and pose practical tasks and problems involving the interpretation and calculation of time. Measures Stage 4: Time
N.4 analyse numerical patterns in different ways, including making out tables and graphs, and continue such patterns.	• identify rules that describe the structure of a pattern and use these rules to make predictions. • represent the relationships between quantities. Algebra Stage 3: Patterns, rules and relationships

Junior Cycle Mathematics Specification Learning outcome Students should be able to:	Primary Mathematics Curriculum Learning Outcome Through appropriately playful and engaging learning experiences, children should be able to:
GT.1 calculate, interpret, and apply units of measure and time.	• determine and calculate units of measurement in fractional and/or decimal form to solve practical problems. Measures Stage 4: Measuring • find, interpret and deduce measures experimentally with increasing precision. Measures Stage 4: Measuring • solve and pose practical tasks and problems involving the interpretation and calculation of time. Measures Stage 4: Time

Junior Cycle Mathematics Specification Learning outcome Students should be able to:	Primary Mathematics Curriculum Learning Outcome Through appropriately playful and engaging learning experiences, children should be able to:
GT.2 investigate 2D shapes and 3D solids so that they can: a. draw and interpret scaled diagrams.	• interpret scale maps and create simple scale drawings. Shape and Space Stage 4: Spatial awareness and location • analyse and show how shapes are enlarged on scaled diagrams. Shape and Space Stage 4: Transformation • construct 2-D and 3-D models or structures given defined measurements and/or specific conditions. Shape and Space Stage 4: Shape
b. draw and interpret nets of rectangular solids, prisms (polygonal bases), cylinder.	• construct 2-D and 3-D models or structures given defined measurements and/or specific conditions. Shape and Space Stage 4: Shape

Junior Cycle Mathematics Specification Learning outcome Students should be able to:	Primary Mathematics Curriculum Learning Outcome Through appropriately playful and engaging learning experiences, children should be able to:
GT.2 investigate 2D shapes and 3D solids so that they can: c. find the perimeter and area of plane figures made from combinations of discs, triangles, and rectangles, including relevant operations involving pi.	• compare, estimate and measure length, weight, capacity, area and volume using appropriate instruments and record and communicate appropriately. Measures Stage 3: Measuring • find, interpret and deduce measures experimentally with increasing precision. Measures Stage 4: Measuring • represent shapes with drawings and models, and calculate dimensions of shapes. Shape and space Stage 3: Shape • construct 2-D and 3-D models or structures given defined measurements and/or specific conditions. Shape and space Stage 4: Shape

Junior Cycle Mathematics Specification Learning outcome Students should be able to:	Primary Mathematics Curriculum Learning Outcome Through appropriately playful and engaging learning experiences, children should be able to:
GT.2 investigate 2D shapes and 3D solids so that they can: d. find the volume of rectangular solids, cylinders, triangular-based prisms, spheres, and combinations of these, including relevant operations involving pi.	• compare, estimate and measure length, weight, capacity, area and volume using appropriate instruments and record and communicate appropriately. Measures Stage 3 - Measuring • identify the relationship between equivalent units of measurement, and rename measures using equivalent units. Measures Stage 3: Measuring • find, interpret and deduce measures experimentally with increasing precision. Measures Stage 4: Measuring • construct 2-D and 3-D models or structures given defined measurements and/or specific conditions. Shape and space Stage 4: Shape

Junior Cycle Mathematics Specification Learning outcome Students should be able to:	Primary Mathematics Curriculum Learning Outcome Through appropriately playful and engaging learning experiences, children should be able to:
GT.2 investigate 2D shapes and 3D solids so that they can: e. find the surface area and curved surface area (as appropriate) of rectangular solids, cylinders, triangular-based prisms, spheres, and combinations of these.	• compare, estimate and measure length, weight, capacity, area and volume using appropriate instruments and record and communicate appropriately. Measures Stage 3: Measuring • represent shapes with drawings and models, and calculate dimensions of shapes. Shape and Space Stage 3: Shape • determine and calculate units of measurement in fractional and/or decimal form to solve practical problems. Measures Stage 4: Measuring • find, interpret and deduce measures experimentally with increasing precision. Measures Stage 4: Measuring

