Stage 6, 2025
Notice of Assessment Task
HSC Course in *Mathematics Extension 1*
Investigation Task

Date of Initial Notification: Monday 17 March 2025 Term 1, Week 8	Date of Submission of Task: Monday 31 March 2025 Term 1, Week 10

Teacher: Ms Wai	Task Number: 2

Time Allowed: 2 Weeks	Weighting of Task: 30%

Course Component/Focus area/Topic/Module:
Trigonometric Functions
Statistics

Task Description:

This assessment consists of 4 parts.
Part A (20 marks): This part involves collecting data and modelling phenomena that are periodic in nature, using trigonometric functions.

Part B, C, D (20 marks): Part B requires students to conduct a binomial experiment and compare their statistics with those published by the Australian Bureau of Statistics.
Part C and D require the student to generate statistical questions and solutions using their data collected.

Submission of Task:
You are required to submit a hard copy of the task on the day or before the day of submission.

Outcomes/Competencies to be assessed in this task:
ME12-3 applies advanced concepts and techniques in simplifying expressions involving compound angles and solving trigonometric equations
ME12-5 applies appropriate statistical processes to present, analyse and interpret data
ME12-6 chooses and uses appropriate technology to solve problems in a range of contexts
ME12-7 evaluates and justifies conclusions, communicating a position clearly in appropriate mathematical forms

Feedback: How will I receive feedback on this task?

☐ Written

☐ Verbal

☐ Whole class

Marking Criteria
Mark allocations are shown in the assessment and will be based on the students' provided solutions and demonstrated working out.

- *If you are absent on the day that the task is due, you MUST see your teacher the next day (not your next lesson) that you are present at school to show your medical certificate or produce a misadventure form (refer to your Assessment Booklet for a copy of the form). If you fail to show a medical certificate, a mark of zero will be awarded and an N-Determination warning letter will be issued.*
- *Exemptions and extensions for any other reason will only be determined at the discretion of the Head Teacher, and only in extenuating circumstances. You must advise the Head Teacher as soon as possible if you know you are unable to submit the task on the due date.*
- *All appeals must be lodged within 48hrs of receipt of the task. Students who may consider an appeal are not permitted to take their task home. The original task cannot be altered in any way prior to the appeal process. See Assessment booklet for details.*

Part A – Trigonometric Functions

Q1. Research the high and low tides of any beach in NSW over a 24 hour period in 2025.

  a) Provide all relevant information, including the raw data and location.
  b) By averaging both the low tide and the high tide data, and applying the necessary transformations, provide a trigonometric equation that would model the periodic tidal fluctuation. The equation should be in the form $y = a \cos(x - b) + c$.
  c) How was the value for a in your equation calculated and what does it represent?
  d) How was the value for b in your equation calculated and what does it represent?
  e) How was the value for c in your equation calculated and what does it represent?
  f) Apply technology to generate a plot of your equation.

Q2. Research another 2 examples where trigonometric equations can be used to model real-life scenario.

Part B – A Binomial Experiment

Students are to conduct a binomial experiment with a group, of about 30, year 11/12 students at Ambarvale High School, investigating a known statistic and determining whether this is represented in the sample group.

Students are to choose 1 of the options below:

Option 1

Source: Australian Bureau of Statistics, Household Use of Information Technology, Australia, 2016-17.

Survey on internet usage of 15-17 year olds.

Survey questions	Probability
Internet connection at home (include via phone)	0.86
Used internet in the last 3 months	0.98
Used internet in the last 3 months for social networking	0.932
Used internet in the last 3 months for a purchase	0.605
Used internet in the last 3 months for health services	0.186

Option 2

Source: Australian Bureau of Statistics, 2016 Census.

Survey questions	Probability
Born in Australia	0.655
Both parents born overseas	0.37
English only spoken at home	0.685
Rented residence	0.318
3-bedroom residence	0.372

You are required to:

1. Collect corresponding statistics via a survey.
2. Compare and contrast your statistics with those from the ABS census shown above.

Part C – Modelling Binomial Probability

Using the binomial data collected in Part B, students create a series of probability questions as well as their solution. Questions should include:

- A simple problem concerning a single outcome
- A problem concerning a range of outcomes
- A problem involving a complementary relationship.

Part D – Mean and Variance of a Bimodal Distribution

Using the binomial data collected in Part B, students create a series of probability questions regarding expected values and variance, as well as the solution to these questions.

Marking Rubric

Part A – Trigonometric Functions

Total marks: /20

Q1	1 Mark	2 marks	3 marks	4 marks
a)	Raw data of high and low tide with corresponding times over a 24-hour period	Raw data with location and link to website		
b)	Some progress towards solution	Correct form with 2 errors	Correct form with 1 error	Correct equation
c)	Provide explanation on calculation or what it represents	Provide explanation on both calculation and what it represents		
d)	Provide explanation on calculation or what it represents	Provide explanation on both calculation and what it represents		
e)	Provide explanation on calculation or what it represents	Provide explanation on both calculation and what it represents		
f)	Plot has correct shape	Plot has no more than 2 errors	Plot has 1 error	Correct plot with X-axis expressed in terms of π
Q2	1 example stated	1 example provided with details/ 2 examples stated	2 examples provided with some details	2 detailed examples provided

Part B – A Binomial Experiment

Total marks: /5

1.	Statistics provided for all 5 questions/ data presented	Both data (example: frequency table/column graph) and statistics provided	Data presented and calculations for statistic provided
2.	Provide basic comparison	Provide detailed comparison	

Part C – Modelling Binomial Probability

Total marks: /6

	Any 1 required question type provided	Any 2 required question types provided	All 3 question types provided
	A correct solution provided	2 correct solutions provided	3 correct solutions provided

Part D – Mean and Variance of a Bimodal Distribution

Total marks: /9

	One question provided	2 questions provided	3 questions provided
	A correct solution on expected values	2 correct solutions on expected values	3 correct solutions on expected values
	A correct solution on variance	2 correct solutions on variance	3 correct solutions on variance

Total marks: / 40