

# College ABCD

## Investigation Task

|                           |  |
|---------------------------|--|
| <b>Assessment Period:</b> | <b>2022 S2</b>                                 |
| <b>Course:</b>            | <b>MATHEMATICAL APPLICATIONS</b>               |
| <b>Unit:</b>              | <b>Unit 2: Mathematical Applications (1.0)</b> |
| <b>Accreditation:</b>     | <b>T</b>                                       |
| <b>Weight:</b>            | <b>30%</b>                                     |
| <b>Maximum Mark:</b>      | <b>38</b>                                      |
| <b>Due Date:</b>          | <b>07 Oct</b>                                  |

### Assessment Conditions

- Individual task
- Completed at home
- Scientific calculators, computer permitted

### Additional Information

Students to submit their task electronically via the LMS

Students are expected to substantially complete and submit all assessment items. Exemption from an item and/or alternate assessment without penalty is available to students providing adequate documentary evidence to validate special circumstances. To meet the minimum assessment requirements of a unit, a student must substantially complete and submit at least 70% of the total assessment fulfilling all assessment conditions detailed on the task sheet.

### Other Applicable Policies

#### Late penalties

Students are encouraged to submit work on time, as this is a valuable organisational skill and a key tenet of assessment condition standardisation. Students are expected to complete work, even if it is late, as soon as possible after the due date. The following policy is to ensure equity for all students:

- All assessment tasks are expected to be submitted by the specified due time and date. Unless otherwise stipulated, the due time is 4:00pm for the physical submission of assessment and 11:59pm for the digital submission of assessment, on the due date.
- Unless there are exceptional circumstances due to illness or misadventure, students must apply for an extension to the specified due date in advance, providing due cause and adequate documentary evidence for late submission to the respective Faculty Leader of Learning and/or Teaching and Learning Coordinator, after consulting their teacher. The Application for Extension of Assessment Submission Form is to be submitted with the assessment item. The student must have the extension request form signed by at least one parent when the application for extension is submitted.
- A late penalty will apply unless an extension is granted. The penalty for late submission is 5% of possible marks per calendar day late, including weekends and public holidays, until a penalty of 35% or the notional zero is reached. If an item is more than 7 days late, it receives the notional zero score (Refer to 4.3.11 Notional Zeros ). Submission on

- weekends or public holidays may not be acceptable if a physical submission is required.
- It may not be possible to grade or score work submitted late after marked work in a unit has been returned to other students. Work not submitted by the time marked work is returned to other students may be declared as 'not submitted'. Students should be aware in writing if this will be less than 7 days after the due date and any extensions granted.

### **Academic Integrity**

The BSSS and College ABCD is committed to a system of school-based assessment and views seriously any breach of the rules or instructions governing assessment. Any cheating, plagiarism, dishonesty, alteration of results or improper practice in relation to school-based assessment in any subject shall constitute a breach of discipline. This includes any tampering with the assessment data on computer files by a student.

Any work that is found to be in breach of discipline in relation to school-based assessment will incur a penalty ranging from a reprimand and warning, in writing, through to the cancellation of all assessment results for Years 11 and 12. Students who unintentionally breach the rules of school-based assessment will be given appropriate counselling and guidance so they do not repeat the offence. The impact on unit scores of the penalties imposed for serious and repeated instances will be managed in accordance with the BSSS Policy and Procedures. Any offence will be reported to the Faculty Leader who will then inform the Teaching and Learning Coordinator for escalation to the Assistant Principal where necessary.

Students are to refer to and be familiar with the BSSS Academic Integrity: Student Guide to ensure student obligations and academic integrity are met. A College Referencing and Curriculum Guide is accessible via the student handbook.

The College uses Turnitin to assist students to prevent plagiarism and enhance academic skills for original thinking, authentic writing, proper attribution and academic integrity practices. Students are to use this tool to check text similarity, find missing citations and ensure proper citation using the Harvard Referencing Style for all assessment from first draft to final submission. The use of Turnitin does not apply to exams and in-class tests.

When submitting the task, students are to sign off on the below prompt made visible via the LMS:

I certify that:

- (a) The work that I have submitted is my own work and has not been submitted for assessment before.
- (b) I have kept a copy of this assignment and all relevant notes and references materials that I used in the production of the assignment.
- (c) I have given references for all sources of information that are not my own, including the words, ideas and images of others.

