 Year 12 Mathematics Standard 1

Further Statistical Analysis – assessment task

Assessment type: Investigative task – using the statistical investigation process

Stage 6

Due date:

Outcomes

* analyses representations of data in order to make predictions and draw conclusions MS1-12-2
* solves problems requiring statistical processes MS1-12-7
* chooses and uses appropriate technology effectively and recognises appropriate times for such use MS1-12-9
* uses mathematical argument and reasoning to evaluate conclusions, communicating a position clearly to others MS1-12-10

All outcomes referred to in this unit come from [Mathematics Standard Stage 6](https://syllabus.nesa.nsw.edu.au/mathematics-standard-stage6/) Syllabus  
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Learning across the curriculum

* Cross-curriculum priorities
  + Aboriginal and Torres Strait Islander histories and cultures
  + Asia and Australia’s engagement with Asia
  + Sustainability
* General capabilities
  + Critical and creative thinking
  + Ethical understanding
  + Information and communication technology capability
  + Intercultural understanding
  + Literacy
  + Numeracy
  + Personal and social capability
* Other areas of learning
  + Civics and citizenship
  + Difference and diversity
  + Work and enterprise

Task

The task involves using the statistical investigation process to investigate an issue in society chosen by the student in consultation with the classroom teacher.

1. Identify a topic of interest and pose a statistical question that will allow you to compare and contrast 2 different populations. Some examples are listed below but you may choose your own topic in consultation with your teacher.
   1. TV habits of teenagers (difference between males and females)
   2. Recreational habits of teenagers (differences between younger and older teenagers)
   3. Modes of transport
   4. Canteen menu
2. Collect data:
3. Collect appropriate data by identifying two appropriate populations and creating a questionnaire with a minimum of 10 questions. Provide at least 3 questions that give numerical data and at least 3 questions that give categorical data. At least one question must be biased and you must explain why the question is biased. Give an example of an invasive question that you will not use. It is suggested that you check these with your teacher before proceeding.
   1. Take a survey of least 20 people in each population. State the type of sample (random, systematic or stratified) that you used and why it is that sort of sample. Write a paragraph justifying your choice of sample, giving reasons for your sample and reasons against the other types of samples.
4. Represent and analyse your data by doing the following:
5. For 3 of your questions that give numerical data, calculate the mean, median, mode and range of the data for each population.
6. Choose 2 questions that give numerical data and 1 question that gives categorical data. Display this data appropriately, justifying your choice of graph. Use the same graph type for the same question in each population. Display each question in a different graph. Make sure to label axes and give your graphs a heading. You may draw your graphs neatly by hand, or using excel or other graphing software.
7. Use your data and statistical calculations to compare and contrast your 2 populations. You must give at least 2 reasons why your populations are similar using statistical calculations, and at least 2 reasons why your data is different using statistical calculations.
8. Communicate and interpret your data, giving reasons based on your calculations. You must use correct mathematical terminology and write in correct sentences. There needs to be a paragraph on each of the following:
   * An evaluation of your questionnaire. Were the questions appropriate? Were the options for answers given appropriate? Are there things you would change next time?
   * An evaluation of how you conducted the statistical process. Did you choose the right sample? Did the questions give you the data that you required? Were you able to answer the question that you originally posed?
   * Answer your original question, using evidence from your calculations.

Marking guideline

Question 1

| Criteria | Possible mark | Awarded mark |
| --- | --- | --- |
| Identify a problem | 1 |  |
| Pose a suitable statistical question | 1 |  |
| Handed to teacher | 1 |  |

Question 2a – collecting data

| Criteria | Possible mark | Awarded mark |
| --- | --- | --- |
| Choose 2 appropriate populations | 1 |  |
| Suitable questions:   * 5 marks – 10 suitable questions * 4 marks – 8-9 suitable questions * 3 marks – 6-7 suitable questions * 2 marks – 4-5 suitable questions * 1 mark – 1-3 suitable questions | 5 |  |
| 3 numerical | 1 |  |
| 3 categorical | 1 |  |
| 1 biased question | 1 |  |
| Explanation of bias | 1 |  |
| Example of invasive question | 1 |  |
| Handed to teacher | 1 |  |

Question 2b – collecting data

| Criteria | Possible mark | Awarded mark |
| --- | --- | --- |
| Evidence of survey given to samples of 20 | 1 |  |
| State the type of sample | 1 |  |
| Justify the sampling method used | 1 |  |

Question 3a – analysing data (maximum 12 marks awarded)

| Criteria | Possible mark | Awarded mark |
| --- | --- | --- |
| Mean:   * 3 marks – all calculations correct * 2 marks – two correct calculations * 1 mark – one correct calculation | 3 |  |
| Median:   * 3 marks – all calculations correct * 2 marks – two correct calculations * 1 mark – one correct calculation | 3 |  |
| Mode:   * 3 marks – all correct * 2 marks – two correct * 1 mark – one correct | 3 |  |
| Range:   * 3 marks – all correct with calculations shown * 2 marks – most correct with calculations shown or all correct with no calculations * 1 mark – some correct with calculations shown or most correct with no calculations | 3 |  |

Question 3b – representing data

| Criteria | Possible mark | Awarded mark |
| --- | --- | --- |
| Appropriate graph chosen and justification given | 1 |  |
| Heading (all graphs have a heading) | 1 |  |
| Axes labelled (all axes labelled) | 3 |  |
| Choose correct scale | 1 |  |

Question 4

| Criteria | Possible mark | Awarded mark |
| --- | --- | --- |
| Give 2 examples of where the data is similar, giving evidence   * 1 mark for each example and 1 mark for giving statistical evidence | 4 |  |
| Give 2 examples of where the data is different, giving evidence   * 1 mark for each example and 1 mark for giving statistical evidence | 4 |  |

Question 5 – communicate and interpret your data giving correct reasons

| Criteria | Possible mark | Awarded mark |
| --- | --- | --- |
| Use correct mathematical terminology:   * 2-3 marks – extensive use of mathematical terminology * 1-2 marks – basic use of mathematical terminology * 0-1 marks – limited use of mathematical terminology | 3 |  |
| Write in correct grammatical sentences:   * 3 marks – all sentences grammatically correct * 2 marks – most sentences grammatically correct * 1 mark – some sentences grammatically correct * 0 mark – no sentences grammatically correct | 3 |  |
| Evaluate and reflect on your questionnaire:   * 3-4 marks – extensive correct evaluation and reflection * 2-3 marks – mostly correct evaluation and reflection * 1-2 marks – basic correct evaluation and reflection * 0-1 marks – limited correct evaluation and reflection | 4 |  |
| Evaluate and reflect on how you conducted the statistical process:   * 2-3 marks – extensive correct evaluation and reflection * 1-2 marks – basic correct evaluation and reflection * 0-1 marks – limited correct or incorrect evaluation and reflection | 3 |  |
| Make correct conclusions based on your data and statistical calculations:   * 3 marks – correctly justified conclusion using their data and statistical calculations * 2 marks – incorrectly justified conclusion using their data and statistical calculations * 1 mark – correct calculation with no justification * 0 mark – no conclusion or justification | 3 |  |

Total:       out of 60