HAESE MATHEMATICS
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YEAR 12 MATHEMATICS ESSENTIAL

CHAPTER 1: GEOMETRY

This is a fairly straightforward chapter to ease students into the school year. Much of the content of this chapter is revision of the geometry work in Year 11. The emphasis this year is looking at the number of vertices, edges, and faces of the shapes, and drawing three-dimensional solids using nets and perspective diagrams. The material in Section D: Views of solids provides the groundwork for the three-dimensional scale diagrams encountered in Chapter 3.

CHAPTER 2: LENGTH AND AREA

Section B (Imperial length) is not in the WACE syllabus, so Western Australian students may skip this section.

In addition to dealing with exact measurements, students should be encouraged to improve their skills in estimating lengths. This chapter contains activities to assist with this.

CHAPTER 3: SCALE DIAGRAMS

Students should be familiar with scale diagrams from the Ratio chapter in Year 11. Emphasis has been placed on the types of scale diagrams students are likely to encounter in their adult lives, such as maps and house plans.

Students may be unfamiliar with bearings, so some extra time may need to be spent exploring this concept, before using them in a scale diagram context.

CHAPTER 4: PYTHAGORAS' THEOREM

A	Solving $x^2 = k$	
B	Pythagoras' theorem	3.2.12
C	The converse of Pythagoras' theorem	3.2.12
D	Problem solving	3.2.12

This chapter comprises a fairly standard treatment of Pythagoras' theorem. Students who have previously only encountered equations with one solution may need extra help solving equations of the form $x^2 = k$. Section A will help students with this. Of course, in applying Pythagoras' theorem to right angled triangles, only the positive solution is considered.

Students are given opportunities to solve problems in real-world contexts, including landscaping and design.

CHAPTER 5: FURTHER MEASUREMENT

A	Surface area	3.1.4, 3.1.5
B	Volume	3.1.7
C	Capacity	3.1.6, 3.1.7
D	Mass	
E	Density	

In this chapter, students extend the measurement work done in Year 11 to consider cones and pyramids. Students will have another opportunity to use Pythagoras' theorem here.

Many of the problems are grounded in real-world contexts, including nursing, hospitality, and nutrition.

Mass and density are not in the WACE syllabus, so Sections D and E can be omitted.

CHAPTER 6: RIGHT ANGLED TRIANGLE TRIGONOMETRY

A	Labelling right angled triangles	
B	The trigonometric ratios	
C	Finding sides and angles	3.2.13, 3.2.15
D	Problem solving using trigonometry	3.2.14, 3.2.16

It is likely that students will have struggled with trigonometry in previous years, if indeed they have encountered trigonometry at all. The material in this chapter should therefore be covered very carefully.

When students are introduced to trigonometric ratios in Section B, students should understand that trigonometric ratios such as $\sin 57°$ are not variables but have a particular value, and they should understand what that value represents in the context of right angled triangles. Having this understanding early will help greatly for the sections which follow.

The problem solving section includes some questions involving bearings, which should reinforce the work done on bearings in Chapter 3.

CHAPTER 7:   NON-RIGHT ANGLED TRIANGLE TRIGONOMETRY

A   Trigonometric ratios of obtuse angles
B   The cosine rule   SACE only
C   The sine rule
D   Problem solving

Non-right angled triangle trigonometry is in the SACE syllabus, but not the WACE syllabus. Therefore, only South Australian students must complete this chapter.

CHAPTER 8:   BUSINESS APPLICATIONS

A   Planning business premises
B   Costing calculations
C   Depreciation
D   Insurance   SACE only
E   Cost of goods sold
F   Profit and loss statements
G   Break-even analysis
H   Business structures and taxation

Again, this chapter is in the SACE syllabus, but not the WACE syllabus. Therefore, Western Australian students should skip this chapter.

CHAPTER 9:   LINE GRAPHS

A   The Cartesian plane   3.3.1
B   Graphing linear relationships   3.3.2, 3.3.7, 3.3.8, 3.3.9
C   Graphing lines from equations   3.3.3, 3.3.9
D   Line graphs   3.3.4, 3.3.5, 3.3.6
E   The intersection of line graphs   3.3.10

In Sections B and C, students are presented with a variety of contexts involving linear relationships, and are asked to interpret the gradient and y-intercept of the linear graph. This will help improve their understanding of the line of best fit in Chapter 12.

CHAPTER 10: PROBABILITY

A	Probability	4.1.1, 4.1.2
B	Experimental probability	4.1.4, 4.1.5, 4.1.11
C	Sample space	4.1.7
D	Theoretical probability	4.1.8
E	Compound events	4.1.9
F	Tree diagrams	4.1.9, 4.1.10
G	Simulations	4.1.3, 4.1.4, 4.1.6

Mathematics Essential students did not study probability in Year 11, so this chapter will need to be worked through slowly.

While the syllabus makes no specific mention of compound events, there seems little point in studying tree diagrams without them.

CHAPTER 11: STATISTICS

A	Sampling	3.4.1, 3.4.2, 3.4.3, 3.4.4, 3.4.5, 3.4.6, 3.4.7, 3.4.8, 3.4.9, 3.4.10, 3.4.11
B	Displaying data	
C	Measuring the centre of data	
D	Measuring the spread of data	
E	Back-to-back stem plots	
F	Parallel box plots	

Section A looks at various sampling methods, and the possible errors that can result from sampling. Students following the WACE syllabus need only study this section.

CHAPTER 12: LINEAR CORRELATION

A	Correlation	3.4.12, 3.4.13, 3.4.14, 3.4.16, 3.4.19
B	Measuring correlation	
C	Line of best fit by eye	3.4.15, 3.4.17, 3.4.18
D	Least squares regression line	

In this chapter, students explore the linear correlation between pairs of variables.

The WACE syllabus has removed the use of technology in finding the correlation coefficient and the least squares regression line. That being the case, Western Australian students can omit Sections B and D, and focus on drawing a line of best fit by eye.

CHAPTER 13: INVESTMENTS

A	Simple interest	4.3.1
B	Compound interest	4.3.2, 4.3.3, 4.3.4, 4.3.5, 4.3.6
C	Future value annuities	
D	Tax and inflation	
E	Superannuation	

Western Australian students need only complete Sections A and B of this chapter.

Students may have studied simple interest briefly in Year 11, in the context of percentages. Simple interest will be covered in more detail, and students will encounter compound interest for the first time.

CHAPTER 14: LOANS

A	Reducing balance loans	4.3.7
B	Home loans	4.3.8
C	Strategies to minimise interest	4.3.8
D	Comparing loans	

This chapter completes the finance work for this course by considering loans. Much of the work is done using technology, so students should assess the reasonableness of the answer the calculator gives.

This chapter contains information which should be useful to the students in their adult lives, such as strategies to minimise interest on a home loan, and the dangers of short term loans.

CHAPTER 15: EARTH GEOMETRY AND TIME ZONES

A	Latitude and longitude	4.2.1
B	Distance on the Earth's surface	4.2.2, 4.2.3
C	Time zones	4.2.4, 4.2.5, 4.2.6, 4.2.7, 4.2.8, 4.2.9

In this final chapter, students learn about latitude and longitude, calculating distances on the Earth's surface, and time zones.

In accordance with the syllabus, distances on the Earth's surface are only calculated along lines of longitude. We have included software which students can use to calculate the distance between any two points on the Earth.