Junior Cycle Mathematics Specification Learning outcome Students should be able to:	Primary Mathematics Curriculum Learning Outcome Through appropriately playful and engaging learning experiences, children should be able to:
GT.3 investigate the concept of proof through their engagement with geometry so that they can: a. perform constructions 1 to 15 in Geometry for Post-Primary School Mathematics (constructions 3 and 7 at HL only).	• compare and classify angles, recognising them as a property of a shape and as a description of a turn. Shape and Space Stage 3: Spatial awareness and location • construct 2-D and 3-D models or structures given defined measurements and/or specific conditions. Shape and Space Stage 4: Shape • investigate and construct angles in the context of shape; and solve angle-related problems. Shape and Space Stage 4: Shape

Junior Cycle Mathematics Specification learning outcome Students should be able to:	Primary Mathematics Curriculum learning outcome Through appropriately playful and engaging learning experiences, children should be able to:
GT.3 investigate the concept of proof through their engagement with geometry so that they can: b. recall and use the concepts, axioms, theorems, corollaries and converses, specified in Geometry for Post-Primary School Mathematics (section 9 for OL and section 10 for HL) I. axioms 1, 2, 3, 4 and 5 II. theorems 1, 2, 3, 4, 5, 6, 9, 10, 13, 14, 15 **and 11, 12, 19**, and appropriate converses including relevant operations involving square roots III. corollaries 3, 4 **and 1, 2, 5** and appropriate converses.	• compare and classify angles, recognising them as a property of a shape and as a description of a turn. Shape and Space Stage 3: Spatial awareness and location • analyse the properties of 2-D and 3-D shapes and identify classes of shapes based on these properties. Shape and Space Stage 3: Shape • investigate and construct angles in the context of shape; and solve angle-related problems. Shape and Space Stage 4: Shape • find, interpret and deduce measures experimentally with increasing precision. Measures Stage 4: Measuring

Junior Cycle Mathematics Specification learning outcome Students should be able to:	Primary Mathematics Curriculum learning outcome Through appropriately playful and engaging learning experiences, children should be able to:
GT.5 investigate properties of points, lines and line segments in the co-ordinate plane so that they can: a. find and interpret: distance, midpoint, slope, point of intersection, and slopes of parallel **and perpendicular** lines.	• describe, interpret and record directional instructions and location. Shape and Space Stage 3: Spatial Awareness and Location • analyse the properties of 2-D and 3-D shapes and identify classes of shapes based on these properties. Shape and Space Stage 3: Shape • describe location on the full co-ordinate plane. Shape and Space Stage 4: Spatial Awareness and Location

Junior Cycle Mathematics Specification learning outcome Students should be able to:	Primary Mathematics Curriculum learning outcome Through appropriately playful and engaging learning experiences, children should be able to:
GT.6 investigate transformations of simple objects so that they can: a. recognise and draw the image of points and objects under translation, central symmetry, axial symmetry, and rotation.	• understand that shapes and line segments can be reflected, rotated and translated. Shape and Space Stage 2: Transformation • model and explain the effects of transformations on shapes and line segments. Shape and Space Stage 3: Transformation • perform and devise a range of steps involving transformations. Shape and Space Stage 4: Transformation
GT.6 investigate transformations of simple objects so that they can: b. draw the axes of symmetry in shapes.	• analyse the properties of 2-D and 3-D shapes and identify classes of shapes based on these properties. Shape and Space Stage 3: Shape • construct 2-D and 3-D models or structures given defined measurements and/or specific conditions. Shape and Space Stage 4: Shape

Junior Cycle Mathematics Specification Learning outcome Students should be able to:	Primary Mathematics Curriculum Learning Outcome Through appropriately playful and engaging learning experiences, children should be able to:
AF.1 investigate patterns and relationships (linear, quadratic, doubling and tripling) in number, spatial patterns and real-world phenomena involving change so that they can: a. represent these patterns and relationships in tables and graphs.	• represent mathematical structures in multiple ways, including verbal expressions, diagrams and symbolic representations. Algebra Stage 4: Pattern, rules and relationships • represent and express problems with known and unknown values in different ways to include the use of appropriate. letter-symbols or words. Algebra Stage 3: Expressions and equations
AF.1 investigate patterns and relationships (linear, quadratic, doubling and tripling) in number, spatial patterns and real-world phenomena involving change so that they can: b. generate a generalised expression for linear and quadratic patterns in words and algebraic expressions and fluently convert between each representation.	• identify, explain and apply generalisations, including properties of operations, mathematical models and patterns. Algebra Stage 4: Pattern, rules and relationships

