



Government of **Western Australia**
School Curriculum and Standards Authority

MATHEMATICS

Investigations for assessment

Acknowledgement of Country

Kaya. The School Curriculum and Standards Authority (the Authority) acknowledges that our offices are on Whadjuk Noongar boodjar and that we deliver our services on the country of many traditional custodians and language groups throughout Western Australia. The Authority acknowledges the traditional custodians throughout Western Australia and their continuing connection to land, waters and community. We offer our respect to Elders past and present.

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Types of mathematics investigations

Introductory comments

For this assessment type, students provide evidence of their learning in relation to their ability to choose and use the appropriate course-related mathematics to investigate or solve a problem in applied or theoretical contexts using the mathematical thinking process or the statistical investigation process.

The mathematical thinking process

The mathematical thinking process is a problem-solving process that consists of a sequence of steps that guide the approach to finding a solution to a problem. One description of the mathematical thinking process includes the following steps:

- clarifying and interpreting the task, identifying the key information and any relevant assumptions
- choosing the course-related mathematics which could help to investigate, model or solve the problem
- using existing mathematical knowledge and strategies to explore or model the problem to obtain a set of observations or a solution
- interpreting the results in relation to the original mathematical situation or context
- communicating the generalisation of the findings or the solution to the problem.

The statistical investigation process

The statistical investigation process is a cyclical process that begins with the need to solve a real-world problem and aims to reflect the way statisticians work. One description of the statistical investigation process in four steps is as follows:

- Clarify the problem and identify or pose the question/s to be answered with data.
- Design a plan to obtain or collect and organise appropriate data.
- Select and apply appropriate graphical and numerical techniques to display and analyse the data.
- Interpret the results of this analysis and relate the interpretation to the original question; communicating findings in a systematic and concise manner.

Scenarios for investigation can be:

- real-life (modelling)
- theoretical
- statistical.

Students are encouraged to use appropriate technology to aid in the investigation. Results and/or conclusions from the investigation are communicated in a format that includes evidence of all aspects of the process and may be presented in a written, digital or oral format.

Types of mathematics investigations

Types of investigations	Examples
<p>Real-life (modelling)</p> <p>Students use the mathematical thinking process to model and solve real world problems using mathematics. The problem originates with a real-world scenario that can be turned into a mathematical problem for which the mathematics of the course can be applied. The student then applies mathematical techniques to determine a solution to the problem and translates it back to the real world.</p> <p>The real-world problem will often contain more elements than is reasonable to consider in the mathematical solution. Students will make and state assumptions in order to simplify the problem to a form that can be investigated. Different assumptions can be applied as they investigate more aspects of the problem. An important part of the process is identifying which assumptions can be reasonably made and then checking to see whether the answer makes sense in the original context.</p>	<ul style="list-style-type: none"> • designing a roller coaster, racetrack, road tunnel or piece of artwork • determining a super team from athletes' individual performances • comparing scenarios for mortgage repayments • decoding using matrices • determining tourist routes • designing the completion of a building project or event • modelling tidal changes • modelling the spread of disease • comparing volume of solids
<p>Theoretical investigations</p> <p>Students use the mathematical thinking process and mathematics of the course to further investigate an aspect or application of a course topic. An investigation may be identified by a mathematical situation within a whole topic, across topics or from a subtopic. Students use problem-solving strategies as well as their knowledge, skills and understanding to explore patterns and structures or changing parameters.</p> <p>The investigation enables students to choose the mathematics required to investigate a problem or situation. They make and state assumptions relevant to the problem to support the aspects of complexity within their investigation.</p>	<ul style="list-style-type: none"> • comparing the effect on the graph of changing variables within a rational function • generalising the types of asymptotes for rectangular hyperbola • comparing the effect of matrix multiplication on polygons/polyhedra • investigating iterative processes to solve equations
<p>Statistical investigations</p> <p>Students use the statistical investigation process and course-related mathematics to investigate and analyse a real-world situation. A statistical investigation involves the collection and processing of primary or secondary data to analyse then formulate conclusions in response to one or more questions that can be answered with evidence from data.</p> <p>The statistical investigation enables students to choose the mathematics required to collect, organise, summarise, display, analyse, evaluate and critically interpret data to develop evidence-based conclusions. They make and state assumptions relevant to the problem to support the aspects of complexity within their investigation.</p>	<ul style="list-style-type: none"> • association between age and music preference • relationship between physical attributes and performance in sport • relationship between fuel prices and day of the week • comparison of house prices between suburbs • examination and comparison of distributions for data sets of random variables/sample proportions or means

Evidence should include:

- an outline of the problem and the context
- the method required to find a solution, in terms of the mathematical model or strategy used
- the application of the mathematical model or strategy, including
 - relevant data and/or information
 - mathematical calculations and results, using appropriate representations
 - the analysis and interpretation of results, including consideration of the reasonableness and limitations of the results
- the results and conclusions in the context of the problem.

Assessing a mathematical investigation

Assessment of the process includes making judgements of the students' ability to identify the underlying mathematics, make reasonable and appropriate assumptions, systematically and logically apply mathematical strategies to investigate the situation, generalise results and communicate the investigation conclusions (taking into account assumptions made) in a logical and clear sequence, including suitable justification and explanation of results found.

