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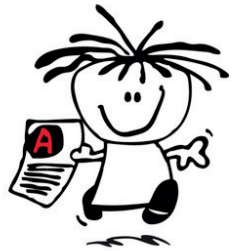

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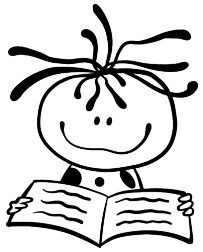
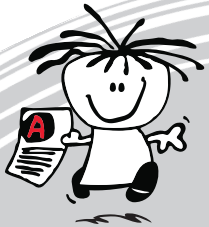
ALGEBRA

CONTENT FRAMEWORK

- Quadratic Equations
  - Quadratic Expressions, f(x) / and the parabola, y = f(x)
    - Nature of the roots



- Quadratic Inequalities
- Simultaneous Equations
- Exponents: Expressions & Equations
- Surds: Expressions & Equations



References to TAS Maths books

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Gr 10 Maths 3-in-1 (Modules 1 → 4)

1.1

Module 1: Numbers & Number Patterns — 1.1

Type of Numbers	1.1	→	1.4
Intervals & Surds	1.5	→	1.7
Mixed Exercise	1.15	→	1.16

Module 2: Exponents — 2.1

Laws, Expressions & Equations	2.1	→	2.12

Module 3: Algebraic Expressions — 3.1

Products & Factors	3.1	→	3.16
Fractions	3.17	→	3.24

Module 4: Algebraic Equations & Inequalities — 4.1

Linear Equations & Inequalities	4.1	→	4.8
Simultaneous Linear Equations	4.9	→	4.13
Quadratic Equations	4.13	→	4.19
Surd Equations	4.19		
Modelling	4.20	→	4.21
Word Sums	4.22	→	4.27

Also see: Exemplar P1 Q1 & Q2 ..... E1

Gr 11 Maths 3-in-1 (Modules 1 → 3)

Also see: Exemplar P1 Q1 → Q3 ..... Q1

Gr 12 Maths 2-in-1 (Module 1)

See Challenging Questions booklet: pages 1 → 2

See the Topic Guides on p. 147 for further exam practice.

Gr 12 Maths Past Papers Toolkit

See the Topic Guides: DBE: p. 1 & IEB: p. 39

PATTERNS & SEQUENCES

CONTENT FRAMEWORK

- Number Patterns
- Linear Sequences

Gr 10

- Quadratic Sequences

Gr 11

- Arithmetic (Linear) Sequences
  T_n & S_n
- Geometric Sequences
  T_n, S_n & S_∞
- Sigma ($\sum$)

Gr 12

Patterns & Sequences

References to TAS Maths books

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Gr 10 Maths 3-in-1 (Module 1)

Number & Geometric Patterns	1.7	→	1.14
Also see: Exemplar P1 (Q3)	E1		

Gr 11 Maths 3-in-1 (Module 4)

	4.1		
Number Patterns	4.1	→	4.6
Linear Sequences	4.7		
Quadratic Sequences	4.7	→	4.10
Also see: Exemplar P1 (Q6 and Q7)	Q2		

Gr 12 Maths 2-in-1 (Module 2)

	4		
Classic Patterns & Quadratic Sequences	4		
Arithmetic (Linear) Sequences	4	→	5
Geometric (Exponential) Sequences	5	→	6
Sigma (∑) & Applications	6	→	7
See Challenging Questions booklet: pages 2 → 3			
Back pages: AP & GP Bookwork (Proofs of Sum formulae)	i		

See the Topic Guide on p. 147 for further exam practice.

Gr 12 Maths Past Papers Toolkit

Back pages: Examinable proofs	i		

See the Topic Guides: DBE: p. 1 & IEB: p. 39

GRAPHS & FUNCTIONS

CONTENT FRAMEWORK

- Concept/Definition of a function
  - Lines
  - Parabolas
  - Hyperbolas
  - Exponential function
  - Logarithmic function (Gr 12)

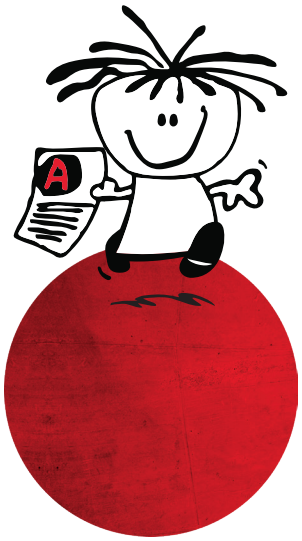
- Parameters

  Gr 10: **a** and **q** as in $y = \mathbf{a}.f(x) + \mathbf{q}$

  Gr 11: **a**, **q** and **p** as in $y = \mathbf{a}.f(x + \mathbf{p}) + \mathbf{q}$

- Sketches, Equations, Interpretation

- Characteristics
  - domain
  - range
  - axis-intercepts
  - turning points
  - minimum & maximum
  - asymptotes
  - shape & symmetry
- Average Gradient (Average rate of change)
- Intervals
- Definition of a Logarithm



Functions

References to TAS Maths books

Gr 10 Maths 3-in-1 (Module 6)

				6.1
Introduction		6.1	→	6.4
Functions		6.4	→	6.5
Individual graphs and their properties		6.6	→	6.17
Interpretation of graphs		6.17	→	6.21

Also see: Exemplar P1 (Q6 & Q7) — E2

Gr 11 Maths 3-in-1 (Module 6a)

				6.1
Algebraic Graphs		6.1	→	6.32

Also see: Exemplar P1 (Q8 → Q10) — Q2

Gr 12 Maths 2-in-1 (Modules 3, 4 and 7)

# 3:Functions & Inverse functions		8	→	12
# 4:Logs & Log functions		12	→	15
# 7:Polynomials (3rd degree)		27	→	28

See Challenging Questions booklet: pages 4 → 9

See the Topic Guide on p. 147 for further exam practice.