Junior Cycle Mathematics Specification Learning outcome Students should be able to:	Primary Mathematics Curriculum Learning Outcome Through appropriately playful and engaging learning experiences, children should be able to:
AF.2 investigate situations in which letters stand for quantities that are variable so that they can: a. generate and interpret expressions in which letters stand for numbers.	• represent and express problems with known and unknown values in different ways to include the use of appropriate letter-symbols or words. Algebra Stage 3: Expression and equations • articulate, represent and solve mathematical situations through the use of expressions and equations that include letter-symbols. Algebra Stage 4: Expressions and equations
AF.2 investigate situations in which letters stand for quantities that are variable so that they can: b. find the value of expressions given the value of the variables.	• articulate, represent and solve mathematical situations through the use of expressions and equations that include letter-symbols. Algebra Stage 4: Expressions and equations

Junior Cycle Mathematics Specification Learning outcome Students should be able to:	Primary Mathematics Curriculum Learning Outcome Through appropriately playful and engaging learning experiences, children should be able to:
AF.2 investigate situations in which letters stand for quantities that are variable so that they can: c. use the concept of equality to generate and interpret equations.	• articulate, represent and solve mathematical situations through the use of expressions and equations that include letter-symbols. Algebra Stage 4: Expression and equations
AF.3 apply the properties of arithmetic operations and factorisation to generate equivalent expressions so that they can develop and use appropriate strategies to: a. add, subtract and simplify: I. linear expressions in one or more variables with coefficients in Q II. quadratic expressions in one variable with coefficients in Z III. **expressions of the form a / (bx + c), where a, b, c ∈ Z**	• understand and apply flexibly the four operations; and the relationships between operations. Number Stage 3: Sets and operations • build upon, select and make use of a range of operation strategies. Number Stage 4: Sets and operations • articulate, represent and solve mathematical situations through the use of expressions and equations that include letter-symbols. Algebra Stage 4: Expression and equations

Junior Cycle Mathematics Specification Learning outcome Students should be able to:	Primary Mathematics Curriculum Learning Outcome Through appropriately playful and engaging learning experiences, children should be able to:
AF.3 apply the properties of arithmetic operations and factorisation to generate equivalent expressions so that they can develop and use appropriate strategies to: b. multiply expressions of the form I. $a(bx + cy + d)$; $a(bx^2 + cx + d)$; and $ax(bx^2 + cx + d)$, where $a, b, c, d \in \mathbb{Z}$ II. $(ax + b)(cx + d)$ and **$(ax + b)(cx^2 + dx + e)$**, where $a, b, c, d, e \in \mathbb{Z}$	• understand and apply flexibly the four operations; and the relationships between operations. Number Stage 3: Sets and operations • build upon, select and make use of a range of operation strategies. Number Stage 4: Sets and operations
AF.3 apply the properties of arithmetic operations and factorisation to generate equivalent expressions so that they can develop and use appropriate strategies to: c. divide quadratic **and cubic** expressions by linear expressions, where all coefficients are integers and there is no remainder	• understand and apply flexibly the four operations; and the relationships between operations. Number Stage 3: Sets and operations • build upon, select and make use of a range of operation strategies. Number Stage 4: Sets and operations

Junior Cycle Mathematics Specification Learning outcome Students should be able to:	Primary Mathematics Curriculum Learning Outcome Through appropriately playful and engaging learning experiences, children should be able to:
AF.3 apply the properties of arithmetic operations and factorisation to generate equivalent expressions so that they can develop and use appropriate strategies to: d. flexibly convert between the factorised and expanded forms of algebraic expressions of the form: I. axy, where $a \in \mathbb{Z}$ II. $axy + byz$, where $a, b \in \mathbb{Z}$ III. $sx – ty + tx – sy$, where $s, t \in \mathbb{Z}$ IV. $dx^2 + bx$; $x^2 + bx + c$; **and** **$ax^2 + bx + c$**, where $b, c, d \in \mathbb{Z}$ **and** $a \in \mathbb{N}$ V. $x^2 – a^2$ **and** $a^2x^2 – b^2y^2$, where $a, b \in \mathbb{Z}$	• understand and apply flexibly the four operations; and the relationships between operations. Number Stage 3: Sets and operations • build upon, select and make use of a range of operation strategies. Number Stage 4: Sets and operations • articulate, represent and solve mathematical situations through the use of expressions and equations that include letter-symbols. Algebra Stage 4: Expressions and equations

