



Problem Solving versus Reasoning

<http://topdrawer.aamt.edu.au/Reasoning>

Problem Solving	Reasoning
PROFICIENCY OVERVIEW	
Students develop the ability to: • make choices • interpret • formulate • model and investigate problem situations • communicate solutions effectively. Students formulate and solve problems when they use mathematics to represent unfamiliar or meaningful situations, when they design investigations and plan their approaches, when they apply their existing strategies to seek solutions and when they verify that their answers are reasonable.	Students develop an increasingly sophisticated capacity for logical thought and actions, such as: • analysing • proving • evaluating • explaining • inferring • justifying • generalising Students are reasoning mathematically when they explain their thinking, when they deduce and justify strategies used and conclusions reached, when they adapt the known to the unknown, when they transfer learning from one context to another, when they prove that something is true or false and when they compare and contrast related ideas and explain their choices.
YEAR 5	
<i>Problem Solving</i> includes formulating and solving authentic problems using whole numbers and measurements and creating financial plans.	<i>Reasoning</i> includes investigating strategies to perform calculations efficiently, continuing patterns involving fractions and decimals, interpreting results of chance experiments, posing appropriate questions for data investigations and interpreting data sets.
YEAR 6	
<i>Problem Solving</i> includes formulating and solving authentic problems using fractions, decimals, percentages and measurements, interpreting secondary data displays, and finding the size of unknown angles.	<i>Reasoning</i> includes explaining mental strategies for performing calculations, describing results for continuing number sequences, explaining the transformation of one shape into another, explaining why the actual results of chance experiments may differ from expected results.

AAMT — TOP DRAWER TEACHERS

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YEAR 7	
<i>Problem Solving</i> includes formulating and solving authentic problems using numbers and measurements, working with transformations and identifying symmetry, calculating angles and interpreting sets of data collected through chance experiments.	<i>Reasoning</i> includes applying the number laws to calculations, applying known geometric facts to draw conclusions about shapes, applying an understanding of ratio and interpreting data displays.
YEAR 8	
<i>Problem Solving</i> includes formulating and modelling practical situations involving ratios, profit and loss, areas and perimeters of common shapes, and using two-way tables and Venn diagrams to calculate probabilities.	<i>Reasoning</i> includes justifying the result of a calculation or estimation as reasonable, deriving probability from its complement, using congruence to deduce properties of triangles, finding estimates of means and proportions of populations.
YEAR 9	
<i>Problem Solving</i> includes formulating and modelling practical situations involving surface areas and volumes of right prisms, applying ratio and scale factors to similar figures, solving problems involving right-angle trigonometry, and collecting data from secondary sources to investigate an issue.	<i>Reasoning</i> includes following mathematical arguments, evaluating media reports and using statistical knowledge to clarify situations, developing strategies in investigating similarity and sketching linear graphs.
YEAR 10	
<i>Problem Solving</i> includes calculating the surface area and volume of a diverse range of prisms to solve practical problems, finding unknown lengths and angles using applications of trigonometry, using algebraic and graphical techniques to find solutions to simultaneous equations and inequalities, and investigating independence of events.	<i>Reasoning</i> includes formulating geometric proofs involving congruence and similarity, interpreting and evaluating media statements and interpreting and comparing data sets.

Unmodified ACARA material

Source: Australian Curriculum, Assessment and Reporting Authority (ACARA)