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| **Minor Award Name** | **Mathematics** |
| **Minor Award Code** | **4N1987** |
| **Level** | **4** |

**Suggested resources to support delivery:**

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| **Theme/Topic** | **Type** | **Relevance** | **Author/Source** | **Web Link** |
| **Number and Financial Maths**  Everyday maths | YouTube video  (14mins) | Overview of mathematical patterns in nature. | The Guardian | <https://www.youtube.com/watch?v=O7x3LBWn-Ao> |
| Website with video links | Several videos showing examples of maths used in daily life with some follow up problems. Content especially suited to young adults. | Thirteen Productions funded by Next Generation Learning Challenges and The Moody Foundation | <http://www.thirteen.org/get-the-math/> |
| Conversions: fractions – decimals – percentages – ratio | Website Limited free daily practice. Then €10 p.m. | Interactive practice questions on conversions. | IXL Learning | <https://ie.ixl.com/math/year-2/convert-between-percents-fractions-and-decimals> |
| Scientific notation | Website Interactive questions | Interactive practice for learners. | IXL learning | <https://ie.ixl.com/math/year-1/scientific-notation> |
| Indices | Website | Gives explanation of Laws of Indices. Can be printed. There are also lots of follow up interactive questions. | Maths is Fun.com | <http://www.mathsisfun.com/exponent.html> |
| Logs | Website | Explains logs and the Laws of Logs. Can be printed. Followed by interactive questions. | <http://www.mathsisfun.com/algebra/logarithms.html> |
| Approximating | Website | Gives examples of how we estimate in daily life | <http://www.mathsisfun.com/numbers/estimation.html> |
| Taxes and VAT | Website | Current income tax and USC rates | Revenue Commissioners | <http://www.revenue.ie/en/tax/it/leaflets/it1.html#section3> |
| Website | Current PRSI rates | DSP | <http://www.welfare.ie/en/Pages/Class-A-2016.aspx> |
| Profit and loss | Website: free but requires login | Video explaining profit mark-up and margin | Alison.com | <https://alison.com/topic/learn/5048/49975/junior-certificate-strand-3-ordinary-level-numbers-and-shapes/profit-markup-and-margin> |
| Simple and Compound Interest | PDF | Downloadable Resource pack with good ideas for integrating maths with other modules.  Credit and interest : pages90 - 97 | State Government of Victoria, Consumer Affairs | <https://www.consumer.vic.gov.au/resources-and-education/teacher-resources/resources/secondary-teacher-resources> |
| Website | Practice questions in compound interest | IXL Learning | <https://ie.ixl.com/math/year-2/compound-interest> |
| Website | Video showing simple interest calculation.  There is a similar video showing a compound interest calculation in this section | Alison.com | <https://alison.com/topic/learn/5048/49979/junior-certificate-strand-3-ordinary-level-numbers-and-shapes/simple-interest-calculating-the-interest> |
| **Geometry**  Symmetry | Website PDF | Printable page showing lines of symmetry | Annenberg Learner Foundation | <https://learner.org/courses/learningmath/geometry/pdfs/7a.pdf> |
| Website | Examples of axial symmetry with downloadable notes and worksheets | Helping With Math.com | <http://www.helpingwithmath.com/by_subject/geometry/geo_symmetry.htm> |
| Website | Animation showing rotation | PBS Learning.org | <http://www.pbslearningmedia.org/asset/mgbh_int_anglerota/> |
| Constructions | Website | Click on Flash Animation for animated demonstrations of constructions | CBS Thurlus from scoilnet.ie website | <http://cbsthurles.scoilnet.ie/blog/files/2011/05/Constructions-pdf.pdf> |
| Website | Construction worksheets with links to interactive demonstrations.  This site also covers other Geometry topics | The Math Open Reference Project | <http://www.mathopenref.com/worksheetlist.html> |
| Perimeter, area and volume | Website | Video explaining π and deriving formula for length of circle. | Alison.com | <https://alison.com/topic/learn/5048/49986/junior-certificate-strand-3-ordinary-level-numbers-and-shapes/circumference-of-a-circle> |
| Website | Free printable worksheets on area, surface area and volume | Maths Drills.com | <http://www.math-drills.com/measurement.php#savolume> |
| Axioms and Theorems | Website or App for iPad or tablet Interactive questions.  Limited free daily practice. | Practice questions in alternate and corresponding angles | IXL Learning | <https://ie.ixl.com/math/year-2/transversal-of-parallel-lines> |
| Practice questions in finding size of missing angles in triangle | <https://ie.ixl.com/math/year-2/find-missing-angles-in-triangles-and-quadrilaterals> |