Junior Cycle Mathematics Specification Learning outcome Students should be able to:	Primary Mathematics Curriculum Learning Outcome Through appropriately playful and engaging learning experiences, children should be able to:
AF.4 select and use suitable strategies (graphic, numeric, algebraic, trial and improvement, working backwards) for finding solutions to: a. linear equations in one variable with coefficients in Q and solutions in Z or in Q	• articulate, represent and solve mathematical situations through the use of expressions and equations that include letter-symbols. Algebra Stage 4: Expressions and equations
AF.7 investigate functions so that they can: a. demonstrate understanding of the concept of a function	• represent and express problems with known and unknown values in different ways to include the use of appropriate letter-symbols or words. Algebra Stage 3: Expressions and equations

Junior Cycle Mathematics Specification Learning outcome Students should be able to:	Primary Mathematics Curriculum Learning Outcome Through appropriately playful and engaging learning experiences, children should be able to:
AF.7 investigate functions so that they can: b. represent and interpret functions in different ways — graphically (for x ∈ N, Z, and R, [continuous functions only], as appropriate), diagrammatically, in words, and algebraically — using the language and notation of functions (domain, range, co-domain, f(x) = , f :x → , and y =) (drawing the graph of a function given its algebraic expression is limited to linear and quadratic functions at OL)	• represent and express problems with known and unknown values in different ways to include the use of appropriate letter-symbols or words. Algebra Stage 3: Expressions and equations • articulate, represent and solve mathematical situations through the use of expressions and equations that include letter-symbols. Algebra Stage 4: Expressions and equations
AF.7 investigate functions so that they can: c. use graphical methods to find and interpret approximate solutions of equations such as f(x) = g(x) and approximate solution sets of inequalities such as f(x) < g(x)	• represent and express problems with known and unknown values in different ways to include the use of appropriate letter-symbols or words. Algebra Stage 3: Expressions and equations • articulate, represent and solve mathematical situations through the use of expressions and equations that include letter-symbols. Algebra Stage 4: Expressions and equations

Junior Cycle Mathematics Specification Learning outcome Students should be able to:	Primary Mathematics Curriculum Learning Outcome Through appropriately playful and engaging learning experiences, children should be able to:
AF.7 investigate functions so that they can: d. make connections between the shape of a graph and the story of a phenomenon, including identifying and interpreting maximum and minimum points	• represent and express problems with known and unknown values in different ways to include the use of appropriate letter-symbols or words. Algebra Stage 3: Expressions and equations • articulate, represent and solve mathematical situations through the use of expressions and equations that include letter-symbols. Algebra Stage 4: Expressions and equations

Junior Cycle Mathematics Specification Learning outcome Students should be able to:	Primary Mathematics Curriculum Learning Outcome Through appropriately playful and engaging learning experiences, children should be able to:
SP.1 investigate the outcomes of experiments so that they can: a. generate a sample space for an experiment in a systematic way, including tree diagrams for successive events and two-way tables for independent events	• use probability to make informed decisions and predictions. Data and Chance Stage 4: Chance
SP.1 investigate the outcomes of experiments so that they can: b. use the fundamental principle of counting to solve authentic problems	• use probability to make informed decisions and predictions. Data and Chance Stage 4: Chance

