# Lesson Plans

## Year 9 Mathematics         TERM 4

**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 guides.

★ 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 some of them 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 3 Lessons (10 weeks)

| Chapter 16 | Coordinate Geometry | Number & Algebra - Linear & Non-linear | 2 weeks |
| Chapter 17 | Trigonometry 2 | Measurement & Geometry - Pythagoras & Trig | 2 weeks |
| Chapter 18 | Algebra 2 | Number & Algebra - Patterns & Algebra | 2 weeks |
| Chapter 19 | Data | Statistics & Probability - Data representation | 2 weeks |
| Chapter 20 | Review | Review all of above | 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 16  Coordinate Geometry    Number & Algebra - Linear & Non-linear        2 weeks**
- ★ Find the distance between two points located on a Cartesian plane using a range of strategies, including graphing software.
- ★ Investigate graphical and algebraic techniques for finding distance.
- ★ Find the midpoint and gradient of a line segment (interval) on the Cartesian plane using a range of strategies.
- ★ Investigate graphical and algebraic techniques for finding midpoint and gradient.

**Chapter 17  Trigonometry 2          Measurement & Geometry - Pythagoras & Trig  2 weeks**
- ★ Apply trigonometry to solve right-angled triangle problems.
- ★ Understand the terms 'adjacent' and 'opposite' sides in a right-angled triangle.
- ★ Select and accurately use the correct trigonometric ratio to find unknown sides and angles in right-angled triangles.

**Chapter 18  Algebra 2              Number & Algebra - Patterns & Algebra        2 weeks**
- ★ 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 understand the inverse relationship between expansion and factorisation.
- ★ Extend and apply the index laws to variables, using positive integral indices.

**Chapter 19  Data                    Statistics & Probability - Data representation      2 weeks**
- ★ Investigate techniques for collecting data, including census, sampling and observation.
- ★ Investigate reports of surveys in digital media and elsewhere for information on how data were obtained to estimate population means and medians.

**Chapter 15  Review**
- ★ Review all of above

**Chapter 16  Coordinate Geometry    Number & Algebra - Linear & Non-linear      2weeks**

★  Find the distance between two points located on a Cartesian plane using a range of strategies, including graphing software.
★  Investigate graphical and algebraic techniques for finding distance.
★  Find the midpoint and gradient of a line segment (interval) on the Cartesian plane using a range of strategies.
★  Investigate graphical and algebraic techniques for finding midpoint and gradient.

| Lesson | Method | Resources |
|---|---|---|
| **1** | ☐  General (covering book, ruling pages, paste study guide etc.) <br> ☐  Purpose of chapter <br> ☐  Exercise 16.1  p214 <br> ☐  Exercise 16.2  p215 <br> ☐  HW: Read and practice the Sweet Trick on p225 | graph paper? |
| **2** | ☐  Exercise 16.3 p216 <br> ☐  Exercise 16.4 p216 <br> ☐  Exercise 16.5 p217 <br> ☐  Some students demonstrate the Sweet Trick p225 <br> ☐  HW: Complete Exercises and demonstrate Sweet Trick at home/lodgings | graph paper? |
| **3** | ☐  Discussion about Sweet Trick - how to improve presentation <br> ☐  Exercise 16.6 p218 <br> ☐  Exercise 16.7 p219 <br> ☐  HW: Complete Exercises | graph paper? |
| **4** | ☐  Exercise 16.8 p220 <br> ☐  HW: Complete exercise | |
| **5** | ☐  Exercise 16.9 p221 (Model solutions) <br> ☐  HW: Complete exercises | |
| **6** | ☐  Mental computation Exercise 16.10 p222 <br> Group work working on a directed/choice/combination of: <br> ☐  Investigation 16.1, 16.2, 16.3 p224 <br> ☐  A game p225 - (play the game a couple of times, determine a strategy) <br> ☐  Technology 16.1, 16.2, 16.3 p226 <br> ☐  HW: A couple of puzzles p225 | Protractor <br> Calculators <br> Internet <br> Computers |
| **7** | ☐  Mental computation Exercise 16.11 p222 <br> Group work working on a directed/choice/combination of: <br> ☐  Investigation 16.1, 16.2, 16.3 p224 <br> ☐  A game p225 - (play the game a couple of times, determine a strategy) <br> ☐  Technology 16.1, 16.2, 16.3 p226 | Calculators <br> Internet <br> Computers |
| **8** | ☐  Mental computation Exercise 16.12 p222 <br> ☐  Competition Questions p223 (Model solutions) <br> ☐  HW: Complete Competition Questions | |
| **9** | ☐  Chapter Review 1 p227 <br> ☐  HW: Complete Chapter Review | |
| **10** | ☐  Chapter Review 2 p228 <br> ☐  HW: Complete Chapter Review | |