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See the Topic Guides: DBE: p. 1 & IEB: p. 39

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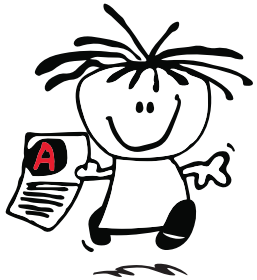
CALCULUS

CONTENT FRAMEWORK

- Concepts:
  - limit
  - average gradient
  - gradient of a tangent
  - limit of average gradient
  - derivative
- Rules of differentiation
- Tangents: Gradient & Equation
- Polynomials;
  Remainder & Factor Theorems
- Cubic graphs
- f, f', f'' & Concavity
- Optimisation /
  Maximum & Minimum



Graph Sketching

Graph	Positive/ Negative	Y-intercept (x = 0) & X-intercept (y = 0)	Turning point/ Stationary pt(s)	Point of Inflection
Straight line	✓	✓	—	—
Parabola	✓	✓	✓	—
Cubic	✓	✓	✓	✓

Note: Domain & Range

References to TAS Maths books

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Gr 12 Maths 2-in-1 (Modules 7 & 8)

Polynomials (3rd degree)	27 ⟶	28
Differential Calculus	29 ⟶	32

See Challenging Questions booklet: pages 9 ⟶ 15

See the Topic Guides on p. 147 for further exam practice.

Back pages: Concavity & The Point of Inflection	xv ⟶	xvi

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Back pages: Concavity & The Point of Inflection	ix ⟶	x

See the Topic Guides: DBE: p. 1 & IEB: p. 39

FINANCE

Gr 10 & Gr 11 SIMPLE and COMPOUND GROWTH and DECAY

$$A = P(1 \pm in) \qquad A = P(1 \pm i)^n$$

Gr 11 NOMINAL and EFFECTIVE INTEREST RATES

The formula: $1 + i_{eff} = \left(1 + \frac{i_{nom}}{m}\right)^m$

Gr 12 FUTURE AND PRESENT VALUE ANNUITIES

$$F_v = \frac{x\left[(1 + i)^n - 1\right]}{i} \qquad P_v = \frac{x\left[1 - (1 + i)^{-n}\right]}{i}$$

Finance

References to TAS Maths books

Gr 10 Maths 3-in-1 (Module 9)

		9.1		
Interest and Interest Rate		9.1	→	9.5
Foreign Exchange Rates		9.5	→	9.8
Revision Exercise		9.8	→	9.11
	Also see: Exemplar P1 (Q4)	E1		

Gr 11 Maths 3-in-1 (Module 11)

		11.1		
Simple and Compound Growth and Decay		11.1	→	11.5
Different Periods of Growth and Decay		11.5	→	11.6
Timelines		11.7	→	11.9
Nominal and Effective Interest Rates		11.9	→	11.10
	Also see: Exemplar P1 (Q4 & Q5)	Q1		

Gr 12 Maths 2-in-1 (Module 5)

		15		
Simple and Compound Growth and Decay	See Challenging Questions booklet: pages 20 → 21	15	→	16
Nominal and Effective Interest Rates		16		
Timelines		16	→	17
Sinking Funds		17		
Annuities	See the Topic Guide on p. 147 for further exam practice.	17	→	19

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See the Topic Guides: DBE: p. 1 & IEB: p. 39

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PROBABILITY THEORY

The Definition of Probability:

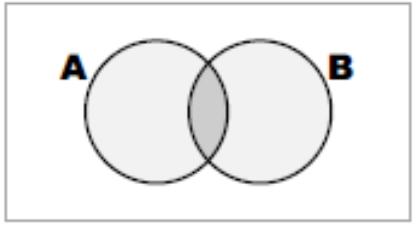
$$P(E) = \frac{n(E)}{n(S)}$$

i.e. Probability of an event E = $\frac{\text{the no. of ways E can occur}}{\text{total no. of possible outcomes}}$

THE PROBABILITY RULES

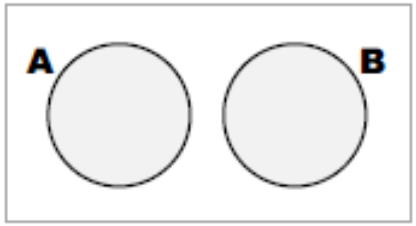
GENERAL RULE

- For **ANY 2 events** A and B:



P(A or B) = P(A) + P(B) – P(A and B)

MUTUALLY EXCLUSIVE EVENTS



There is no overlap of events A & B.

