GOLD COAST CHRISTIAN COLLEGE | Christ Centred Service Oriented Innovative Learning

Gold Coast Christian College (Reedy Creek)

General Mathematics

IA1

Student name	
Student number	
Teacher	
Issued	02/02/2024
Due date	01/03/2024

Marking summary

Criterion	Marks allocated	Provisional marks
Formulate	4	
Solve	7	
Evaluate and verify	5	
Communicate	4	
Overall	**20**	

Conditions

Technique	Problem-solving and modelling task
Unit	Unit 3: Bivariate data, sequences and change, and Earth geometry
Topic/s	Topic 2: Time series analysis
Duration	4 weeks (including 3 hours of class time)
Mode / length	Written: Up to 10 pages (including tables, figures and diagrams) and a maximum of 2000 words
Individual / group	A unique response must be developed by each student
Other	Use of technology is required and must go beyond simple computation or word processing
Resources	N/A

Context

Virtually all businesses are faced with constant demands on their money and must choose wisely where to spend the money they have. One key element in maintaining cash flow, and staying in business, is inventory management. If the volume of supplies purchased is too great then money is unavailable to meet other costs. If too few supplies are purchased then an inability to supply the necessary items to customers will prevent sales being made.

You have been approached by a client wishing to use mathematical modelling to estimate their sales for the upcoming year in order to optimise their inventory management.

Task

Investigate the historic data set that your client has provided you with in order to provide them with advice about probable future sales figures. Your client requires a forecast of annual sales figures through to 2027 and monthly sales figures for 2023.

To complete this task, you must:

- present your findings as an investigative report based on the approach to problem-solving and mathematical modelling
- use the problem-solving and mathematical modelling approach to develop your response
- respond with a range of understanding and skills, such as using mathematical language, appropriate calculations, tables of data, graphs and diagrams
- provide a response to the context that highlights the real-life application of mathematics
- respond using a written report format that can be read and interpreted independently of the problem-solving and modelling task sheet
- use both analytic procedures and technology
- develop a unique response.

Stimulus

The attached spreadsheet has multiple data sets showing the total monthly value of sales. You will be assigned one data set to analyse for this task.

Checkpoints

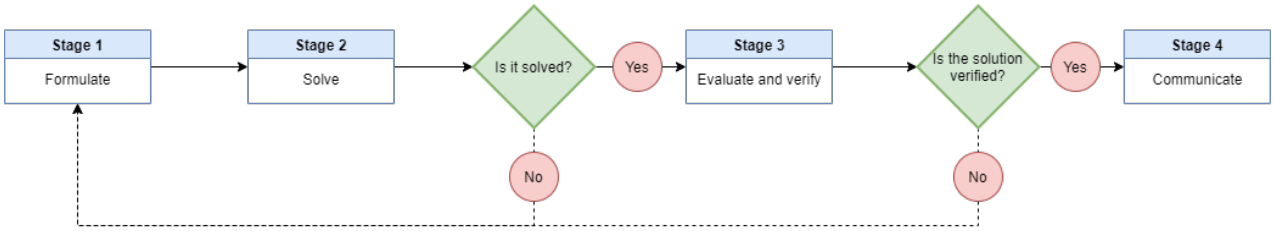
- ☐ One week after issue date: students submit (via SEQTA) evidence of 'formulation' of the task to their teacher.
- ☐ Two weeks after issue date: Students submit (via SEQTA) evidence of their progress to their teacher.
- ☐ Three weeks after issue date: Students develop a draft for feedback. A summary of written feedback and advice will be given to the whole class.
- ☐ Four weeks after issue date: Students submit thier final response.

Authentication strategies

- You must provide documentation of your progress at the indicated checkpoints.
- You must use Turnitin to submit your response.
- You must acknowledge all sources.
- You must submit a declaration of authenticity.
- Your data set is unique.

Scaffolding

The approach to problem-solving and modelling must be used.



