Gymea Technology High School
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Year 12 Mathematics Extension 1

# HSC Task 3: Breaking Down Questions: Investigation and Quiz

**Due Date**: 19th June 2025 - Beginning of Period 0

**Task Distributed**: 26th May 2025

**Unit**: Vectors and Trigonometric Equations

**Task Type**: Investigation and Quiz

**Task Weighting**: 25%

**Outcomes**: ME12-2, ME12-6, ME12-7, ME12-3

## Task Description

This assessment consists of the following 2 compulsory sections:

**Part A: Create a Topic Study Guide**

Students will create a Topic Study Guide for the topics outlined above. The Topic Study Guide will consist of:

- A **glossary** of the key **verbs** and **topic specific terminology** presented in these topics in identified HSC questions. Each verb must be accompanied by a short explanation of what mathematical process that verb requires you to do.
- Identification of questions presented in the **2023 and 2024 HSC Exam** papers that linked to these two topic areas listed above.
- **Annotations of the worked solution** to each identified HSC question. In each question identified, students are also required to highlight or underline the key terms in this question and write a short annotation on how the key verb and mathematical terminology in that questions **leads you to the solution**

The questions you will be analysing will cover the following range of techniques from each topic:

| Vectors | Trigonometric Equations |
|---|---|
| • Perform addition and subtraction of vectors and multiplication of a vector by a scalar algebraically and geometrically, and interpret these operations in geometric terms<br>• Define, calculate and use the magnitude of a vector in two dimensions<br>• Define and use the direction of a vector in two dimensions<br>• Define, calculate and use the scalar (dot) product of two vectors<br>• Examine properties of parallel and perpendicular vectors and determine if two vectors are parallel or perpendicular<br>• Define and use the projection of one vector onto another<br>• Solve problems involving displacement, force and velocity involving vector concepts in two dimensions<br>• Prove geometric results and construct proofs | • Convert expressions of the form $x + b\sin x$ to $R\cos(x \pm \alpha)$ or $R\sin(x \pm \alpha)$ and apply these to solve equations of the form $a\cos x + b\sin x = c$, sketch graphs and solve related problems<br>• solve trigonometric equations requiring factorising and/or the application of compound angle, double angle formulae or the $t$-formulae<br>• prove and apply other trigonometric identities<br>• solve trigonometric equations and interpret solutions in context using technology or otherwise |

| | |
|---|---|
| involving vectors in two dimensions | |

Students can use the scaffold and worked example provided on Google Classroom as a guide to create their Topic Study Guides. It can be word published or handwritten.

**Part B: Moodle Quiz Assessing Your Glossary Knowledge**

Students will sit a short in-class Moodle quiz assessing the knowledge and skills developed through your investigation. The questions will require you to:

- Identify key verbs and terminology in past HSC questions.
- Match definitions to key verbs and key math terms.
- Identify steps to solve a question when presented with a key term
- Solve a range of past HSC multiple-choice questions from the topic areas listed above.

**Preparation for this Task**

For the Part A component, the following websites may assist you to locate past HSC exams and their marking guidelines:

**Students Online:** https://studentsonline.nesa.nsw.edu.au/go/pastpapers/

**NESA Past HSC Exams:** https://educationstandards.nsw.edu.au/wps/portal/nesa/11-12/Understanding-the-curriculum/resources/hsc-exam-papers

For the quiz aspect of this task, you will need to prepare by:

- Reviewing class work and past HSC examples from each topic listed above.
- Ensuring all set work is up to date.
- Practice completing examination questions with detailed answers under time pressure. (1 mark = 1.5 minutes).
- Seek teacher assistance for unclear work.
- Review the HSC Reference Sheet. You will be provided with one for the quiz.

## NESA Glossary of Key Words

This task will assist you to build your understanding of the verbs associated with these topics. Remember, the question verb will provide an understanding of the detail needed to successfully answer the question.

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

**Part A: Topic Study Guide**

Students are encouraged to use the blank scaffold on google classroom to produce their Topic Study Guide. This needs to be submitted on the day of the Moodle Quiz: 19th June 2025

**Part B: Moodle Quiz**

For the Moodle Quiz, you must bring the following equipment.

- Board approved calculator
- Blue or black pen

You will be provided with a HSC reference sheet.

You can successfully prepare for the Moodle Quiz by:

- Being familiar with your topic study guide
- Reviewing class work and past HSC examples from each topic in the study guide.
- Ensuring all set work is up to date.

- Practice completing examination questions with detailed answers under time pressure. (1 mark = 1.5 minutes).
- Seek teacher assistance for unclear work.
- Review the HSC Reference Sheet. You will be provided with one for the quiz.

## 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.

## How does this link to my learning?

- This task will require you to identify, interpret and analyse key verbs and terminology in a range of past HSC questions on the topics outlined below.
- It will assist you in developing your skills and understanding in how to recognise these key terms in examination style questions and determine how they lead you to the solution you are required to develop.
- The structure of the questioning style in this task will mirror that of the HSC examination and these topics are commonly assessed each year.
- 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

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.

**Instructional Marking Rubric for Part A**

| Category | 0 Marks | 1 Mark | 2 Marks | 3 Marks |
|---|---|---|---|---|
| **Identification of key HSC verbs** | Does not identify a question verb or does not show a clear understanding of the verb's meaning. | Correctly identifies at least one verb from a suitable HSC question and attempts to explain its meaning. | Correctly identifies at least three verbs from suitable HSC questions and correctly explains their meaning, that may not be directly linked to the key topics. | Correctly identifies at least three verbs from each topic area from suitable HSC questions and correctly explains their meaning. |
| **Definitions of topic specific terminology** | Does not correctly define any key mathematical terms for either topic or does not show a clear understanding of the terminology. | Correctly identifies at least one key term identified in suitable HSC questions, but the links to the syllabus ideas are not well explained. | Correctly defines at least two key terms identified in suitable HSC questions and provides sufficient understanding of how they link to syllabus ideas / techniques. | Correctly defines at least three key terms from each topic area identified in suitable HSC questions and provides sufficient understanding of how they link to syllabus ideas / techniques. |
| **Identification of questions linked to the topic areas** | Does not identify any questions that link to either topic. | Attempts to identify and highlight the key verbs and underline the topic terminology from a suitable HSC question. | Identifies and correctly highlights the key verbs and underlines the topic terminology for at least two questions. They must be suitable HSC questions. | Identifies and correctly highlights the key verbs and underlines the topic terminology for at least two questions from each topic. They must be suitable HSC questions. |
| **Annotation of worked solutions, explaining why each step was used.** | Does not identify a question or does attempt to annotate a solution to a question. | Attempts to annotate one identified question that provides a clear understanding of how the key verbs and topic specific terminology link to the solution. | Correctly annotates at least two of their identified questions that provides a clear understanding of how the key verbs and topic specific terminology link to the solution. | Correctly annotates at least two of the identified questions (from above) from each topic area that provides a clear understanding of how the key verbs and topic specific terminology link to the solution. |