- For 2 **mutually exclusive events** A and B:

P(A or B) = P(A) + P(B) . . . **THE SUM RULE**

Note: Since A and B do not intersect, **P(A and B) = 0** in this case.

INDEPENDENT EVENTS

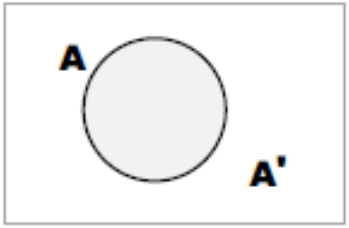
- For 2 **independent** events A and B:

P(A and B) = P(A) × P(B) . . . **THE PRODUCT RULE**

THE COMPLEMENTARY RULE

P(not A) = 1 – P(A)

Note: The sum of the probabilities **P(A) + P(A') = 1**



Probability

References to TAS Maths books

Gr 10 Maths 3-in-1 (Module 12)

	12.1	
Definitions and Terminology	12.1	→ 12.2
Calculating Probability	12.2	→ 12.3
Visual Representations of Probability	12.3	→ 12.11

Also see: Exemplar P1 (Q5) — E2

Gr 11 Maths 3-in-1 (Module 12)

	12.1	
Introduction to Probability	12.2	→ 12.5
Venn Diagrams	12.6	→ 12.10
Independent Events	12.11	→ 12.14
2-Way Contingency Tables	12.15	→ 12.16
Exercises	12.17	→ 12.19

Also see: Exemplar P1 (Q11 & Q12) — Q3

Gr 12 Maths 2-in-1 (Module 12)

	50	
The Probability Rules	50	
Venn Diagrams	50	→ 51
Tree Diagrams	51	→ 52
2-Way Contingency Tables	52	→ 53
& Fundamental Counting Principles	53	

See Challenging Questions booklet: pages 16 → 19

See the Topic Guide on p. 147 for further exam practice.

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See the Topic Guides: DBE: p. 1 & IEB: p. 39

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STATISTICS

CONTENT FRAMEWORK

UNIVARIATE DATA (Gr 10 & 11)

- Organising, Summarising, Displaying data
- Measures of Central Tendency
- Measures of Dispersion
- Diagrams
- Variance & Standard Deviation
- Symmetry & Skewed Data
- Outliers

(Scatterplots)

BIVARIATE DATA (Gr 12)

- Scatterplots
- Regression
- Correlation

Statistics

References to TAS Maths books

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Gr 10 Maths 3-in-1 (Module 10)

# 1:	Organising data	10.1 ⟶ 10.2
# 2:	Summarising data	10.2 ⟶ 10.9
# 3:	Displaying data	10.10 ⟶ 10.15

Note: The Gr 10 Exemplar Exams and Memos are at the end of the book

Gr 11 Maths 3-in-1 (Module 13)

# 1:	Summary	13.1 ⟶ 13.4
# 2:	Measures of Central Tendency	13.4 ⟶ 13.5
# 3:	Measures of Dispersion	13.6
# 4:	Diagrams	13.6 ⟶ 13.18
# 5:	Variance & Standard Deviation	13.19 ⟶ 13.22
# 6:	Symmetric & Skewed Data	13.23 ⟶ 13.27
# 7:	Outliers	13.28
# 8:	Scatter Plots	13.29 ⟶ 13.30
# 9:	Mixed Exercise	13.31 ⟶ 13.32

Note: The Gr 11 Exemplar Exams and Memos are at the end of the book

See Challenging Questions booklet – page 42

Gr 12 Maths 2-in-1 (Module 11)

# 1:	Univariate Data	44 ⟶ 47
# 2:	Bivariate Data	47 ⟶ 49
Back pages:	Calculator Instructions	xvii
	The Formula Sheet	xviii

See the Topic Guide on p. 148 for further exam practice.

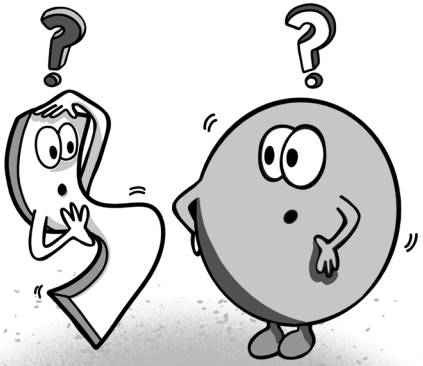
Gr 12 Maths Past Papers Toolkit

Back pages:	Calculator Instructions	xvii
	The Formula Sheet	xviii

See the Topic Guides: DBE: p. 2 & IEB: p. 40

ANALYTICAL GEOMETRY

CONTENT FRAMEWORK



- Formulae
- The ∠ of inclination
- Straight line graphs

(Gr 10 & 11)

- Circles **(Gr 12)**

Analytical Geometry

References to TAS Maths books

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Gr 10 Maths 3-in-1 (Module 8)

# 1:	Important Revision: coordinates of a point, || and ⊥ lines, geometric figures	8.1 ⟶ 8.3
# 2:	The 3 analytical concepts: gradient, distance, midpoint: in 3 classic situations	8.3 ⟶ 8.13

Note: The Gr 10 Exemplar Exams and Memos are at the end of the book

Gr 11 Maths 3-in-1 (Module 5)