**Chapter 17  Trigonometry 2    Measurement & Geometry - Pythagoras & Trig        2 weeks**

★ Apply trigonometry to solve right-angled triangle problems.
★ Understand the terms 'adjacent' and 'opposite' sides in a right-angled triangle.
★ Select and accurately use the correct trigonometric ratio to find unknown sides and angles in right-angled triangles.

| Lesson | Method | Resources |
|:---:|---|---|
| **1** | ☐ Purpose of chapter<br>☐ Exercise 17.1, p230<br>☐ Exercise 17.2 p231<br>☐ HW: Read and practice the Sweet Trick on p240 | |
| **2** | ☐ Exercise 17.3 p232<br>☐ Exercise 17.4 p233<br>☐ Some students demonstrate the Sweet Trick p240<br>☐ HW: Complete Exercises and demonstrate Sweet Trick at home/lodgings | |
| **3** | ☐ Discussion about Sweet Trick - how to improve presentation<br>☐ Exercise 17.5 p234 (Model solutions)<br>☐ HW: Complete exercise | |
| **4** | ☐ Exercise 17.6 p235 (Model solutions)<br>☐ HW: Complete exercise | |
| **5** | ☐ Exercise 17.7 p236 (Model solutions)<br>☐ Exercise 17.8 p237 (Model solutions)<br>☐ HW: Complete exercises | |
| **6** | ☐ Discussion of why employers are adamant that employees have adequate mental computation skills - also very useful revision technique<br>☐ Mental computation Exercise 17.9 p238<br>☐ Investigations 17.1, 17.2, 17.3, 17.4 p241<br>☐ Technology 17.1, 17.2 p242<br>☐ A game p240 | |
| **7** | ☐ Mental computation Exercise 17.10 p238<br>Group work working on a directed/choice/combination of:<br>☐ Investigations 17.1, 17.2, 17.3, 17.4 p241<br>☐ Technology 17.1, 17.2 p242<br>☐ A game p240<br>☐ HW: A couple of puzzles p240 | Tape measure protractors Internet computers protractor straws |
| **8** | ☐ Mental computation Exercise 17.11 p238<br>☐ Competition Questions p239 (Model solutions)<br>☐ HW: Complete Competition Questions | |
| **9** | ☐ Chapter Review 1 p243<br>☐ HW: Complete Chapter Review | |
| **10** | ☐ Chapter Review 2 p244<br>☐ HW: Complete Chapter Review | |

| **Chapter 18  Algebra 2** | **Number & Algebra - Patterns & Algebra** | **2 weeks** |

