

Maths CBA 1

The Mathematical Investigation



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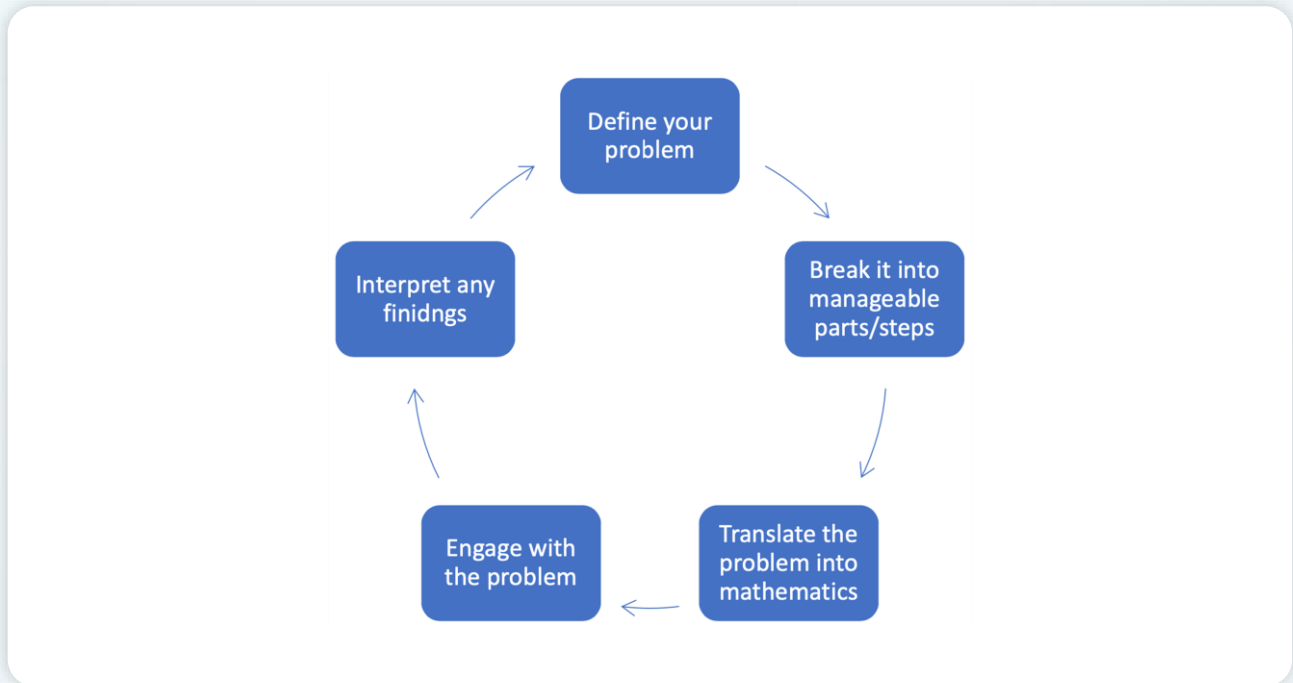
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Introduction

Maths CBA 1 is a Mathematical Investigation which you will complete at any stage in 2nd year. For this, you will, over a three-week period in class, work with the Problem-Solving Cycle (see below) to investigate a mathematical problem of your choice. You are free to select any problem that interests you. Examples of mathematical investigations include a bedroom makeover, calculating the cost of a trip around Europe, designing a swimming pool, investigating the relationship between the area and perimeter of a shape, or finding the cost of owning a dog, the list is endless. You will then present your CBA in a format of your choice be it a poster, a written or typed report, a PowerPoint presentation etc in roughly 400-600 words.



Problem-Solving Cycle



There are a few steps in the problem-solving cycle, they are:

1. Define your problem. Here you will come up with your maths question on the investigation you wish to solve.
2. Break it down into steps so that you can try solving it. You bring the maths into the problem and start working to try to solve your question.
3. Present your solutions and interpret them by referring to your question.

The cycle can be vague at times but in our template below we have lots of prompts and tips on what to do at each stage.