# 1:	Revision and general approach	5.1 ⟶ 5.4
# 2:	The angle of inclination (& gradient)	5.4 ⟶ 5.8
# 3:	Straight line graphs	5.8 ⟶ 5.11
# 4:	Polygons in Analytical Geometry	5.12
# 5:	Drawers of Tools	5.13
# 6:	Mixed Exercise	5.14 ⟶ 5.15

Note: The Gr 11 Exemplar Exams and Memos are at the end of the book

The Formula Sheet viii

See Challenging Questions booklet pages 39 ⟶ 41

Gr 12 Maths 2-in-1 (Module 9)

# 1:	Gr 10 & 11 Revision	33
# 2:	Gr 12 Circles, centre at the origin/any centre	34 ⟶ 35
Back pages:	Analytical Geometry Toolkit	xiii ⟶ xiv
	The Formula Sheet	xviii

See the Topic Guide on p. 148 for further exam practice.

Gr 12 Maths Past Papers Toolkit

Back pages:	Trigonometry Proofs & Summary	xi ⟶ xii
	The Formula Sheet	xviii

See the Topic Guides: DBE: p. 2 & IEB: p. 40

TRIG SUMMARY (Grade 12)

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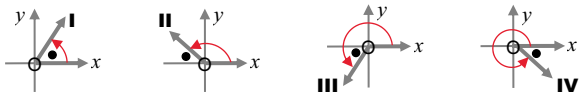
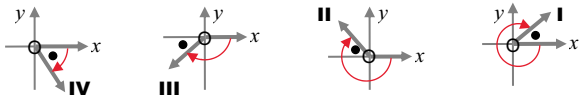
ANGLES IN STANDARD POSITIONS

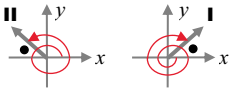
- **Positive ∠s** (anticlockwise from 0° to 360°):



- **Negative ∠s** (clockwise from 0° to −360°):

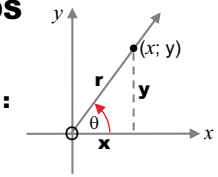


Also possible:



THE RATIOS

& their

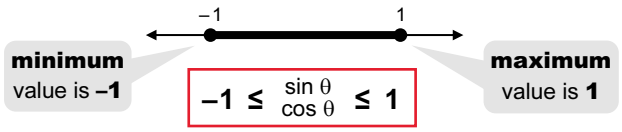


- **Definitions:**
- **Signs:**
  sin θ is positive in **I** & **II**
  cos θ is positive in **I** & **IV**
  tan θ is positive in **I** & **III**
- **Critical values:**

sin θ	cos θ	tan θ
$\frac{y}{r}$ O/H	$\frac{x}{r}$ A/H	$\frac{y}{x}$ O/A
II I	I IV	I III
1 / 0 0 / −1	0 / −1 1 / 0	−1 ∓ ∞ ± 1 / 0 0 / 1 ± ∞ ∓ −1

- **Minimum & Maximum values** of **sin θ** & **cos θ**:

The values of **sin** θ & **cos** θ range from **−1** to **1**.



All values are **proper fractions** or **0** or **±1**.

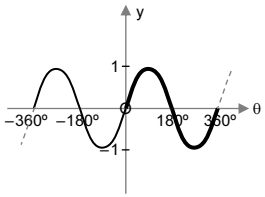
tan θ

Note that tan θ has **no minimum or maximum** values.

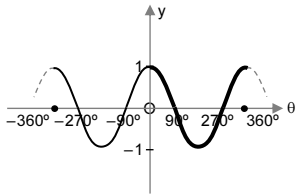
The **range of values** of tan θ is from −∞ to ∞.

- **Graphs:**

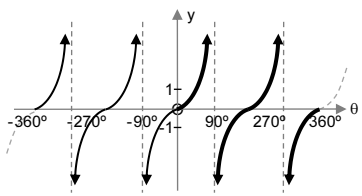
y = sin θ



y = cos θ



y = tan θ



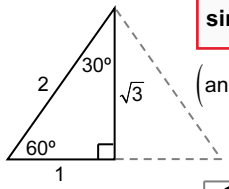
IDENTITIES

$\tan\theta = \frac{\sin\theta}{\cos\theta}$

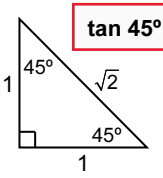
$\sin^2\theta + \cos^2\theta = 1$

$\therefore \sin^2\theta = 1 - \cos^2\theta$
& $\cos^2\theta = 1 - \sin^2\theta$

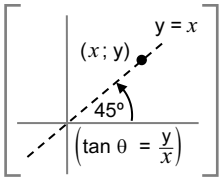
SPECIAL ∠s



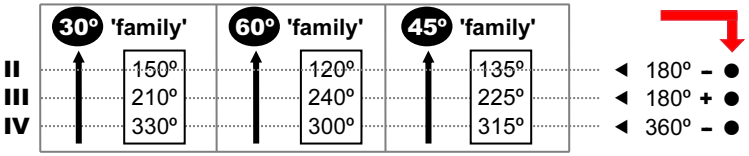
$\sin 30° = \frac{1}{2}$ (and $\cos 60° = \frac{1}{2}$)



$\tan 45° = 1$



& their 'families':



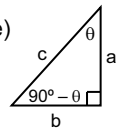
GENERAL FORMS

ANY ratio (180° ± **θ**, 360° − **θ**, − **θ**) = **±** that **SAME** ratio of **θ**

CO-RATIOS (sine and **co**sine)

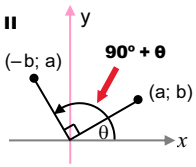
- **90° − θ** (an **acute** angle)

sin(90° − θ) = cos θ
cos(90° − θ) = sin θ



- **90° + θ** (an **obtuse** angle)

sin(90° + θ) = cos θ
cos(90° + θ) = −sin θ



The ratio **CHANGES** to the **CO**-ratio.

