Lesson Plans

Year 9 Mathematics TERM 1

Some general points about the following lesson plans:

- ★ The lesson plans outline only one way of sequencing the learning material in each chapter of the textbook.
- ★ The content and sequence will obviously vary from class to class (The following guide is ambitious in many instances).
- ★ All activities and investigations in each chapter have been deliberately designed to support the National Curriculum content whilst keeping in mind the development and reinforcement of skills required in the study of mathematics in Year 11/12.
- ★ The length of lessons vary from school to school and even within schools. The following guide is based on 35/40 min lessons because it was reasoned that adjustment to 60/75/90 mins lessons would be easier than reducing lesson plans.
- ★ Students may be challenged further by completing each chapter Task, Competition Questions, and by finding and entering any of the many competitions, challenges, projects etc that may be found on the Internet. Such students may benefit by doing an Internet search early in the year and planning entries before they close.

Assessment

A task	7th week of Term
Mental computation	Last week of Term
End of Term Test	Last week of Term

Summary of Term 1 Lessons (10 weeks)

Chapter 1	Indices 1	Number & Algebra - Real Numbers	2 weeks
Chapter 2	Algebra 1	Number & Algebra - Patterna & Algebra	2 weeks
Chapter 3	Area	Measurement & Geometry - Units	2 weeks
Chapter 4	Graphs	Number & Algebra - Linear & Non	2 weeks
Chapter 5	Review		2 weeks

Note: The workprogram contains a detailed mapping of curriculum content.

Year 9 Level Description

The proficiency strands Understanding, Fluency, Problem Solving and Reasoning are an integral part of mathematics content across the three content strands: Number and Algebra, Measurement and Geometry, and Statistics and Probability. The proficiencies reinforce the significance of working mathematically within the content and describe how the content is explored or developed. They provide the language to build in the developmental aspects of the learning of mathematics.

At this year level:

- **Understanding** includes describing the relationship between graphs and equations, simplifying a range of algebraic expressions, explaining the function of relative frequencies and probabilities, calculating areas of shapes and surface areas of prisms and the constancy of the trigonometric ratios for right-angle triangles.
- **Fluency** includes applying the index laws to expressions with integer indices, expressing numbers in scientific notation, listing outcomes for experiments and developing familiarity with calculations involving the Cartesian plane.
- **Problem Solving** includes calculating 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.
- **Reasoning** includes following mathematical arguments, evaluating media reports and using statistical knowledge to draw conclusions, developing strategies in investigating similarity and sketching linear graphs**.**

Year 9 Content Description

Chapter 1 Indices 1 (Number & Algebra ➡ Real Numbers)

★ Apply index laws to numerical expressions with integer indices.
★ Connect different strategies for simplifying expressions with indices to illustrate the meaning of negative indices.
★ Move fluently between representations of numeric and algebraic terms with negative indices.
★ Apply knowledge of index laws to algebraic terms and simplify algebraic expressions, using both positive and negative integral indices.

Chapter 2 Algebra 1 (Number & Algebra ➡ Patterns & Algebra)

★ Apply the distributive law to the expansion of algebraic expressions, including binomials, and collect like terms where appropriate.
★ Understand that the distributive law can be applied to algebraic expressions as well as numbers, and understanding the inverse relationship between expansion and factorisation.
★ Extend and apply the index laws to variables, using positive integral indices.

Chapter 3 Area (Measurement & Geometry ➡ Using units of measurement)

★ Calculate the areas of composite shapes.
★ Understand that partitioning composite shapes into rectangles and triangles is a strategy for solving problems involving perimeter and area.
★ Analyse nets of prisms and cylinders to establish formulas for surface area.
★ Calculate the surface area of cylinders and right prisms and solve related problems.
★ Become fluent with calculation of area and identify that area is used in the workplace and everyday life.