### **For penalties for late and non-submission of work**

Review [BSSS Policy and Procedure Manual 4.3.10](#) for more details.

### **For academic integrity**

Review [BSSS Policy and Procedure Manual 4.3.12](#) for more details.

## Project Proposal:

The research area I was assigned is number 8, Vaccination Rates. The data I will use to complete the analysis for this assignment is

“The share of one-year-olds who have received at least one of the following vaccinations: BCG, DTP3, HepB3, Hib3, Measles 1<sup>st</sup>, PCV3, Pol3 or ROTAC. This shows the number for the vaccine with the highest coverage.” [http://gapm.io/dvacc\\_for\\_1yr](http://gapm.io/dvacc_for_1yr)

The data available on the website went up to 2020 but that data was missing for a lot of countries, so I intend to use the 2019 data.

There are 193 countries listed on the spreadsheet.

I expect the data to show that some countries will have lower rates of vaccination than other places. I think the factors indicating this will be wealth and proportion of parents who are against science and vaccinations.

### RC 2

communicates simple mathematical judgements or arguments in oral, written and/or multimodal forms, with some use of appropriate language  
Student addresses rubric section 1 to an outstanding level explaining the link between the research topic and the data.

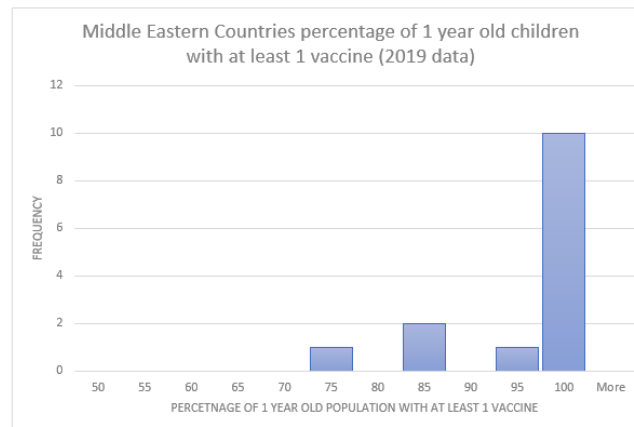
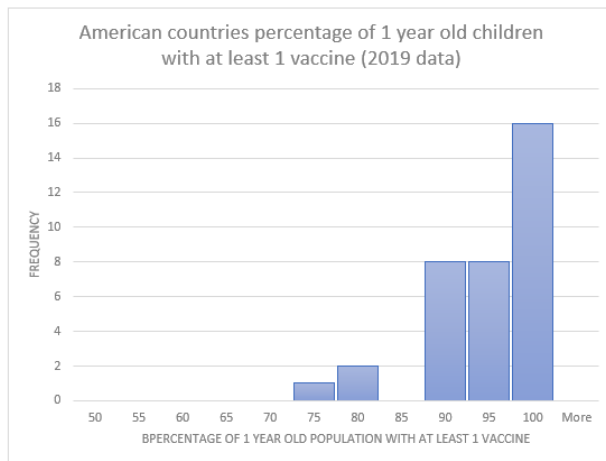
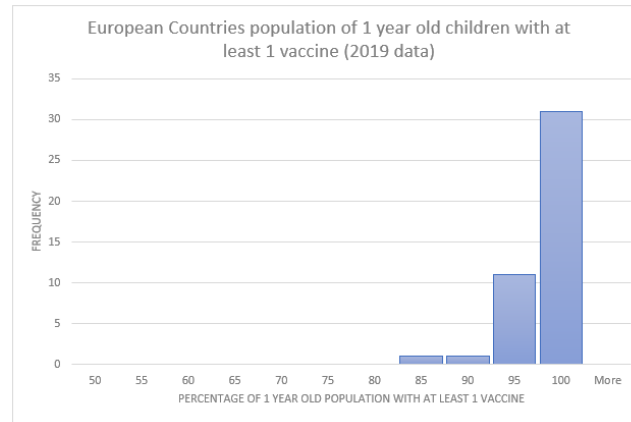
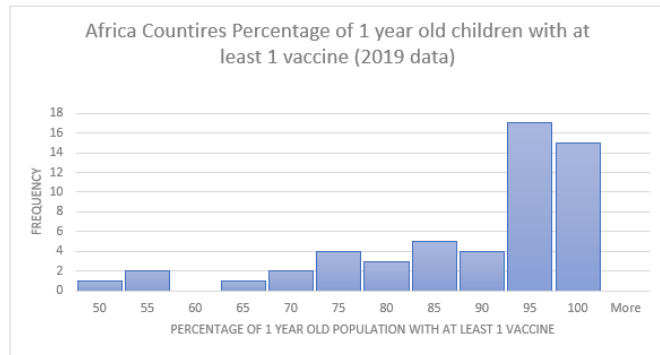
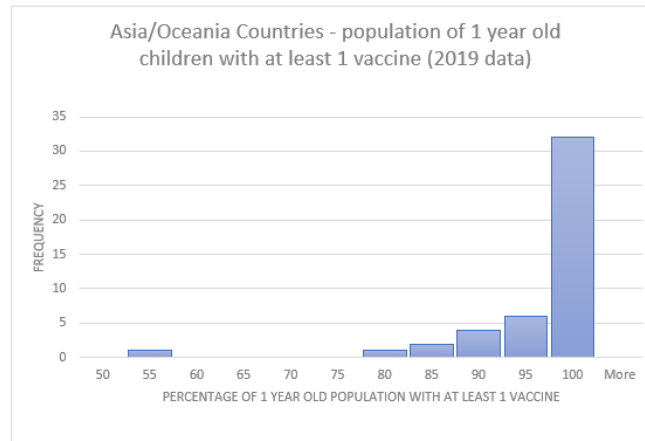
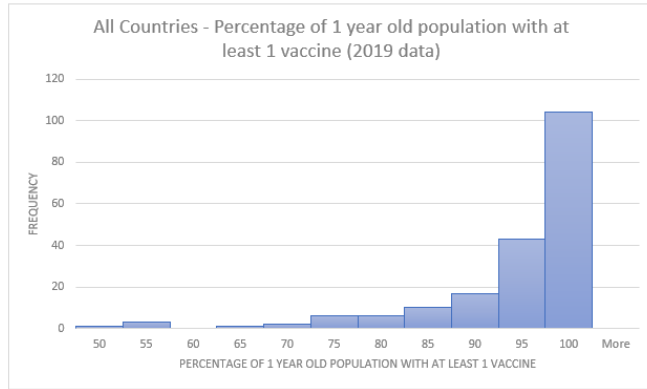
Student did not really explain the relationship the chosen data point to the research area. (D level response)