SOLUTION OF Δs

In Right-angled Δs, we use:

- Regular trig. ratios
- the Theorem of Pythagoras
- Area = $\frac{1}{2}$bh

In Non-Right-angled Δs, we use:

- **Sine Rule:**

$\frac{\sin A}{a} = \frac{\sin B}{b} = \frac{\sin C}{c}$

- **Cosine Rule:**

$c^2 = a^2 + b^2 - 2ab\cos C$

- **Area Rule:**

AREA $= \frac{1}{2}ab\sin C$

But also: Area of Δ = $\frac{1}{2}$bh

COMPOUND ∠s

- $\sin(A \pm B) = \sin A\cos B \pm \cos A\sin B$
- $\cos(A \pm B) = \cos A\cos B \mp \sin A\sin B$

DOUBLE ∠s

- $\sin 2x = 2\sin x\cos x$
- $\cos 2x = \cos^2 x - \sin^2 x$
  $= 1 - 2\sin^2 x$
  $= 2\cos^2 x - 1$

The Quadrants

sin θ — II, I

cos θ — I, IV

tan θ — III, I

THE SIGNS

Angles in Standard Positions

Positive $\angle^s$

Negative $\angle^s$

IDENTITIES

$\tan\theta = \frac{\sin\theta}{\cos\theta}$

$\sin^2\theta + \cos^2\theta = 1$

SPECIAL $\angle^s$ & their families

General forms

$180° - \theta$

$180° + \theta$

$360° - \theta$ & $-\theta$

Co-ratios

$90° \pm \theta$

THE DEFINITIONS

$\frac{O}{H}$ $\frac{A}{H}$ $\frac{O}{A}$

& $\frac{y}{r}$ $\frac{x}{r}$ $\frac{y}{x}$

Critical Values (incl min & max)

The Graphs

EQUATIONS

Proofs of sin, cos and area rules & 2D/3D Problem-solving

THE ANSWER SERIES *Your Key to Exam Success*

Trigonometry

References to TAS Maths books

THE ANSWER SERIES *Your Key to Exam Success*

Gr 10 Maths 3-in-1 (Module 5)

# 1:	Pre-trig	5.1 ⟶ 5.3
# 2:	Trigonometry of acute angles	5.4 ⟶ 5.18
# 3:	Trigonometry 'Unlimited' (0° ⟶ 360°)	5.18 ⟶ 5.27

Note: The Gr 10 Exemplar Exams and Memos are at the end of the book

Gr 11 Maths 3-in-1 (Modules 6b, 7 and 10)

# 1:	Trigonometric Graphs	6.33 ⟶ 6.40
# 2:	Trigonometry (Part 1) – General	7.1 ⟶ 7.23
	Gr 11 Trigonometry Summary	7.24
# 3:	Trigonometry (Part 2) – Area, Sine and Cosine Rules	10.1 ⟶ 10.17

Note: The Gr 11 Exemplar Exams and Memos are at the end of the book

The Formula Sheet viii

See Challenging Questions booklet: pages 23 ⟶ 28

Gr 12 Maths 2-in-1 (Module 6)

# 1:	Trigonometry Part 1: General, including Compound angles	19 ⟶ 25
# 2:	Trigonometry Part 2: 2D and 3D problems	25 ⟶ 27
Back pages:	Area, Sine & Cosine Rules & PROOFS	iv
	Compound Angles & PROOFS	v
	Gr 12 Trigonometry Summary	vi
	The Formula Sheet	xviii

See the Topic Guide on p. 148 for further exam practice.

Gr 12 Maths Past Papers Toolkit

Back pages:	Trigonometry Proofs & Summary	iv ⟶ vii
	The Formula Sheet	xviii

See the Topic Guides: DBE: p. 2 & IEB: p. 40

EUCLIDEAN GEOMETRY

CONTENT FRAMEWORK

- Lines
- Triangles
- Quadrilaterals

(Gr 8 ⟶ 10)

- Circles **(Gr 11)**

Gr 12?