Chapter 4 Graphs (Number & Algebra ➡ Linear & Non-linear Relationships)

★ Sketch linear graphs using the coordinates of two points.
★ Determine linear rules from suitable diagrams, tables of values and graphs and describe them both using words and algebra.
★ Sketch parabolas, hyperbolas, circles.

Chapter 20 Review

★ Review of all of above.

Chapter 1 Indices 1 Number & Algebra - Real Numbers 2 weeks

- ★ Apply index laws to numerical expressions with integer indices.
- ★ Connect different strategies for simplifying expressions with indices to illustrate the meaning of negative indices.
- ★ Move fluently between representations of numeric and algebraic terms with negative indices.
- ★ Apply knowledge of index laws to algebraic terms and simplify algebraic expressions, using both positive and negative integral indices.

Lesson	Method	Resources
1	☐ Purpose of chapter ☐ Warm-up Exercise 1.1 and 1.2 p2 ☐ HW: Read and practice the Sweet Trick on p13	
2	☐ Exercise 1.3, Exercise 1.4, Exercise 1.5 p3 ☐ Index Law 1. Exercise 1.6 p4 ☐ Some students demonstrate the Sweet Trick p13 ☐ HW: Complete Exercises and demonstrate Sweet Trick at home/lodgings	
3	☐ Discussion about Sweet Trick - how to improve presentation ☐ Index Law 2. Exercise 1.7 p4 ☐ Index Law 3. Exercise 1.8 p4 (Model solutions to more difficult problems) ☐ Index Law 4. Exercise 1.9 p4 ☐ HW: Complete Exercises	
4	☐ Index Law 5. Exercise 1.10 p6 (Model solutions) ☐ Summary of Index Laws. Exercise 1.11 p7 (Model solutions) ☐ HW: Complete exercises	
5	☐ Discussion of why employers are adamant that employees have adequate mental computation skills - also very useful revision technique ☐ Mental computation Exercise 1.13 p9 ☐ NAPLAN Questions p10 (Model solutions) ☐ HW: Complete NAPLAN Questions	
6	☐ Mental computation Exercise 1.14 p9 Group work working on a directed/choice/combination of: ☐ Investigation 1.1, 1.2 p12 ☐ A game p13 ☐ Technology 1.1, 1.2 p14 ☐ HW: A couple of puzzles p13	calculators spreadsheets
7	☐ Mental computation Exercise 1.15 p9 Group work working on a choice/directed/combination of: ☐ Investigation 1.1, 1.2 p12 ☐ A game p13 ☐ Technology 1.1, 1.2 p14	calculators spreadsheets
8	☐ Summary of Index Laws. Exercise 1.12 p8 ☐ Competition Questions p11 (Model solutions) ☐ HW: Complete Competition Questions	
9	☐ Chapter Review 1 p16 ☐ HW: Complete Chapter Review	
10	☐ Chapter Review 2 p16 ☐ HW: Complete Chapter Review	

Chapter 2 Algebra 1 (Number & Algebra ➡ Patterns & Algebra)

- ★ Apply the distributive law to the expansion of algebraic expressions, including binomials, and collect like terms where appropriate.
- ★ Understand that the distributive law can be applied to algebraic expressions as well as numbers, and understanding the inverse relationship between expansion and factorisation.
- ★ Extend and apply the index laws to variables, using positive integral indices.