★ 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 understand 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<br>☐ Exercise 18.1, 18.2, 18.3 p246 (Model solutions)<br>☐ HW: Read and practice the Sweet Trick on p257 | |
| **2** | ☐ Exercise 18.4 p247<br>☐ Exercise 18.5, 18.6, 18.7 p248<br>☐ Some students demonstrate the Sweet Trick p257<br>☐ HW: Complete Exercises and demonstrate Sweet Trick at home/lodgings | |
| **3** | ☐ Discussion about Sweet Trick - how to improve presentation<br>☐ Exercise 18.8 p249 (Model solutions)<br>☐ HW: complete exercise | |
| **4** | ☐ Exercise 18.9, 18.10 p250 (Model solutions)<br>☐ Exercise 18.11, 18.12 p251 (Model solutions)<br>☐ HW: Complete exercises | |
| **5** | ☐ Exercise 18.13 p252 (Model solutions)<br>☐ Exercise 18.14 p253 (Model solutions)<br>☐ HW: Complete exercises | |
| **6** | ☐ Mental computation Exercise 18.15 p254<br>Group work working on a directed/choice/combination of:<br>☐ Investigation 18.1, 18.2, 18.3 p256<br>☐ Technology 18.1, 18.2, 18.3, 18.4 p258<br>☐ A game p257<br>☐ HW: A couple of puzzles p257 | Graphics calculators Internet spreadsheets |
| **7** | ☐ Mental computation Exercise 18.16 p254<br>Group work working on a directed/choice/combination of:<br>☐ Investigation 18.1, 18.2, 18.3 p256<br>☐ Technology 18.1, 18.2, 18.3, 18.4 p258<br>☐ A game p257 | |
| **8** | ☐ Mental computation Exercise 18.17 p254<br>☐ Competition Questions p255 (Model solutions)<br>☐ HW: Complete Competition Questions | |
| **9** | ☐ Chapter Review 1 p259<br>☐ HW: Complete Chapter Review | |
| **10** | ☐ Chapter Review 2 p260<br>☐ HW: Complete Chapter Review | |

| Chapter 19  Data | Statistics & Probability - Data representation | 2 weeks |
|---|---|---|

★ Investigate techniques for collecting data, including census, sampling and observation.

★ Investigate reports of surveys in digital media and elsewhere for information on how data were obtained to estimate population means and medians.

| Lesson | Method | Resources |
|---|---|---|
| 1 | ☐ Purpose of chapter<br>☐ Exercise 19.1, 19.2 p262<br>☐ Exercise 19.3 p263<br>☐ HW: Read and practice the Sweet Trick on p272 | |
| 2 | ☐ Exercise 19.4 p264<br>☐ Some students demonstrate the Sweet Trick p272<br>☐ HW: Complete Exercise and demonstrate Sweet Trick at home/lodgings | |
| 3 | ☐ Discussion about Sweet Trick - how to improve presentation<br>☐ Exercise 19.5 p265<br>☐ Exercise 19.6 p266<br>☐ HW: Complete exercises | |
| 4 | ☐ Exercise 19.7 p267<br>☐ HW: Complete exercise | |
| 5 | ☐ Exercise 19.8 p267<br>☐ HW: Complete exercises | |
| 6 | ☐ Mental computation Exercise 19.9 p268<br>Group work working on a directed/choice/combination of:<br>☐ Investigation 19.1, 19.2, 19.3, 19.4 p270<br>☐ Technology 19.1 p271<br>☐ A game p272<br>☐ HW: A couple of puzzles p272 | Internet spreadsheet graphics calculator |
| 7 | ☐ Mental computation Exercise 19.10 p268<br>Group work working on a directed/choice/combination of:<br>☐ Investigation 19.1, 19.2, 19.3, 19.4 p270<br>☐ Technology 19.1 p271<br>☐ A game p272 | |
| 8 | ☐ Mental computation Exercise 19.11 p268<br>☐ Competition Questions p269 (Model solutions)<br>☐ HW: Complete Competition Questions | |
| 9 | ☐ Chapter Review 1 p273<br>☐ HW: Complete Chapter Review | |
| 10 | ☐ Chapter Review 2 p274<br>☐ HW: Complete Chapter Review | |

## A Task

Work on one of the four tasks at the beginning of each chapter.
(Page 213, page 229, page 245, page 261)

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

# Chapter 20 Review

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| Lesson | Method | Resources |
|---|---|---|
| **1-10** | ☐ Purpose of Review<br>☐ Review 1 p276<br>☐ Review 2 p279<br>☐ Repetition of above until mastery?<br>☐ Sample end of term papers (www.drdwyer.com.au)<br>☐ Assessment | Textbook<br>Assesssment instruments |