Gr 12: Theorem of Pythagoras **(Gr 8)**

Similar Δ^s **(Gr 9)**

Midpoint Theorem **(Gr 10)**

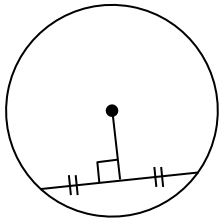
& The Proportion Theorem

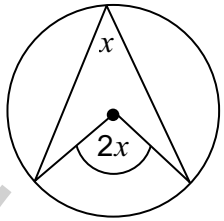
Ratio **Proportion** **Area**

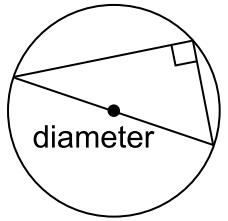
GROUPING/LINKING CIRCLE GEOMETRY THEOREMS

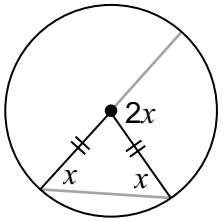
The grey arrows indicate how various theorems are used to prove subsequent ones

I The 'Centre' group



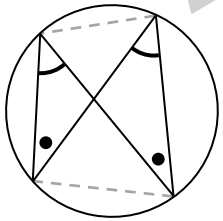


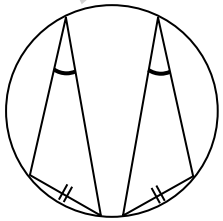




Equal radii!

II The 'No Centre' group

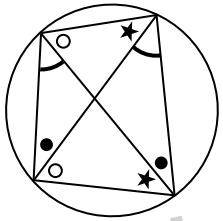


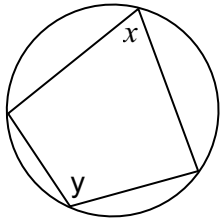


Equal chords!

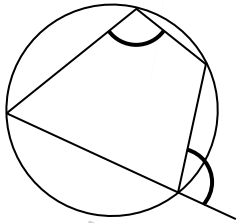
Equal chords subtend equal angles
and, vice versa,
equal angles are subtended
by equal chords.

III The 'Cyclic Quad.' group

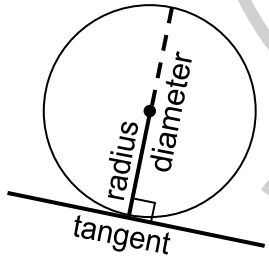


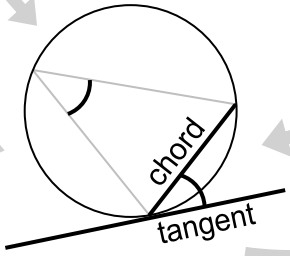


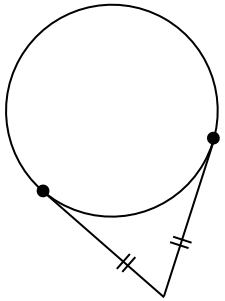
$x + y = 180°$



IV The 'Tangent' group







Equal tangents!

EUCLIDEAN GEOMETRY:
THEOREM STATEMENTS & ACCEPTABLE REASONS

LINES

The adjacent angles on a straight line are supplementary.	$\angle^s$ on a str line
If the adjacent angles are supplementary, the outer arms of these angles form a straight line.	adj $\angle^s$ supp
The adjacent angles in a revolution add up to 360º.	$\angle^s$ around a pt **OR** $\angle^s$ in a rev
Vertically opposite angles are equal.	vert opp $\angle^s$
If AB || CD, then the alternate angles are equal.	alt $\angle^s$; AB || CD
If AB || CD, then the corresponding angles are equal.	corresp $\angle^s$; AB || CD
If AB || CD, then the co-interior angles are supplementary.	co-int $\angle^s$; AB || CD
If the alternate angles between two lines are equal, then the lines are parallel.	alt $\angle^s$ =
If the corresponding angles between two lines are equal, then the lines are parallel.	corresp $\angle^s$ =
If the co-interior angles between two lines are supplementary, then the lines are parallel.	co-int $\angle^s$ supp

TRIANGLES

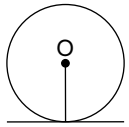
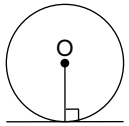
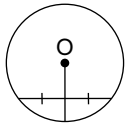
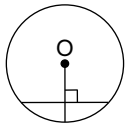
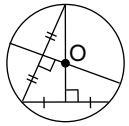
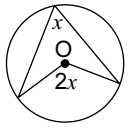
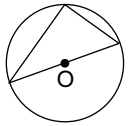
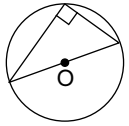
The interior angles of a triangle are supplementary.	$\angle$ sum in Δ **OR** sum of $\angle^s$ in Δ **OR** int $\angle^s$ in Δ
The exterior angle of a triangle is equal to the sum of the interior opposite angles.	ext $\angle$ of Δ
The angles opposite the equal sides in an isosceles triangle are equal.	$\angle^s$ opp equal sides
The sides opposite the equal angles in an isosceles triangle are equal.	sides opp equal $\angle^s$
In a right-angled triangle, the square of the hypotenuse is equal to the sum of the squares of the other two sides.	Pythagoras **OR** Theorem of Pythagoras
If the square of the longest side in a triangle is equal to the sum of the squares of the other two sides then the triangle is right-angled.	**Converse** Pythagoras **OR Converse** Theorem of Pythagoras
If three sides of one triangle are respectively equal to three sides of another triangle, the triangles are congruent.	SSS
If two sides and an included angle of one triangle are respectively equal to two sides and an included angle of another triangle, the triangles are congruent.	SAS **OR** S$\angle$S
If two angles and one side of one triangle are respectively equal to two angles and the corresponding side in another triangle, the triangles are congruent.	AAS **OR** $\angle\angle$S
If in two right angled triangles, the hypotenuse and one side of one triangle are respectively equal to the hypotenuse and one side of the other, the triangles are congruent.	RHS **OR** 90ºHS
The line segment joining the midpoints of two sides of a triangle is parallel to the third side and equal to half the length of the third side.	Midpt Theorem
The line drawn from the midpoint of one side of a triangle, parallel to another side, bisects the third side.	line through midpt || to 2nd side
A line drawn parallel to one side of a triangle divides the other two sides proportionally.	line || one side of Δ **OR** prop theorem; name || lines
If a line divides two sides of a triangle in the same proportion, then the line is parallel to the third side.	line divides two sides of Δ in prop
If two triangles are equiangular, then the corresponding sides are in proportion (and consequently the triangles are similar).	$\|\|\| \Delta^s$ **OR** equiangular Δ^s
If the corresponding sides of two triangles are proportional, then the triangles are equiangular (and consequently the triangles are similar).	sides of Δ in prop
If triangles (or parallelograms) are on the same base (or on bases of equal length) and between the same parallel lines, then the triangles (or parallelograms) have equal areas.	same base; same height **OR** equal bases; equal height

