Mathematics Standard Year 11

2022

Assessment Notification: TASK 2

Task Date: Tuesday 9th August, 2022

Notification date: Monday 25th July, 2022

Duration: 50 minutes.

Assessment Weighting: 30%

Content: MS-S2 – Relative Frequency and Probability

MS-A2 – Linear Relationships

MS-S1.2 – Exploring and describing data

MS – M1.2 – Perimeter, Area and Volume

Assessment will be an in-class test. Test questions will a combination of seen questions (taken from the Mathematics Standard Worksheets attached) and unseen questions.

You will be supplied with a NESA approved Standard Mathematics Reference sheet.

You may use a scientific calculator.

Outcomes:

MS11-1	uses algebraic and graphical techniques to compare alternative solutions to contextual problems
MS11-2	represents information in symbolic, graphical and tabular form
MS11-7	Develops and carries out simple statistical processes to answer questions posed
MS11-8	Solves probability problems involving multistage events
MS11-10	justifies a response to a given problem using appropriate mathematical terminology and/or calculations

Recommended preparation:

Completion of Worksheets

Preparation of study/summary sheet (You will **NOT** be allowed to take this into the test)

Chapter Revision.

Extra homework questions as given by your teacher.

Attached to this notification is a copy of the Syllabus Dot points that will be covered in the Assessment.

SYLLABUS DOT POINTS

Algebra

MS-A2 Linear Relationships

Content

Students:

- model, analyse and solve problems involving linear relationships, including constructing a straight-line graph and interpreting features of a straight-line graph, including the gradient and intercepts **AAM** ◊
  - recognise that a direct variation relationship produces a straight-line graph
  - determine a direct variation relationship from a written description, a straight-line graph passing through the origin, or a linear function in the form $y = mx$
  - review the linear function $y = mx + c$ and understand the geometrical significance of m and c
  - recognise the gradient of a direct variation graph as the constant of variation **AAM**
  - construct straight-line graphs both with and without the aid of technology (ACMGM040)
- construct and analyse a linear model, graphically or algebraically, to solve practical direct variation problems, including the cost of filling a car with fuel or a currency conversion graph **AAM** ◊
  - identify and evaluate the limitations of a linear model in a practical context

Measurement

M1.2: Perimeter, area and volume

Students:

- review and extend how to solve practical problems requiring the calculation of perimeters and areas of triangles, rectangles, parallelograms, trapezia, circles, sectors of circles and composite shapes ◊
  - review the use of Pythagoras' theorem to solve problems involving right-angled triangles
  - review the use of a scale factor to find unknown lengths in similar figures
- solve problems involving surface area of solids including prisms, cylinders, spheres and composite solids
- solve problems involving volume and capacity of solids including prisms, cylinders, spheres, pyramids and composite solids
  - convert between units of volume and capacity
- calculate perimeters and areas of irregularly shaped blocks of land by dissection into regular shapes including triangles and trapezia **AAM**
  - derive the Trapezoidal rule for a single application, $A \approx \frac{h}{2}(d_f + d_l)$
  - use the Trapezoidal rule to solve a variety of practical problems with and without technology, eg the volume of water in a swimming pool
- solve problems involving perimeters, area, surface area, volumes and capacity in a variety of contexts **AAM**

Statistical Analysis

S1.2: Summary statistics

Students:

- describe the distinguishing features of a population and sample ◊
  - define notations associated with population values (parameters) and sample-based estimates (statistics), including population mean μ, population standard deviation σ, sample mean $\bar{x}$ and sample standard deviation s
- summarise and interpret grouped and ungrouped data through appropriate graphs and summary statistics **AAM** ◊
  - discuss the mode and determine where possible
  - calculate measures of central tendency, including the arithmetic mean and the median (ACMEM050)
  - investigate the suitability of measures of central tendency in real-world contexts and use them to compare datasets
  - calculate measures of spread including the range, quantiles (including quartiles, deciles and percentiles), interquartile range (IQR) and standard deviation (calculations for standard deviation are only required by using technology)
- investigate and describe the effect of outliers on summary statistics ◊
  - use different approaches for identifying outliers, including consideration of the distance from the mean or median, or the use of $Q_1 - 1.5 \times IQR$ and $Q_3 + 1.5 \times IQR$ as criteria, recognising and justifying when each approach is appropriate
  - investigate and recognise the effect of outliers on the mean and median
- investigate real-world examples from the media illustrating appropriate and inappropriate uses or misuses of measures of central tendency and spread (ACMEM056) **AAM**
- describe, compare and interpret the distributions of graphical displays and/or numerical datasets and report findings in a systematic and concise manner **AAM** ◊
  - identify modality (unimodal, bimodal or multimodal)
  - identify shape (symmetric or positively or negatively skewed)
  - identify central tendency, spread and outliers, using and justifying appropriate criteria
  - calculate measures of central tendency or measures of spread where appropriate

- construct and compare parallel box-plots **AAM**
  - complete a five-number summary for different datasets (ACMEM058)
  - compare groups in terms of central tendency (median), spread (IQR and range) and outliers (using appropriate criteria)
  - interpret and communicate the differences observed between parallel box-plots in the context of the data

Relative Frequency and Probability

Content

Students:

- review, understand and use the language associated with theoretical probability and relative frequency ◊
  - construct a sample space for an experiment and use it to determine the number of outcomes (ACMEM154)
  - review probability as a measure of the 'likely chance of occurrence' of an event (ACMMM052)
  - review the probability scale: $0 \leq P(A) \leq 1$ for each event A, with $P(A) = 0$ if A is an impossibility and $P(A) = 1$ if A is a certainty (ACMMM053)
- determine the probabilities associated with simple games and experiments ◊
  - use the following definition of probability of an event where outcomes are equally likely: $P(\text{event}) = \frac{\text{number of favourable outcomes}}{\text{total number of outcomes}}$
  - calculate the probability of the complement of an event using the relationship $P(\text{an event does not occur}) = 1 - P(\text{the event does occur}) = P(\overline{\text{the event does occur}}) = P(\text{event}^c)$
- use arrays and tree diagrams to determine the outcomes and probabilities for multistage experiments (ACMEM156) **AAM**
  - construct and use tree diagrams to establish the outcomes for a simple multistage event
  - use probability tree diagrams to solve problems involving two-stage events

- solve problems involving simulations or trials of experiments in a variety of contexts **AAM** ◊
  - perform simulations of experiments using technology (ACMEM150)
  - use relative frequency as an estimate of probability (ACMEM152)
  - recognise that an increasing number of trials produces relative frequencies that gradually become closer in value to the theoretical probability
  - identify factors that could complicate the simulation of real-world events (ACMEM153)
- solve problems involving probability and/or relative frequency in a variety of contexts **AAM**
  - use existing known probabilities, or estimates based on relative frequencies to calculate expected frequency for a given sample or population, eg predicting, by calculation, the number of people of each blood type in a population given a two-way table of percentage breakdowns
  - calculate the expected frequency of an event occurring using np where n represents the number of times an experiment is repeated, and on each of those times the probability that the event occurs is p