re(Solve) MATHS BY INQUIRY

Summary of reSolve Special Topics (as of April 13, 2017)

Special Topics are a significant resource within the reSolve classroom resources that address the needs of 21st century learners. They

- are substantial units of work and accompanying resources that address some major current gaps
- prioritise the Australian Curriculum proficiencies of reasoning and problem solving,
- provide imaginative opportunities for creatively using new technologies and real world contexts,
- respond to the results of international assessments showing that solving real problems is a specific area of weakness for Australian students.

Trialling the Special Topics

Materials will become available progressively during 2017 on the reSolve website http://resolve.edu.au.

For information about Special Topics, contact Director of Special Topics <Kaye.Stacey@science.org.au>. To find out more about reSolve Mathematics by Inquiry, visit http://resolve.edu.au or contact mbi@science.org.au

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ST1. **Mechanical Linkages and Deductive Geometry (**for Years 7 to 10)

Mechanical linkages – sets of hinged rods – form the basis of many everyday objects such as ironing tables, car jacks, elevated work platforms and folding umbrellas. Many of these objects incorporate geometry very appropriate to Years 7 to 10 including isosceles triangles, rhombuses, parallelograms. They offer rich potential for investigating geometry, with working models or real-life examples, and then explored using dynamic geometry software. Students' deductive reasoning is developed when working with and exploring the models (tactile or virtual). There are fifteen tasks with student sheets and teacher lesson notes available.


Now ready for trialling. Contact Kaye Stacey <kaye.stacey@science.org.au>

ST2. **Bringing the Real World into Algebra** (for Years 5 to 10)

These 5 units will help students appreciate the purposes of algebra, promote algebraic thinking and especially an understanding of functions (including linear, quadratic and exponential). Real world contexts from a variety of settings including science and music will be explored. Digital images, hands on activities and data collection will be used to engage students in solving real world problem functions. Mathematical thinking about functions links visual, numerical, graphical and symbolic representations as students explore relationships between variables and develop generalisations. There will be separate units for each year level, following the Australian Curriculum content.

Lessons will be available for trialling in Terms 3 and 4, 2017.
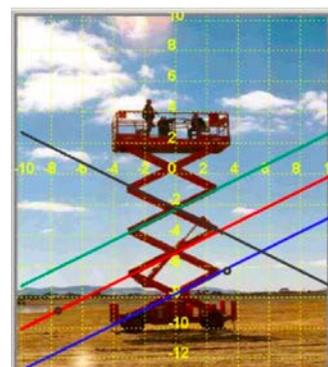
ST3. **Modelling Motion** (for Years 5 to 8)
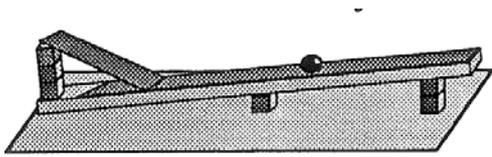
What happens to the speed of a ball rolling uphill?

Four lessons (with material for each year level) will be available for trialling in Term 3, 2017 and the following four lessons available for Term 4, 2017.

An inquiry-based unit of eight lessons, focussing on modelling a variety of different motions with mathematics. Contexts include rolling balls and falling objects, Olympics events, and Galileo's experiments with falling objects. The modelling of a motion mathematically is used to make predictions: "how long will it take a ball to hit the ground?" or "how fast will it be going on impact?" Students will experience the power of mathematics in STEM and build mathematical modelling skills. Depending on students' level, they will make and interpret mathematical representations including tables of data, graphs and functions, use proportional reasoning, and work with rates of change and algebra. Lessons use simple equipment and can be taught in ordinary classrooms.

ST4. **The Bar Model Method** (for Years 5, 6 and 7)

Three units of approximately 8 lessons each, exemplifying the 'bar model method'. This is a pedagogical strategy widely used in Singapore to help students solve word problems. The method:
- offers an efficient and effective problem-solving tool for use across many topics in mathematics
- promotes the visualisation of mathematical quantities and relationships within a problem
- exemplifies and makes visible the part-whole thinking that is key to so much of primary mathematics.

Units will be progressively available for trialling from May 1st, 2017 to the end of the year (year 5 first).

ST5. **Assessing Reasoning** (for all primary teachers)

Mathematical reasoning is one of four proficiencies in the Australian Curriculum: Mathematics. This project will provide a framework for assessing reasoning and a learning trajectory that describes how students' reasoning develops. These tools will strengthen teachers' insights into their students' reasoning and provide assessment strategies. Student work samples, assessment rubrics and video clips will demonstrate progress in reasoning, and highlight questioning to elicit reasoning. Illustrative material will be from Years 3 to 6 students. It is intended that the framework and learning trajectory could become a part of everyday planning, teaching and assessment in all primary mathematics content strands.

Available for trialling from August to November 2017.

ST6. **Mathematics and Algorithmic Thinking** (for Years 8, 9, 10)

These units will introduce students to the possibilities of computer-based mathematics, highlighting computational and algorithmic thinking. They will demonstrate how mathematicians work in the real world. Three units use specially constructed software and will require no prior coding knowledge. Topics being planned include computer-generated art (involving measurement and geometry), cellular automata (data representation, statistics), and population growth and decay (science links). The optional follow-up coding-based units look 'behind the scenes' and will allow students to develop and extend coding knowledge. Explorations will range from bite-sized investigations where students are guided step by step, to open-ended explorations where students design their own projects.

Available for trialling from Term 4, 2017.

COMING SOON

Mathematical Inquiry into Authentic Problems (for Foundation to Year 6)
Trialling anticipated in Terms 3 and 4, 2017 and Term 1, 2018

Mathematical Modelling (for Years 9 and 10).
Trialling anticipated from August, 2017