### RC3

explains the reasonableness of solutions to some routine and non-routine problems

Student did not explain the differences expected between regions at all. Just an overview. (D level response)

## Histograms, Boxplots and Report:



### RC1

represents complex mathematical concepts in numerical, graphical and symbolic form in routine and non-routine problems in a variety of contexts

Student represents all sets of data as histograms with equal bucket sizes and same size x axis for ease of comparison and detailed titles for the reader to have accurate context.

### All Countries:

The histogram of the whole world population shows a negative skew. There are 16 outliers on the low end-- 11 of the outliers are from Africa, 2 from Asia/Oceania, 2 from the Americas and 1 from the Middle East. There can be no outliers on the high end as there will not be any country with 111% of its 1-year-old population with some vaccination.

### African Countries:

The histogram of African countries shows a negative skew. There are 3 outliers on the low end, Somalia, Chad and South Sudan as they all have percentages of 1 years with at least 1 vaccine at a level less than 57.875%. There can be no outliers on the high end as there will not be any country with 118.875% of its 1-year-old population with some vaccination.

The boxplot tells us this data is the most inconsistent or spread out of all regions and it has the highest range, standard deviation and IQR.

### American Countries:

The histogram for the American countries shows a negative skew. There are no outliers on the low end, but Haiti is nearly at that mark. There can be no outliers on the high end as there will not be any country with 114% of its 1-year-old population with some vaccination. The IQR is the second largest for this group. The data seems to be quite spread out 32 countries have between 85 and 99 % of the 1-year-old population having had at least 1 vaccine. Only 3 countries are at the low end.

### Asian/Oceania Countries:

The Asian/Oceania histogram shows a negative skew. There is an obvious outlier at the low end of Papua New Guinea and some other outliers that are less obvious. There are no outliers at the high end.