Choosing your mathematical problem

The toughest part of the CBA for most people is thinking of a mathematical problem. My advice is to think of what interests you – if you like sports, animals, travelling, fashion, cooking, music and so on, then try to research where maths comes into these areas.

Maths links into every single aspect of life so first find the area of interest you will work in and then try to focus on where the maths is. Your teacher, family, friends and the internet are the best resources to use for this stage. Be sure to ask your teacher for feedback on your problem to make sure there is enough maths in it to carry out a good CBA.

How will I be assessed?

Your teacher will award you a **grade descriptor** for your CBA.

These are:

- Exceptional
- Above Expectations
- In Line with Expectations
- Yet to Meet Expectations.

Every teacher across the country uses the same tool to correct the CBAs, this is called the Features of Quality. It is a good idea to familiarise yourself with it so that you can see where the top grades are going and what is needed to get these results.

When you are working through your investigation, be sure to check in the Features of Quality to check that you are hitting the nail on the head with your approach.

Features of Quality – Mathematical Investigation

Features of Quality are the criteria used to assess the level of student achievement in a Classroom-Based Assessment (CBA). Described below are the Features of Quality for the Mathematical Investigation.

	Yet to Meet Expectations	In Line with Expectations	Above Expectations	Exceptional
Defining the Problem Statement	Uses a given problem statement and with guidance breaks the problem down into steps	With guidance poses a problem statement, breaks the problem down into manageable steps and simplifies the problem by making assumptions, if appropriate	With limited guidance poses a problem statement and clarifies/simplifies the problem by making reasonable assumptions, where appropriate	Poses a concise problem statement and clarifies and simplifies the problem by making justified assumptions, where appropriate
Finding a Strategy or Translating the Problem to Mathematics	Uses a given strategy	Chooses an appropriate strategy to engage with the problem	Justifies the use of a suitable strategy to engage with the problem and identifies any relevant variables	Develops an efficient justified strategy and evaluates progress towards a solution where appropriate; conjectures relationship between variables where appropriate
Engaging with the Mathematics to Solve the Problem	Records some observations/data and follows some basic mathematical procedures	Records observations/data and follows suitable mathematical procedures with minor errors; graphs and/or diagrams/ words are used to provide insights into the problem and/or solution	Records observations/data systematically, suitable mathematical procedures are followed, and accurate mathematical language, symbolic notation and visual representations are used; attempts are made to generalise any observed patterns in the solution/observation	Mathematical procedures are followed with a high level of precision, and a justified answer is achieved; solution/observations are generalised and extended to other situations where appropriate
Interpreting and Reporting	Comments on any solution	Comments on the reasonableness of the solution where appropriate and makes a concrete connection to the original question, uses everyday familiar language to communicate ideas	Checks reasonableness of solution and revisits assumptions and /or strategy to iterate the process, if necessary, uses formal mathematical language to communicate ideas and identifies what worked well and what could be improved	Deductive arguments used and precise mathematical language and symbolic notation used to consolidate mathematical thinking and justify decisions and solutions; strengths and/ or weaknesses in the mathematical representation/ solution strategy are identified

Source: *Junior Cycle Mathematics Guidelines for the Classroom-Based Assessments and Assessment Task*, November 2019.
During the CBA and SLAR meeting, teachers should refer to the most recent publication of the Assessment Guidelines available at www.curriculumonline.ie.

As you can see, the language used in the Features of Quality can be complicated as it is used by teachers to correct your work.

See below for a student-friendly version to help you understand the marking process better. While you work through your CBA it is a good idea to check in with this to check whether you are on track for the grade you are aiming for.

