Gymea Technology High School
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Year 12 Mathematics Extension 2

Task 2: Half Yearly Exam

Due Date: 10th April – Week 10 Thursday

Task Distributed: 20th March 2025 **Topic:** Complex Numbers and Nature of Proof

Task Type: Half Yearly Examination **Task Weighting**: 25%

Outcomes: ME11-1, ME11-2, ME11-3, ME11-4, ME11-5, ME12-1, ME12-7

Task Description Duration: 2h 00min + 10min reading

This exam will consist of two sections.

- **Section 1: Multiple-Choice** 10 multiple choice questions worth one mark each covering a range of the units listed below. The questions increase in difficulty throughout this section and must be answered on the multiple-choice answer sheet in your answer booklet. You should allow 15 minutes to complete this section.

- **Section 2: Written Response** This section contains multiple questions with parts. The parts of each question will be a mixture of short and long response questions worth 1 mark or more covering a range of the concepts listed in the Areas of Learning above. You should allow 1 hour and 45 minutes to complete this section. You need to complete your answers in the Answer Booklet provided, starting each new question on a new page. All necessary working must be shown for this section.

This examination will mirror the setup and questioning style of your HSC examination. It will test all content covered since the start of the Year 11 course. A HSC Reference Sheet will also be provided. Your knowledge, skills and understanding in the following areas can be assessed in this examination:

HSC Topics – Complex Numbers	**HSC Topics – Nature of Proof**
• Prove and use DeMoivre's theorem • Define and determine conjugate roots of polynomials with real coefficients • Solve quadratics with complex coefficients • Examine vector addition and subtraction of complex numbers • Examine the geometrical effects of multiplying complex numbers, rotations by i and conjugates • Determine the nth roots of unity • Solve problems using nth roots of complex numbers • Solve and sketch a range of complex relations (locus of complex numbers)	• Use the formal language and notation of proof • Prove simple results involving numbers • Use proof by contradiction and use examples and counter-examples • Prove results involving inequalities including properties of squares, triangle inequalities, arithmetic means and geometric means • Prove further results of inequalities from these initial proofs
Concepts from the Mathematics Advanced and Mathematics Extension 1 courses may also be assessed in this exam or may assist in the solving of Extension 2 concepts assessed in this exam.	

Preparation for this Task

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).
- Accessing practice past papers on Moodle.
- Regularly completing practice examination questions.
- Seeking teacher assistance on unclear work.
- Ensuring all set work is up to date.

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. Students who are absent from the examination, or have a legitimate reason for missing the task, must notify the school before the exam commences. To avoid a zero mark being awarded, any absence must be supported by valid misadventure/illness documentation as outlined in the Year 12 Assessment Booklet.

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.

- **Calculate -** Provide a numerical answer
- **Demonstrate -** Show by example
- **Derive -** Use working to obtain a formula or equation
- **Estimate -** Use a method to find an approximate answer
- **Evaluate -** Determine the value of
- **Explain -** Describe why or how something has occurred
- **Identify -** Recognise and name
- **Justify** – Support an argument or conclusion linking to calculations
- **Prove / Show -** Provide all algebraic steps and working in a logical sequence
- **Simplify** - 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

Students are NOT permitted to bring notes or any electronic device into the exam.

If you are absent from the examination you must contact the school on the day and follow school assessment and illness/misadventure policies and procedures. A valid attempt at all questions is required.

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.