The spread of the Asian/Oceania countries has the second largest spread of any region with a range of 47% between the country with 99% of their 1-year-old having received their vaccination and then PNG on the low end.

### European Countries:

The European countries histogram shows a negative skew, and the box plot shows us that the data for European countries is very close together with the smallest standard deviation, IQR and range.

### Middle Eastern Countries:

The Middle Eastern countries histogram shows a negative skew and 1 outlier at the low-end representing Yemen's 73% of the population of one-year-olds only having received one vaccination.

The box plot shows a similar range of scores as that of the Americas.

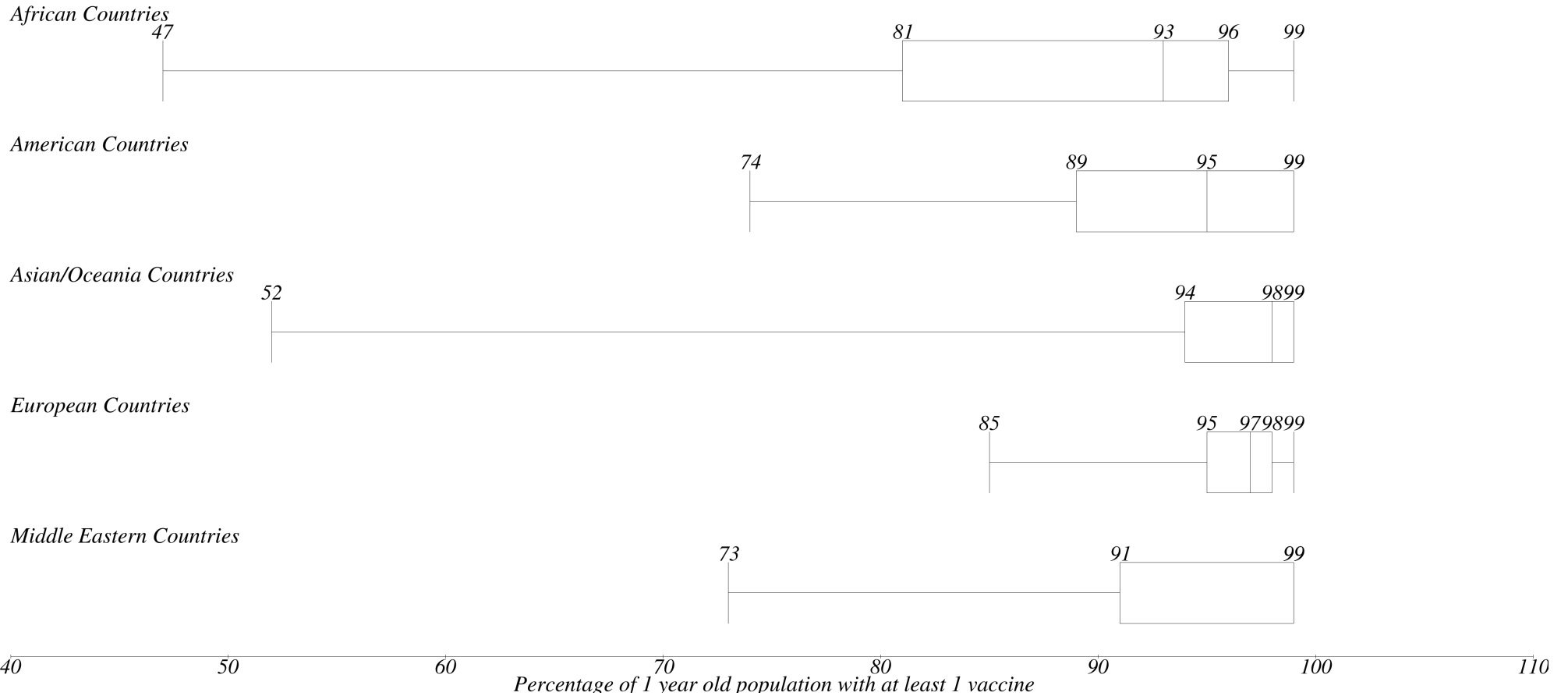
RC2

communicates mathematical judgements and arguments in oral, written and/or multimodal forms, using appropriate and accurate language

Student has used a few statistical measures to summarise their data analysis referring to both the histograms and boxplots at times throughout the various summaries. Student has used some statistical language and descriptions of the data sets.