Junior Cycle Mathematics Specification Learning outcome Students should be able to:	Primary Mathematics Curriculum Learning Outcome Through appropriately playful and engaging learning experiences, children should be able to:
SP.2 investigate random events so that they can: a. demonstrate understanding that probability is a measure on a scale of 0-1 of how likely an event (including an everyday event) is to occur	• describe and test predictability and (un)certainty in events. Data and Chance Stage 3: Chance • use probability to make informed decisions and predictions. Data and Chance Stage 4: Chance • represent and express probability in different forms. Data and Chance Stage 4: Chance
SP.2 investigate random events so that they can: b. use the principle that, in the case of equally likely outcomes, the probability of an event is given by the number of outcomes of interest divided by the total number of outcomes	• represent and express probability in different forms. Data and Chance Stage 4: Chance

Junior Cycle Mathematics Specification Learning outcome Students should be able to:	Primary Mathematics Curriculum Learning Outcome Through appropriately playful and engaging learning experiences, children should be able to:
SP.2 investigate random events so that they can: c. use relative frequency as an estimate of the probability of an event, given experimental data, and recognise that increasing the number of times an experiment is repeated generally leads to progressively better estimates of its theoretical probability	• use probability to make informed decisions and predictions. Data and Chance Stage 4: Chance • represent and express probability in different forms. Data and Chance Stage 4: Chance
SP.3 carry out a statistical investigation which includes the ability to: a. generate a statistical question	• pose questions of interest and collect, display and critically analyse data in a range of ways for a range of purposes and communicate the findings. Data and Chance Stage 3: Data • pose questions, collect, compare, summarise and represent data selectively to answer those questions. Data and Chance Stage 4: Data

Junior Cycle Mathematics Specification Learning outcome Students should be able to:	Primary Mathematics Curriculum Learning Outcome Through appropriately playful and engaging learning experiences, children should be able to:
SP.3 carry out a statistical investigation which includes the ability to: b. plan and implement a method to generate and/or source unbiased, representative data, and present this data in a frequency table	• pose questions of interest and collect, display and critically analyse data in a range of ways for a range of purposes and communicate the findings. Data and Chance Stage 3: Data • pose questions, collect, compare, summarise and represent data selectively to answer those questions. Data and Chance Stage 4: Data
SP.3 carry out a statistical investigation which includes the ability to: c. classify data (categorical, numerical)	• pose questions of interest and collect, display and critically analyse data in a range of ways for a range of purposes and communicate the findings. Data and Chance Stage 3: Data

Junior Cycle Mathematics Specification Learning outcome Students should be able to:	Primary Mathematics Curriculum Learning Outcome Through appropriately playful and engaging learning experiences, children should be able to:
SP.3 carry out a statistical investigation which includes the ability to: d. select, draw and interpret appropriate graphical displays of univariate data, including pie charts, bar charts, line plots, histograms (equal intervals), ordered stem and leaf plots, and ordered back-to-back stem and leaf plot	• pose questions of interest and collect, display and critically analyse data in a range of ways for a range of purposes and communicate the findings. Data and Chance Stage 3: Data • pose questions, collect, compare, summarise and represent data selectively to answer those questions. Data and Chance Stage 4: Data
SP.3 carry out a statistical investigation which includes the ability to: e. select, calculate and interpret appropriate summary statistics to describe aspects of univariate data. Central tendency: mean (including of a grouped frequency distribution), median, mode. Variability: range	• pose questions, collect, compare, summarise and represent data selectively to answer those questions. Data and Chance Stage 4: Data • critically analyse and evaluate findings; and communicate inferences, conclusions and implications from the findings Data and Chance Stage 4: Data

Junior Cycle Mathematics Specification Learning outcome Students should be able to:	Primary Mathematics Curriculum Learning Outcome Through appropriately playful and engaging learning experiences, children should be able to:
SP.3 carry out a statistical investigation which includes the ability to: f. evaluate the effectiveness of different graphical displays in representing data	• critically analyse and evaluate findings; and communicate inferences, conclusions and implications from the findings. Data and Chance Stage 4: Data
SP.3 carry out a statistical investigation which includes the ability to: g. discuss misconceptions and misuses of statistics	• critically analyse and evaluate findings; and communicate inferences, conclusions and implications from the findings. Data and Chance Stage 4: Data
SP.3 carry out a statistical investigation which includes the ability to: h. discuss the assumptions and limitations of conclusions drawn from sample data or graphical/numerical summaries of data	• critically analyse and evaluate findings; and communicate inferences, conclusions and implications from the findings. Data and Chance Stage 4: Data