Stage 1: Formulate

- Design a mathematical plan to solve the problem.
- Relate these to ideas to mathematical representations – concepts, techniques, technology.
- Identify and document assumptions.
- Document observations of the data collection and mathematical processes.
- Create a mathematical model/idea/graph that may solve the problem accurately.
- Formulating a model requires mathematization – moving from the real-world problem to the mathematical world

Stage 2: Solve

- Apply appropriate maths to solve the problem.
- If the problem is not solved, refine the model. Revision of assumptions, data may be needed.
- Solutions can be found using algebra, graphs, arithmetic or numeric methods and with or without technology.
- You must use technology accurately.

Stage 3: Evaluate and verify

- Once you have an outcome/solution, evaluate the reasonableness of the solution considering assumptions and observations.
- Evaluate the results, make a judgement about the solution in relation to the original scenario/question.
- Explore strengths and limitations of any data collection, your processes and models.
- Justify your decisions using mathematical reasoning.
- Note if your model/idea was not successful, go back to stage 1 and come up with a new/refined plan.
- Note that problem-solving and mathematical modelling is not usually linear but rather involves an iterative process. Iterative means to repeat.

Stage 4: Communicate

- Communicate your findings clearly and fully throughout.
- Organise PSMT concisely, including a suitable introduction, body and conclusion, which can be read independently of the task sheet.
- Use mathematical, statistical and everyday language.
- Throughout the report, discuss key results, strengths, limitations, assumptions and their effects on the results and model.
- Draw conclusions.
- Make recommendations on how to further improve the plan/model in relation to the task.

Instrument-specific marking guide (IA1): Problem-solving and modelling task (20%)

Criterion: Formulate

Assessment objectives

1. select , recall and use facts, rules, definitions and procedures drawn from Unit 3 Topics 1, 2 and/or 3
2. comprehend mathematical concepts and techniques drawn from Unit 3 Topics 1, 2 and/or 3
5. justify procedures and decisions by explaining mathematical reasoning

The student work has the following characteristics:	Marks
• documentation of appropriate assumptions • accurate documentation of relevant observations • accurate translation of all aspects of the problem by identifying mathematical concepts and techniques.	3–4
• statement of some assumptions • statement of some observations • translation of simple aspects of the problem by identifying mathematical concepts and techniques.	1–2
• does not satisfy any of the descriptors above.	0

Criterion: Solve

Assessment objectives

1. select , recall and use facts, rules, definitions and procedures drawn from Unit 3 Topics 1, 2 and/or 3
6. solve problems by applying mathematical concepts and techniques drawn from Unit 3 Topics 1, 2 and/or 3.

The student work has the following characteristics:	Marks
• accurate use of complex procedures to reach a valid solution • discerning application of mathematical concepts and techniques relevant to the task • accurate and appropriate use of technology.	6–7
• use of complex procedures to reach a reasonable solution • application of mathematical concepts and techniques relevant to the task • use of technology.	4–5
• use of simple procedures to make some progress towards a solution • simplistic application of mathematical concepts and techniques relevant to the task • superficial use of technology.	2–3
• inappropriate use of technology or procedures.	1
• does not satisfy any of the descriptors above.	0

Criterion: Evaluate and verify

Assessment objectives

4. evaluate the reasonableness of solutions
5. justify procedures and decisions by explaining mathematical reasoning

The student work has the following characteristics:	Marks
• evaluation of the reasonableness of solutions by considering the results, assumptions and observations • documentation of relevant strengths and limitations of the solution and/or model • justification of decisions made using mathematical reasoning.	4–5
• statements about the reasonableness of solutions by considering the context of the task • statements about relevant strengths and limitations of the solution and/or model • statements about decisions made relevant to the context of the task.	2–3
• statement about a decision and/or the reasonableness of a solution.	1
• does not satisfy any of the descriptors above.	0

Criterion: Communicate

Assessment objectives

3. communicate using mathematical, statistical and everyday language and conventions

The student work has the following characteristics:	Marks
• correct use of appropriate technical vocabulary, procedural vocabulary and conventions to develop the response • coherent and concise organisation of the response, appropriate to the genre, including a suitable introduction, body and conclusion, which can be read independently of the task sheet.	3–4
• use of some appropriate language and conventions to develop the response • adequate organisation of the response.	1–2
• does not satisfy any of the descriptors above.	0