**RC1**

represents complex mathematical concepts in numerical, graphical, and symbolic form in routine and non-routine problems in a variety of contexts  
Student represents all sets of data as boxplots with same scale for ease of comparison and clear, detailed titles for the reader to have accurate context.



## Conclusions and Recommendations:

I would recommend Australian Aid look at spending their aid money in Africa, Asia/Oceania and the Middle East. As Papua New Guinea had a very low average rate of vaccination in 1 year old (52%) and it is so close to Australia. I would recommend that a significant amount of the \$10 000 000 be spent there to help those people and protect our own population. I would suggest the rest of the Australian Aid money be spent Africa (whose box plot was all over the place) and Yemen (73%) in the Middle East to help these countries to increase the percentage of 1 year old children who have access to vaccines. Spending the aid money here might help increase the rates of vaccination in these countries.

### RC 5/RC 2/CT 3

**\*\*describes the potential of Mathematics to generate knowledge in the public good**

**\*\*communicates mathematical judgements and arguments in oral, written and/or multimodal forms, using appropriate and accurate language**

**\*\*applies mathematical models to routine and non-routine problems in some contexts**

**Student provided a brief recommendation with how to spend the aid money. Some explanation is provided with regard to PNG as to why this is important to Australia.**

## Reflection of Time and Resources:

I probably should have started my assignment work before I did. I completed the labelling of the data by region early on and then left it for about a week. Then I sorted the data and completed the analysis by region a couple of days before the assignment was due. The histograms and boxplots were done the day before the task and the write up was completed the day the assignment was due. I should not have left so much time after labelling the data by region as I was quite rushed at the end trying to get it submitted by time. The data was interesting to see, especially PNG being such a close country to here and having such a low vaccination rate.

### RC4

reflects on their own thinking and explains planning, time management, use of appropriate strategies to work independently and collaboratively

**Student reflects on their own thinking and analyses their time management effectiveness. Would like to have seen some indication that next time an assignment is given out that the student intends to manage time and resources more efficiently.**

| Project proposal  | A grade response   | B grade response  | C grade response   | D grade response  | E grade response   |
|---|--|---|--|---|--|
| <b>Area of study and data used to measure from Gapminder website.</b><br><br><b>(5 marks)</b> | Clearly stated Area of Research and data you are using to measure this with a well reasoned and succinct justification for why this measure will be appropriate for the area of research.    | Area of research and data measurement stated.<br><br>Clearly stated link between area of research and data used to measure with the use of clear, reasoned appropriate and accurate language. | Area of research and data measurement stated. Link between measurement data and area of research made using appropriate and accurate language. | Area of research and data measurement stated. Link between measurement data and area of research discussed with some appropriate language used. | Area of research and data measurement stated, no explanation of how this data can be used to measure the area of research. |
| <b>Expectation</b><br><br><b>(5 marks)</b>  | Clearly stated, well-reasoned and succinct justification for what you expect the results to show for ALL data and REGIONAL data with succinct, well-reasoned explanation for your reasoning. | Justification for what you expect the results to show for ALL data and REGIONAL data using clear, reasoned, appropriate and accurate language.  | Justification for what you expect the results to show for ALL data and REGIONAL data using appropriate and accurate language.                  | Expectation for ALL data and REGIONAL data provided with some justification using some appropriate language.                                    | Expectation for ALL data and REGIONAL data provided without justification.   |

| Data Analysis and Display   | A grade response  | B grade response   | C grade response   | D grade response   | E grade response  |
|---|---|--|--|--|---|
| <b>Data Analysis for data by REGION and for ALL data</b><br><br><b>(25 marks)</b> | Selected and applied an appropriately efficient spreadsheet formula to find mean, standard deviation, 5 number summary values, IQR, range, outliers and clearly labelled analysis measures and formulas are | Selected and applied an appropriately efficient spreadsheet formula to find mean, standard deviation, 5 number summary values, IQR, range, outliers. All formulas are able to be read. | Applied spreadsheet formula to find mean, standard deviation, 5 number summary values, IQR, range, outliers. All formulas are able to be read. | Applied spreadsheet formula to find some of the measures of data analysis: mean, standard deviation, 5 number summary values, IQR, range, outliers.<br><br>All formulas are able to be read. | Applied spreadsheet formula to find some of the measures of data analysis: mean, standard deviation, 5 number summary values, IQR, range, outliers. |