Lesson	Method	Resources
1	Purpose of chapter. Importance of algebra for solving millions of problems Exercise 2.1 p18 (Model solutions for students) Exercise 2.2 p18 and p 19 (Model solutions for students) HW: Read and practice the Sweet Trick on p29	
2	Exercise 2.3 p19 (Model solutions) Exercise 2.4 p20 (Model solutions) Some students demonstrate the Sweet Trick p29 HW: Complete Exercise and demonstrate Sweet Trick at home/lodgings	
3	Discussion about Sweet Trick - how to improve presentation Exercise 2.5 p20 (Model solutions) Exercise 2.6 p21 (Model solutions) HW: Complete Exercises	
4	Exercise 2.7 p22 (Model solutions) HW: Complete exercise	
5	Mental computation Exercise 2.12 p25 Exercise 2.8 and 2.9 p23 (Model solutions) Exercise 2.10 and 2.11 p24 (Model solutions) HW: Complete exercises	
6	Mental computation Exercise 2.13 p25 Group work working on directed/choice/combination of: Investigations 2.1, 2.2, 2.3 p28 A game p29 Technology 2.1, 2.2, 2.3, 2.4 p30 HW: A couple of puzzles p29	
7	Mental computation Exercise 2.14 p25 Group work working on directed/choice/combination of: Investigations 2.1, 2.2, 2.3 p28 A game p29 Technology 2.1, 2.2, 2.3, 2.4 p30	computers graphics calculators
8	NAPLAN Questions p26 Competition Questions p27 HW: Complete NAPLAN Questions	
9	Chapter Review 1 p31 HW: Complete Chapter Review	
10	Chapter Review 2 p32 HW: Complete Chapter Review	

Chapter 3 Area (Measurement & Geometry ➡ Using units of measurement)

- ★ Calculate the areas of composite shapes.
- ★ Understand that partitioning composite shapes into rectangles and triangles is a strategy for solving problems involving perimeter and area.
- ★ Analyse nets of prisms and cylinders to establish formulas for surface area.
- ★ Calculate the surface area of cylinders and right prisms and solve related problems.
- ★ Become fluent with calculation of area and identify that area is used in the workplace and everyday life.

Lesson	Method	Resources
1	☐ Purpose of chapter. ☐ Exercise 3.1 p34 ☐ Exercise 3.2 p35 ☐ HW: Read and practice the Sweet Trick on p46 and complete exercises	
2	☐ Exercises 3.3, 3.4 p36 ☐ Exercises 3.5 p37 ☐ Some students demonstrate the Sweet Trick p46 ☐ HW: Complete Exercises and demonstrate Sweet Trick at home/lodgings	
3	☐ Discussion about Sweet Trick - how to improve presentation ☐ Exercise 3.6, 3.7 p38 ☐ Exercise 3.8 p39 (Model solutions) ☐ HW: Complete exercises	
4	☐ Exercise 3.9 p40 ☐ HW: Complete exercise	
5	☐ Mental computation Exercise 3.10 p41 ☐ NAPLAN Questions p42 (Model solutions) ☐ HW: Complete NAPLAN Questions	
6	☐ Mental computation Exercise 3.11 p41 ☐ Competition Questions p43 (Model solutions) ☐ HW: Complete Competition Questions	
7	☐ Mental computation Exercise 3.12 p41 Group work working on a directed/choice/combination of: ☐ Investigations 3.1, 3.2, 3.3, 3.4 p44 ☐ Technology 3.1, 3.2, 3.3 p45 ☐ A Game p46	grid paper box scissors newspaper Internet
8	Group work working on a directed/choice/combination of: ☐ Investigations 3.1, 3.2, 3.3, 3.4 p44 ☐ Technology 3.1, 3.2, 3.3 p45 ☐ A Game p46 ☐ HW: A couple of puzzles p46	grid paper box scissors newspaper Internet
9	☐ Chapter Review 1 p47 ☐ HW: Complete Chapter Review	
10	☐ Chapter Review 2 p48 ☐ HW: Complete Chapter Review	

Chapter 4 Graphs (Number & Algebra ➡ Linear & Non-linear Relationships)

★ Sketch linear graphs using the coordinates of two points.
★ Determine linear rules from suitable diagrams, tables of values and graphs and describe them both using words and algebra.
★ Sketch parabolas, hyperbolas, circles.