QUADRILATERALS

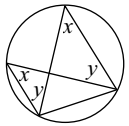
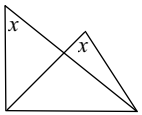
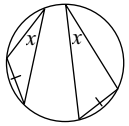
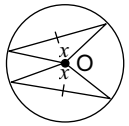
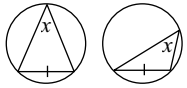
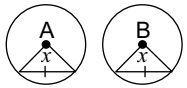
The interior angles of a quadrilateral add up to 360º.	sum of $\angle^s$ in quad
The opposite sides of a parallelogram are parallel.	opp sides of ||m
If the opposite sides of a quadrilateral are parallel, then the quadrilateral is a parallelogram.	opp sides of quad are || **OR** **converse** opp sides of ||m
The opposite sides of a parallelogram are equal in length.	opp sides of ||m
If the opposite sides of a quadrilateral are equal, then the quadrilateral is a parallelogram.	opp sides of quad are = **OR** **converse** opp sides of a parm
The opposite angles of a parallelogram are equal.	opp $\angle^s$ of ||m
If the opposite angles of a quadrilateral are equal then the quadrilateral is a parallelogram.	opp $\angle^s$ of quad are = **OR** **converse** opp angles of a parm
The diagonals of a parallelogram bisect each other.	diag of ||m
If the diagonals of a quadrilateral bisect each other, then the quadrilateral is a parallelogram.	diags of quad bisect each other **OR** **converse** diags of a parm
If one pair of opposite sides of a quadrilateral are equal and parallel, then the quadrilateral is a parallelogram.	pair of opp sides = and ||
The diagonals of a parallelogram bisect its area.	diag bisect area of ||m
The diagonals of a rhombus bisect at right angles.	diags of rhombus
The diagonals of a rhombus bisect the interior angles.	diags of rhombus
All four sides of a rhombus are equal in length.	sides of rhombus
All four sides of a square are equal in length.	sides of square
The diagonals of a rectangle are equal in length.	diags of rect
The diagonals of a kite intersect at right-angles.	diags of kite
A diagonal of a kite bisects the other diagonal.	diag of kite
A diagonal of a kite bisects the opposite angles.	diag of kite

CIRCLES

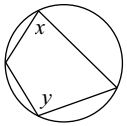
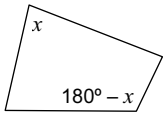
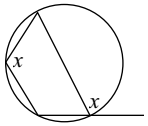
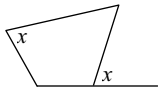
GROUP I

	The tangent to a circle is perpendicular to the radius/diameter of the circle at the point of contact.	tan ⊥ radius tan ⊥ diameter
	If a line is drawn perpendicular to a radius/diameter at the point where the radius/diameter meets the circle, then the line is a tangent to the circle.	line ⊥ radius **OR** **converse** tan ⊥ radius **OR** **converse** tan ⊥ diameter
	The line drawn from the centre of a circle to the midpoint of a chord is perpendicular to the chord.	line from centre to midpt of chord
	The line drawn from the centre of a circle perpendicular to a chord bisects the chord.	line from centre ⊥ to chord
	The perpendicular bisector of a chord passes through the centre of the circle.	perp bisector of chord
	The angle subtended by an arc at the centre of a circle is double the size of the angle subtended by the same arc at the circle (on the same side of the chord as the centre)	∠at centre = 2 × ∠ at circumference
	The angle subtended by the diameter at the circumference of the circle is 90º.	$\angle^s$ in semi circle **OR** diameter subtends right angle **OR** ∠ in ½ ⊙
	If the angle subtended by a chord at the circumference of the circle is 90°, then the chord is a diameter.	chord subtends 90º **OR** **converse** $\angle^s$ in semi circle

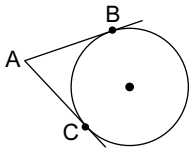
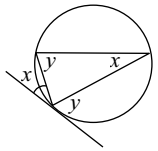
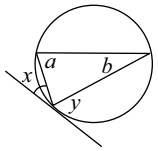
GROUP II