	Yet to Meet Expectations	In Line with Expectations	Above Expectations	Exceptional
Defining the Problem Statement	You are given a question and with help you break it down into steps.	With help you pose a problem, break it down into simpler parts and steps and make assumptions if necessary.	With a limited amount of help you pose your problem, break it down into simpler parts and steps and make assumptions if necessary.	You state a clear, concise and simplified problem. Your assumptions (if necessary) are explained and valid.
Finding a Strategy or Translating the Problem to Mathematics	You are given the strategy/steps to follow.	You come up with a suitable strategy/ steps to try solve the problem.	You come up with a strategy and justify the steps you will take to engage with the problem. You identify the relevant variables/factors in the investigation.	You create an effective strategy that is explained as it leads towards a solution. Where possible relationships between variables are stated.
Engaging with the Mathematics to Solve the Problem	Some data or observations are recorded, and some basic maths is done.	You record your data/observations and follow suitable mathematical procedures with few errors. You use graphs, diagrams, tables or words to try find a solution and solve the problem.	You record your observations and data efficiently. You follow suitable steps and engage with the maths using accurate language, notation and visual representations (graphs, tables, diagrams). You attempt to generalise your solution.	You carry out mathematical procedures accurately to reach your answer. You generalise your solutions and extend them to other problems or further areas of investigation.
Interpreting and Reporting	You comment on your solution.	You comment on your solution by linking back to the original question. You use simple language to communicate your ideas. You comment on whether your solution makes sense.	You use mathematical language to comment on your solution. You reflect on what worked well and what could be improved. You check the validity your solutions and if necessary, you revisit your assumptions/ strategy to better your solution.	From your work you present your solution using concise mathematical language and justify the process followed and solutions found. You reflect on the strengths and weaknesses from your strategy/steps followed and your presented solution.

How to use these CBA Guidelines

These guidelines contain a scaffolded template which can help you work through your CBA in an organised manner. It breaks the Mathematical Investigation into **8 steps**. The idea is that if you follow each of these steps and follow the prompts, then you can use this as the basis for your final report.

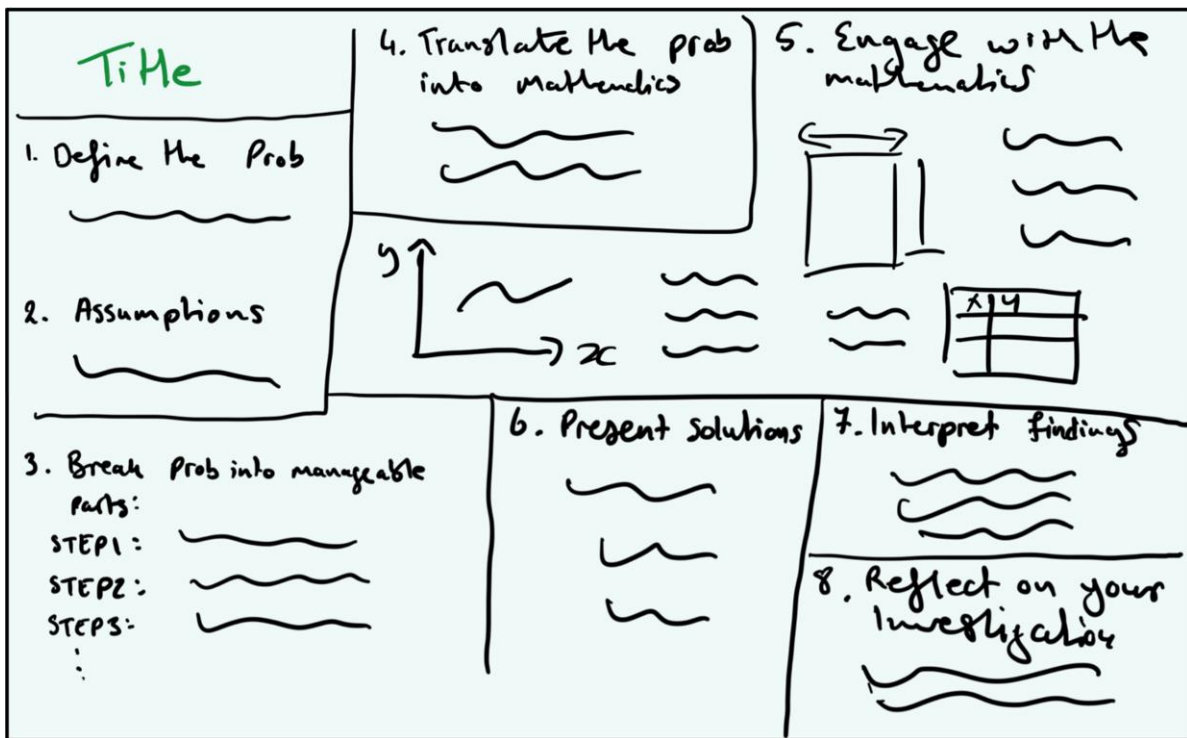
Basically, if you complete this booklet, then you simply take the titles and your workings and copy them into your final report or poster or PowerPoint presentation. So this is like your rough and messy first draft which you will then copy it into your final version.