| Practice questions on Pythagoras’ Theorem followed by practical problem questions. | <https://ie.ixl.com/math/year-2/pythagoras-theorem-find-the-length-of-the-hypotenuse> |
| Website video | Demonstrates alternate and corresponding angles created by transversal | Khan Academy | <https://www.khanacademy.org/math/geometry/parallel-and-perpendicular-lines/ang-intro/v/figuring-out-angles-between-transversal-and-parallel-lines> |
| Website video (10mins) | Shows using Pythagorean Theorem to find length of side | <https://www.khanacademy.org/math/geometry/right-triangles-topic/pyth-theor/v/the-pythagorean-theorem> |
| Website | Downloadable applet requires java. Shows  Theorems on course. | CEMTL UL Limerick | <http://www3.ul.ie/cemtl/JCApplets.htm> |
| Website | This section of vast website would be useful for revision of theorems with a revise, video and test option | BBC Bitesize | <http://www.bbc.co.uk/education/guides/zhdfr82/revision/1> |
| Graphs/ordered pairs | Website video  (11mins) | Video introducing co-ordinate plane and relating linear equation to graph | Khan Academy | <https://www.khanacademy.org/math/algebra/introduction-to-algebra/overview_hist_alg/v/descartes-and-cartesian-coordinates> |
| Co-ordinate geometry formulae | Website | Tutorial video on finding equation of line | Alison.com | <https://alison.com/topic/learn/4971/49512/module-1-junior-certificate-strand-2-ordinary-level-geometry-and-trigonometry/parallel-lines> |
| Website | Video showing derivation and use of formulae for distance, slope and midpoint.  Suitable for stronger learners who want to understand derivation of formulae. | <https://alison.com/topic/learn/4971/49510/module-1-junior-certificate-strand-2-ordinary-level-geometry-and-trigonometry/geometry-with-co-ordinates> |
| **Algebra** | Website | Covers most of algebra course including basic manipulation of equations, solving linear equations and inequalities, factorising and solving quadratics, solving word problems and laws of indices. | Maths is Fun.com | <http://www.mathsisfun.com/algebra/index.html> |
| Website | This site allows you to input and expression or equation and it will simplify, solve or graph it for you automatically. Covers 3 levels – basic, intermediate and advanced. | Developed and maintained by Bill Langton, Australia. | <http://www.quickmath.com/> |
| Independent/ dependent variables | Website or App for iPad or tablet  Interactive questions  Website video | Learners can practice identifying the independent and dependent variable in everyday situations. Answers corrected and explained.  Video explaining concept of a variable | IXL Learning  Khan Academy | <https://ie.ixl.com/math/year-1/identify-independent-and-dependent-variables>  <https://www.khanacademy.org/math/algebra/introduction-to-algebra/alg1-intro-to-variables/v/what-is-a-variable> |
| Using equations to solve problems | Website(PDF) | Student activity pages at end of this PDF contain several word problems. | Project Maths Development team | <http://www.projectmaths.ie/documents/T&L/IntroductionToEquations.pdf> |
| Inequalities | Website(PDF) | Teaching and Learning plan on inequalities. Includes student activities. Also available as PowerPoint | Project Maths Development team | <http://www.projectmaths.ie/documents/T&L/IntroductionToInequalities.pdf> |
| Quadratic equations | Website video  (5mins) | Shows examples of using quadratic formula with and without negative coefficients | Khan Academy | <https://www.khanacademy.org/math/algebra/quadratics/solving-quadratics-using-the-quadratic-formula/v/quadratic-formula-1> |
| also  <https://www.khanacademy.org/math/algebra/quadratics/solving-quadratics-using-the-quadratic-formula/v/applying-the-quadratic-formula> |
|  | Website(PDF) | Teaching and learning plan on quadratic equations. Includes pages on student activities/problems. Also available as PowerPoint. | Project Maths Development team | <http://www.projectmaths.ie/documents/T&L/IntroductionToQuadraticEquations.pdf> |
| **Statistics** | Website | Covers a lot of Level 4 Statistics including types of data, graphing data, measures of location and spread. A short explanation is given followed by practice questions. | Maths is Fun.com | <http://www.mathsisfun.com/data/index.html> |
| Averages | Website video (8mins) | Intro to mean ,median and mode | Khan Academy | <https://www.khanacademy.org/math/probability/descriptive-statistics/central-tendency/v/statistics-intro-mean-median-and-mode> |
| Website video (3mins) | Video showing calculation of averages | <https://www.khanacademy.org/math/probability/descriptive-statistics/central-tendency/v/mean-median-and-mode> |
