**Stage 2 General Mathematics**

**AT2: Mathematical Investigation**

**Critical Path Analysis**

**Introduction**

Critical Path Analysis deals with the investigation of the sequence of tasks that must be completed to successfully complete a project in the shortest time. Your task is to show how the shortest time can be found as well as other aspects related to Critical Path Analysis.

**Part A**

Consider the unique precedence table provided to you. Use it to demonstrate your knowledge with respect to critical path analysis.

Concepts to include:

* Create a network
* Show forward & backward scans
* State the critical path and minimum completion time
* Show EST, LST and slack times for all tasks

Display the depth of your understanding of all associated concepts of networks and how they have been used to find the minimum completion time.

**Part B**

Consider changes to your network from Part A. Include a prediction of what will happen before you begin and a complete interpretation of the impact of each change, including changes to critical time, critical path and slack time.

Concepts to include:

* Impact of changing times of tasks, on the critical path
* Impact of changing times of tasks not on the critical path
* How multiple critical paths may occur
* Discuss the impact of parallel paths
* Impact of changing prerequisites
* Impact of an addition of a new task
* Summarise findings in a table
* Importance of critical path analysis for business

**Part C**

Create your own scenario where you are able to incorporate all of the above with, in context discussion. Predict and analyse complex changes that have impacts to showcase your knowledge and comment on the reasonableness of each outcome. Business implications should be addressed.

Be sure to comment on any limitations of the model in this investigation that could influence your results.

**Key information about predictions RC5:**

Students are required to make and test at least two predictions based on the mathematics that they are using to consider scenarios.

In the process of forming and testing predictions, students will need to:

* State the prediction
* Test the prediction mathematically
* Discuss the outcome of testing the prediction.

To reach the A grade band for RC5, students need to form and test more than one appropriate prediction.

**REPORT FORMAT for INVESTIGATIONS**

The following is an outline of how an Investigation should be written:

**INTRODUCTION**

* An **introduction** that outlines the problem to be explored, including an understanding of the problem or situation being investigated.
* The **method of solution** in terms of the mathematical model or strategy to be used.

**MATHEMATICAL INVESTIGATIONS & ANALYSIS/DISCUSSION**

* The appropriate **application of the mathematical model** or strategy, including:

‐ relevant data and/or information

‐ mathematical **calculations** and **results**, and appropriate **representations**

* discussion and **interpretation** of results
* formation and testing of appropriate **predictions**, using sound mathematical evidence
* consideration of the **reasonableness** and **limitations** of the results.

**CONCLUSION**

* A statement of the **results and logical and concise conclusions** in the context of the original problem.

‐ refer to what you wrote in your introduction

‐ comment on the appropriateness of the solution.

**APPENDICES AND BIBLIOGRAPHY** as appropriate.

* Attach your raw data that was used.
* Refer to any extra resources used to find a solution to the problem.

The format of an investigation report may be written or multimodal.

Each investigation report, excluding bibliography and appendices if used, must be a maximum of **12 A4 pages** if written, or the equivalent in multimodal form. The maximum page limit is for single‐sided A4 pages with minimum font size 10. Page reduction, such as 2 A4 pages reduced to fit on 1 A4 page, is not acceptable. Conclusions, interpretations and/or arguments that are required for the assessment must be presented in the report, and not in an appendix. Appendices are used only to support the report, and do

not form part of the assessment decision.

For this assessment type, students provide evidence of their learning in relation to the following assessment design criteria:

* concepts and techniques
* reasoning and communication.

**Performance Standards for Stage 2 General Mathematics**

| - | **Concepts and Techniques** | **Reasoning and Communication** |
| --- | --- | --- |
| **A** | Comprehensive knowledge and understanding of concepts and relationships.  Highly effective selection and application of mathematical techniques and algorithms to find efficient and accurate solutions to routine and complex problems in a variety of contexts.  Successful development and application of mathematical models to find concise and accurate solutions.  Appropriate and effective use of electronic technology to find accurate solutions to routine and complex problems. | Comprehensive interpretation of mathematical results in the context of the problem.  Drawing logical conclusions from mathematical results, with a comprehensive understanding of their reasonableness and limitations.  Proficient and accurate use of appropriate mathematical notation, representations, and terminology.  Highly effective communication of mathematical ideas and reasoning to develop logical and concise arguments.  Formation and testing of appropriate predictions, using sound mathematical evidence. |
| **B** | Some depth of knowledge and understanding of concepts and relationships.  Mostly effective selection and application of mathematical techniques and algorithms to find mostly accurate solutions to routine and some complex problems in a variety of contexts.  Attempted development and successful application of mathematical models to find mostly accurate solutions.  Mostly appropriate and effective use of electronic technology to find mostly accurate solutions to routine and some complex problems. | Mostly appropriate interpretation of mathematical results in the context of the problem.  Drawing mostly logical conclusions from mathematical results, with some depth of understanding of their reasonableness and limitations.  Mostly accurate use of appropriate mathematical notation, representations, and terminology.  Mostly effective communication of mathematical ideas and reasoning to develop mostly logical arguments.  Formation and testing of mostly appropriate predictions, using some mathematical evidence. |
| **C** | Generally competent knowledge and understanding of concepts and relationships.  Generally effective selection and application of mathematical techniques and algorithms to find mostly accurate solutions to routine problems in different contexts.  Application of mathematical models to find generally accurate solutions.  Generally appropriate and effective use of electronic technology to find mostly accurate solutions to routine problems. | Generally appropriate interpretation of mathematical results in the context of the problem.  Drawing some logical conclusions from mathematical results, with some understanding of their reasonableness and limitations.  Generally appropriate use of mathematical notation, representations, and terminology, with reasonable accuracy.  Generally effective communication of mathematical ideas and reasoning to develop some logical arguments.  Formation of an appropriate prediction and some attempt to test it using mathematical evidence. |
| **D** | Basic knowledge and some understanding of concepts and relationships.  Some selection and application of mathematical techniques and algorithms to find some accurate solutions to routine problems in context.  Some application of mathematical models to find some accurate or partially accurate solutions.  Some appropriate use of electronic technology to find some accurate solutions to routine problems. | Some interpretation of mathematical results.  Drawing some conclusions from mathematical results, with some awareness of their reasonableness.  Some appropriate use of mathematical notation, representations, and terminology, with some accuracy.  Some communication of mathematical ideas, with attempted reasoning and/or arguments.  Attempted formation of a prediction with limited attempt to test it using mathematical evidence. |
| **E** | Limited knowledge or understanding of concepts and relationships.  Attempted selection and limited application of mathematical techniques or algorithms, with limited accuracy in solving routine problems.  Attempted application of mathematical models, with limited accuracy.  Attempted use of electronic technology, with limited accuracy in solving routine problems. | Limited interpretation of mathematical results.  Limited understanding of the meaning of mathematical results, their reasonableness or limitations.  Limited use of appropriate mathematical notation, representations, or terminology, with limited accuracy.  Attempted communication of mathematical ideas, with limited reasoning.  Limited attempt to form or test a prediction. |