The template follows the **four** main sections from the Features of Quality and each section has a number of sub-titles and prompts for you to follow. All in all, there are **8 steps** within these sections for you to follow to help you create your final report.

They are:

Section from Features of Quality	Template Sub-title/Prompt
Defining the Problem	1. Define your problem 2. Make assumptions where necessary
Finding a Strategy or Translating the problem into Mathematics	3. Break the problem into manageable parts. 4. Translate the problem into mathematics (variables)
Engaging with the Mathematics to Solve the Problem	5. Engage with the problem 6. Present your solution & generalise
Interpreting and Reporting	7. Interpret any findings and extend/generalise your findings 8. Reflect on your investigation

Sample Poster Layout Using Scaffolded Template Titles



Top Tips for CBA 1

- Chose a topic and **area that interests** you. The more interested you are, the more you will commit to the project. Choosing your question can be a tough

task so use your resources – your teacher, your friends and family and the internet to try come up with a mathematical problem for your CBA.

- Practical topics such as Trigonometry, Area & Volume, Financial Maths and Coordinate Geometry are **easy to bring into everyday life situations** and can be good topics to focus on if you're struggling to come up with a mathematical problem/question.
- **Ask your teacher for feedback** on your progress. Check in that you are on track and ask for help if you're stuck or unsure what to do next.
- **Don't waste your class time** during the CBA. While 3 weeks seems like a long time, stay on track and set small targets each day to progress through the CBA.
- When you're creating the final report make sure you **explain everything**. Justify all your steps and workings. Be sure you have a detailed conclusion answering your question. Always show your workings for all calculations. If you follow the prompts in our template, you'll be flying it!
- **Check in with the Features of Quality** regularly. This is basically the marking scheme for the CBA so you can clearly see what an Exceptional CBA needs to contain. As you work through your CBA, read the student-friendly version of the Features of Quality and ask yourself if you're hitting the nail on the head with the top sections.

CBA Scaffolded Template

1. Define your problem

Here you state your mathematical problem. You must state what your question or investigation is in a specific and concise way. You don't want to have a broad and vague question as this will be hard to answer. You want to narrow down your question to the exact thing you want to solve and what you want to find out. Here you should mention why you chose this problem. Can you predict what the outcome may be?

2. Make assumptions (Where necessary)

Not everyone will have to complete this step. You may need to restrict your problem and so assumptions may be necessary. If you make any assumptions, make sure you justify them. Here are some examples of assumptions: you may need to assume a pool you're constructing will be 2m deep, or that you have a €1,000 budget for your garden makeover, or that you're ignoring wind resistance in a situation.

3. Break the problem into manageable parts

What will you do first to try to solve your problem? What will you do next? This is an important step, and you should spend a good bit of time on it. Here you must state exactly how you are planning on solving the problem. Literally list the steps you will follow, i.e Step 1, Step 2, Step 3, ... Explain how you will complete each step.

For example, say you are completing a bedroom makeover. The steps may look like this:

Step 1: Draw a plan of the room and find measurements using a measuring tape

Step 2: Make a list of new items needed for the room – bed, carpet, paint, rug.

Step 3: Find the cost of the items needed by researching 3 different online shops

And so on...



Best of luck in the exam!
You will be great