	Angles subtended by a chord of the circle, on the same side of the chord, are equal	$\angle^s$ in the same seg
	If a line segment joining two points subtends equal angles at two points on the same side of the line segment, then the four points are concyclic. (This can be used to prove that the four points are concyclic).	line subtends equal $\angle^s$ **OR** **converse** $\angle^s$ in the same seg
	Equal chords subtend equal angles at the circumference of the circle.	equal chords; equal $\angle^s$
	Equal chords subtend equal angles at the centre of the circle.	equal chords; equal $\angle^s$
	Equal chords in equal circles subtend equal angles at the circumference of the circles.	equal circles; equal chords; equal $\angle^s$
	Equal chords in equal circles subtend equal angles at the centre of the circles. (A and B indicate the centres of the circles)	equal circles; equal chords; equal $\angle^s$

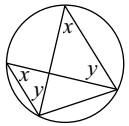
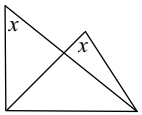
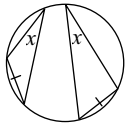
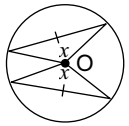
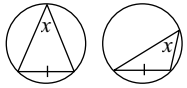
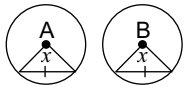
GROUP III

	The opposite angles of a cyclic quadrilateral are supplementary (i.e. x and y are supplementary)	opp $\angle^s$ of cyclic quad
	If the opposite angles of a quadrilateral are supplementary then the quadrilateral is cyclic.	opp $\angle^s$ quad sup **OR** **converse** opp $\angle^s$ of cyclic quad
	The exterior angle of a cyclic quadrilateral is equal to the interior opposite angle.	ext $\angle$ of cyclic quad
	If the exterior angle of a quadrilateral is equal to the interior opposite angle of the quadrilateral, then the quadrilateral is cyclic.	ext $\angle$ = int opp $\angle$ **OR** **converse** ext $\angle$ of cyclic quad

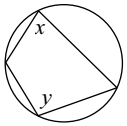
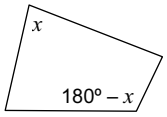
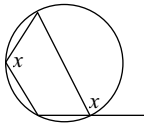
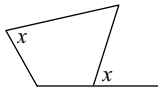
GROUP IV

	Two tangents drawn to a circle from the same point outside the circle are equal in length (AB = AC)	Tans from common pt **OR** Tans from same pt
	The angle between the tangent to a circle and the chord drawn from the point of contact is equal to the angle in the alternate segment.	tan chord theorem
	If a line is drawn through the end-point of a chord, making with the chord an angle equal to an angle in the alternate segment, then the line is a tangent to the circle. (If $x = b$ or if $y = a$ then the line is a tangent to the circle)	**converse** tan chord theorem **OR** $\angle$ between line and chord

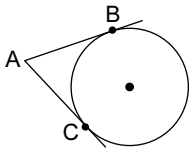
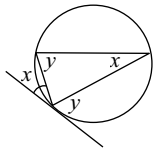
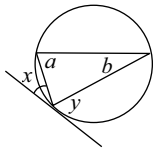
GROUP II

	Angles subtended by a chord of the circle, on the same side of the chord, are equal	$\angle^s$ in the same seg
	If a line segment joining two points subtends equal angles at two points on the same side of the line segment, then the four points are concyclic. (This can be used to prove that the four points are concyclic).	line subtends equal $\angle^s$ **OR** **converse** $\angle^s$ in the same seg
	Equal chords subtend equal angles at the circumference of the circle.	equal chords; equal $\angle^s$
	Equal chords subtend equal angles at the centre of the circle.	equal chords; equal $\angle^s$
	Equal chords in equal circles subtend equal angles at the circumference of the circles.	equal circles; equal chords; equal $\angle^s$
	Equal chords in equal circles subtend equal angles at the centre of the circles. (A and B indicate the centres of the circles)	equal circles; equal chords; equal $\angle^s$

GROUP III

	The opposite angles of a cyclic quadrilateral are supplementary (i.e. x and y are supplementary)	opp $\angle^s$ of cyclic quad
	If the opposite angles of a quadrilateral are supplementary then the quadrilateral is cyclic.	opp $\angle^s$ quad sup **OR** **converse** opp $\angle^s$ of cyclic quad
	The exterior angle of a cyclic quadrilateral is equal to the interior opposite angle.	ext $\angle$ of cyclic quad
	If the exterior angle of a quadrilateral is equal to the interior opposite angle of the quadrilateral, then the quadrilateral is cyclic.	ext $\angle$ = int opp $\angle$ **OR** **converse** ext $\angle$ of cyclic quad

GROUP IV

	Two tangents drawn to a circle from the same point outside the circle are equal in length (AB = AC)	Tans from common pt **OR** Tans from same pt
	The angle between the tangent to a circle and the chord drawn from the point of contact is equal to the angle in the alternate segment.	tan chord theorem
	If a line is drawn through the end-point of a chord, making with the chord an angle equal to an angle in the alternate segment, then the line is a tangent to the circle. (If $x = b$ or if $y = a$ then the line is a tangent to the circle)	**converse** tan chord theorem **OR** $\angle$ between line and chord

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Theory without practice
is empty

Practice without theory
is blind