



Year 12 Mathematics Extension 1

HSC Task 1: Open Book Test

Due Date: Tuesday 17 December 2024 (Period 1)

Task Distributed: 25th November 2024

Unit: Further Trig Identities and Inverse Functions, Further Rates of Change

Task Type: Open Book Test

Task Weighting: 20%

Outcomes: ME11-4, ME11-6, ME11-7

Task Description

Duration: 50 minutes

This exam will consist of two sections.

- **Section 1:** 5 multiple choice questions worth one mark each covering a range of the units listed above.
- **Section 2:** A mixture of short and long response questions worth one mark or more.

This is an open-book task, meaning that you are permitted to bring into the exam one A4 sized double-sided page of summary notes. **Your notes must be handwritten only.** You will submit your summary notes with your exam paper. These summary notes are worth 5% of your total exam mark.

Your knowledge, skills and understanding in the following areas can be assessed in this examination:

Further Trig Identities	Further Rates of Change
<ul style="list-style-type: none"> • Define, graph and solve problems using inverse trigonometric functions $y = \sin^{-1} x$, $y = \cos^{-1} x$ and $y = \tan^{-1} x$. • Restrict the domains of inverse trigonometric functions so that they exist • Apply and prove properties of trig functions and their inverses • Derive and use the following further trig identities: <ul style="list-style-type: none"> ○ Sum and differences of angles ○ Double angles ○ T-formulae ○ Trigonometric products 	<ul style="list-style-type: none"> • Use language to describe rates of change such as at rest, initially, change of direction and increasing at an increasing rate • Find and interpret the rate of change $\frac{dQ}{dt}$ of a given function $Q = f(t)$ • Apply rates of change to a range of scenarios including motion (displacement, velocity and acceleration) • Develop models and solve problems requiring use of the chain rule • Solve practical growth or decay problems by sketching, analysing and manipulating models of the form $N(t) = Ae^{kt}$ • Sketch and analyse models of the form $N(t) = P + Ae^{kt}$

Inverse Trig Functions	Harder Advanced concepts
<ul style="list-style-type: none"> ● Explore notation for inverse trigonometric functions ● Use restricted domains to enable the inverse trigonometric functions to exist ● Sketch the graphs of the inverse trigonometric functions $\sin x$, $\cos x$ and $\tan x$. ● Prove and use a range of properties of inverse functions over valid domains ● Solve problems involving inverse trigonometric functions 	<p>Harder Advanced concepts may also be assessed in this task as relevant parts of linking questions:</p> <ul style="list-style-type: none"> ● Quadratic and Cubic Functions ● Calculus and Applications of Calculus ● Exponentials and Logarithms

As this is an examination you will need to prepare for this task by:

- Making summary notes of each topic listed above (mind map, flow chart, dot points).
- Redoing formative tasks.
- Accessing practice past papers on Moodle.
- Regularly completing practice examination questions under timed conditions.
- Seeking teacher assistance on unclear work.
- Ensuring all set work is up to date.

NESA Glossary of Key Words

Understand the verb associated with the task. The verb will provide an understanding of the detail needed to successfully answer the question.

- **Factorise** – Use algebraic techniques to write the expression as a product of its factors
- **Find / Evaluate** – Use techniques (generally algebraic) to determine a value or expression
- **Prove / Show** – Provide all algebraic steps and working in a logical sequence
- **Simplify** – Use algebraic techniques to write an expression in its simplest form
- **Sketch** – Neatly draw a function on a number plane, clearly showing key features
- **Solve** – Use algebraic techniques to find a solution

Check the NESA Glossary of Key Words for further guidance <https://educationstandards.nsw.edu.au/wps/portal/nesa/11-12/hsc/hsc-student-guide/glossary-keywords>

Details of Submission

For successful completion of this assessment, you must have the following equipment:

- Board approved calculator
- Pencil, eraser and ruler for graphs and diagrams
- Blue or black pen
- **One A4 paper double sided summary note with handwriting only**

Students are NOT permitted to bring an electronic device into the exam.

Teacher Feedback and Student Self-Reflection

- The task will typically be returned to students within 14 days of the due date.
- At this time feedback including information on how to improve will be provided through analysis of the examination questions as a class discussion. Explanation will be provided as requested.
- Students can clarify or seek further feedback by speaking with their teacher or the assessment marker.

Upon return of the task, students will also be expected to complete a self-reflection. This will require students to review incorrect responses by seeking clarification from the teacher. Additionally, students will be required to complete a survey in reflection of the examination.

How does this link to my learning?

- The structure of the questioning style in this task will mirror that of the HSC examination.
- This task will be used by you and your teachers to assess your knowledge and understanding of course outcomes and allow you to refine your skills as you prepare for the HSC examination.
- This task will draw together the above outcomes and assess your ability to apply a range of mathematical skills and techniques that you have covered in class.

Assessment Procedures

All students should be fully aware of the School Assessment Procedures for their year group. These were provided at the beginning of the school year and are available on the school website under the Learning Tab for each year group.