| Website video (8mins) | Demonstrates effect of outlier on mean | <https://www.khanacademy.org/math/probability/descriptive-statistics/central-tendency/v/comparing-distribution-means> |
| Good practice in statistics | Website | Downloadable graphs showing misuse of statistics | PULSE funded by SEPA (USA) | <http://pulse.pharmacy.arizona.edu/math/lies_more_lies.html> |
| **General** | Book | 4 Workbooks covering L. Cert Applied course but also useful for Level 4 maths | Goldenkey Educational Publishing | <https://www.folens.ie/programmes/active-maths> |
| Book | Active Maths Leaving Cert OL Book 1 & 2 covers all areas of the course and is a good resource book for tutors. A lot of the content is at a higher level than required but the Algebra, Statistics, Arithmetic and Co-ordinate geometry chapters in particular are useful. Many of the exercise questions relate the maths learned to everyday problems. | By Michael Keating, Derek Mulvany and JamPublished by Folens | <https://www.folens.ie/books/active-maths-1-activity-book> |
| Website | Website with lots of graded problems in  Geometry and Algebra designed to develop logical reasoning. Web link is to section on everyday problems. | A+click | <http://www.aplusclick.com/grade14.htm> |
| Website | Lots of useful content. Explanation of topics could be printed and used as notes for learners. Exercises are interactive. | Maths is Fun.com | <http://www.mathsisfun.com/index.htm> |
| Website – downloadable PDF booklets | Explanations/exercises could be printed for learners.  Topics covered:  Booklet1: Graphing inequalities; BIMDAS rule; Laws of Indices ;  Bk4: Linear and simultaneous equations  Bk5: Factorising and solving quadratics  Bk6: Linear graphs and slope  Bk9: Indices and Logs | CEMTL University of Limerick | <http://www3.ul.ie/cemtl/headstart.htm> |
| Website | Geogebra is useful for showing the | Geogebra – free | <http://www.geogebra.org/> |
| graphics package | Relationship between equations and graphs and also for demonstrating geometry concepts. Difficult to use initially | mathematics software |  |
| PDF | Instructions on using The Function Inspector in Geogebra which shows graph of equation entered. | Project maths website | <http://www.projectmaths.ie/documents/LearnGeoGebra/UsingTheFunctionInspectorInGeoGebra.pdf?strand> |
| Website | A lot of the content on this website could not be used for delivering Level 4 due to time constraints but it may prompt new ideas for delivery of course. | Project maths website | <http://www.projectmaths.ie/> |
| Website | Large site with printable notes and worksheets and interactive questions with answers and explanations. Covers some Level 4 topics which are mostly found in the Book 8 section | CIMT Plymouth | <http://www.cimt.plymouth.ac.uk/projects/mepres/book8/book8int.htm> |
| Website | Most of resources at National Level 4 (this link) are useful. Each topic has a revise, test and video clips section.  Some of National Level 5 is relevant e.g. Quadratic Equations section | BBC Bitesize | <http://www.bbc.co.uk/education/subjects/zyc76sg> |
| Website | Contains free printable worksheets | Fun Maths.com | <http://www.funmaths.com/worksheets/> |
| Website | A list of 134 maths resource websites | Scoilnet.ie | <https://www.scoilnet.ie/search/?fq=school_level%3A2&q=maths> |

**Useful Organisations:**

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| **Name** | **Contact Information** |
| Quality and Qualifications Ireland (QQI) – for minor and major award component specifications | <http://www.qqi.ie/> |
| Further Education Support Services (FESS) – for resources and information on CPD | <http://fess.ie/> |
| Irish Maths Teachers association (IMTA) – organisation representing and supporting maths teachers | <http://www.imta.ie/> |
| Dyslexia Association of Ireland – website has information section for teachers on dyslexia and a section on dyscalculia. | <http://www.dyslexia.ie/information/information-for-teachers-schools-and-colleges/> |
| Project Maths Development Team | <http://www.projectmaths.ie/> |

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| **MOOCs (Massive Online Open Courses)** | |
| Free access to online courses  Search regularly for new courses and new start dates | <https://www.mooc-list.com/> |
| Coursera.org – an education platform that partners with top universities and organisations worldwide to offer online courses. | <https://www.coursera.org/> |
| Course Talk – lists online courses with student reviews | <https://www.coursetalk.com/> |
| MOOC List is a directory of online courses | <https://www.mooc-list.com/?static=true> |