|   |  |   |   |  |   |
|---|--|---|---|--|---|
|   | able to be read.   |   |   |  |   |
| <b>Data Display- Histograms</b><br><br>(15 marks) | Represented mathematical concepts in graphical form with clear titles and consistent group sizes for all 5 groups of REGIONAL data   | Represented mathematical concepts in graphical form with consistent group sizes and titles for all 5 groups of REGIONAL data.   | Represented mathematical concepts in graphical form and informative titles for all 5 groups of data.  | Represented mathematical concepts in graphical form with titles for all 5 groups of data.                          | Represented mathematical concepts in graphical form for some of the REGIONAL data.                    |
| <b>Data Display- Boxplot</b><br><br>(15 marks)    | Represented mathematical concepts in graphical form with clear titles and a shared scale for all 5 groups of REGIONAL data.  | Represented mathematical concepts in graphical form with titles and a shared scale for all 5 groups of REGIONAL data.   | Represented mathematical concepts in graphical form with informative titles for all 5 groups of REGIONAL data.  | Represented mathematical concepts in graphical form with titles for all 5 groups of REGIONAL data.                 | Represented mathematical concepts in graphical form for some of the regional data.                    |
| <b>Report</b><br><br>(15 marks)                   | Communicates mathematical judgements and arguments in written form which is succinct and well-reasoned, using appropriate and accurate language and references to multiple statistical measurements as evidence. | Communicates mathematical judgements and arguments in written form which is reasoned, using appropriate language and references to multiple statistical measurements as evidence. | Communicates mathematical judgements and arguments in written form using some appropriate language and references to some statistical measurements as evidence. | Communicates simple mathematical judgements in written form referencing some statistical measurements as evidence. | Communicates simple mathematical judgements in written form with limited use of appropriate language. |

| Conclusions and recommendations | A grade response   | B grade response  | C grade response   | D grade response   | E grade response  |
|---------------------------------|--|---|--|--|---|
| <b>Use of data analysis</b>     | Succinctly used various mathematical calculations to communicate and | Used various mathematical calculations to communicate and analyse | Used some mathematical calculations to communicate and explain | Used some mathematical calculations to communicate and describe the potential of | Identified some ways in which Mathematics is used to generate knowledge for |

|   |  |   |  |   |   |
|---|--|---|--|---|---|
| <b>(15 marks)</b>                         | evaluate the potential of Mathematics to make decisions for the public good.   | the potential of Mathematics to make decisions for the public good.   | the potential of Mathematics to make decisions for the public good.  | Mathematics to make decisions for the public good.  | the public good.  |
| <b>Reflection</b><br><br><b>(5 marks)</b> | Reflected with insight on their own thinking and evaluated planning, time management and use of appropriate strategies to work independently.  | Reflected on their own thinking and analysed planning, time management and use of appropriate strategies to work independently. | Reflected on their own thinking and explained planning, time management and use of appropriate strategies to work independently. | Reflected on their own thinking with some reference to planning, time management and use of appropriate strategies to work independently. | Reflected on their own thinking with little or no reference to planning, time management and use of appropriate strategies to work independently. |
| <b>Teacher Feedback</b>                   | <p>In your proposal it would have been a good idea to explain what the acronyms meant and clearly state how your data relates to the research area. For example, the rate of vaccinations in 1-year olds is a good indication of Vaccination Rates across a population as parents are usually very concerned with the health of babies. Your expectation of what your data might tell you is very brief and non-specific.</p> <p>Your spreadsheet uses some formulas effectively but no formula visible for minimum, maximum, range and IQR. Your spreadsheet is clearly set out and well organised.</p> <p>Your Histograms have great titles and the same axes for comparisons. Well done! Your box plots also look good and make it easy to see the differences in vaccination rates across the regions.</p> <p>Your summary of the analysis for each region looks good. You have used some statistical measures for each region and made mention of the histograms or boxplots for some regions.</p> <p>Your recommendations were ok but not overly specific. As to how you would break down the \$10 000 000. How much of that should PNG get? How much should Yemen get? etc.</p> |   |  |   |   |