Lesson	Method	Resources
1	☐ Purpose of chapter ☐ Exercise 4.1 p50 (Model solutions) ☐ Exercise 4.2 p51 (Model solutions) ☐ HW: Read and practice the Sweet Trick on p62, complete exercises	
2	☐ Exercise 4.3 p52 (Model solutions) ☐ Exercise 4.4 p53 (Model solutions) ☐ Some students demonstrate the Sweet Trick p62 ☐ HW: Complete exercise and demonstrate Sweet Trick at home/lodgings	
3	☐ Exercise 4.5 p54 ☐ HW: Complete exercise	
4	☐ Exercise 4.6 p55 ☐ HW: Complete above exercise	
5	☐ Exercise 4.7 p56 ☐ HW: Complete above exercise	
6	☐ Mental computation Exercise 4.8 p57 ☐ NAPLAN Questions p58 ☐ Competition Questions p59 ☐ HW: Complete above exercises	
7	☐ Mental computation Exercise 4.9 p57 Group work working on a directed/choice/combination of: ☐ Investigations 4.1, 4.2, 4.3 p60 ☐ Technology 4.1, 4.2, 4.3, 4.4 p61 ☐ A Game p62 ☐ HW: A couple of puzzles p62	string stopwatches tape measures Internet spreadsheets Graphics calc.
8	☐ Mental computation Exercise 4.10 p57 Group work working on a directed/choice/combination of: ☐ Investigations 4.1, 4.2, 4.3 p60 ☐ Technology 4.1, 4.2, 4.3, 4.4 p61 ☐ A Game p62	
9	☐ Chapter Review 1 p63 ☐ HW: Complete Chapter Review	
10	☐ Chapter Review 2 p64 ☐ HW: Complete Chapter Review	

A Task

Work on one of the four tasks at the beginning of each chapter.
(Page 1, page 17, page 33, page 49)

Lesson	Method	Resources
1-5	□ Setup □ Decide whether tasks completed individually, groups of two, three, or four □ Decide which tasks are assigned to individuals/groups □ Decide how tasks are to be presented: Oral presentation, poster presentation (on classroom wall), power point presentation etc. □ If the presentation will take class time then decide when. □ Each lesson may be started with a mental computation or a summary of what is expected from the work on the tasks.	Textbook Assesssment instruments

Chapter 5 Review

Chapter 1 Indices 1 (Number & Algebra ➞ Real Numbers)

★ Apply index laws to numerical expressions with integer indices.
★ Connect different strategies for simplifying expressions with indices to illustrate the meaning of negative indices.
★ Move fluently between representations of numeric and algebraic terms with negative indices.
★ Apply knowledge of index laws to algebraic terms and simplify algebraic expressions, using both positive and negative integral indices.

Chapter 2 Algebra 1 (Number & Algebra ➞ Patterns & Algebra)

★ Apply the distributive law to the expansion of algebraic expressions, including binomials, and collect like terms where appropriate.
★ Understand that the distributive law can be applied to algebraic expressions as well as numbers, and understanding the inverse relationship between expansion and factorisation.
★ Extend and apply the index laws to variables, using positive integral indices.

Chapter 3 Area (Measurement & Geometry ➞ Using units of measurement)

★ Calculate the areas of composite shapes.
★ Understand that partitioning composite shapes into rectangles and triangles is a strategy for solving problems involving perimeter and area.
★ Analyse nets of prisms and cylinders to establish formulas for surface area.
★ Calculate the surface area of cylinders and right prisms and solve related problems.
★ Become fluent with calculation of area and identify that area is used in the workplace and everyday life.

Chapter 4 Graphs (Number & Algebra ➞ Linear & Non-linear Relationships)

★ Sketch linear graphs using the coordinates of two points.
★ Determine linear rules from suitable diagrams, tables of values and graphs and describe them both using words and algebra.
★ Sketch parabolas, hyperbolas, circles.

Lesson	Method	Resources
1-10	□ Purpose of Review □ Review 1 p66 □ Review 2 p70 □ Repetition of above until mastery? □ Sample end of term papers (www.drdwyer.com.au) □ Assessment	Textbook Assesssment instruments