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| T_home:kateprumm:Desktop:CHS.jpg  | **Teaching and Learning Program** |
| **Title/Type of Unit: Probability and Investigating Data****Program Risk Level: Low** | **Duration: 10 Weeks, 3 lessons****By Ursula** |
| **Syllabus Outcomes****Stage 4** | *A student:***Probability*** MA4-1WM communicates and connects mathematical ideas using appropriate terminology, diagrams and symbols
* MA4-2WM  applies appropriate mathematical techniques to solve problems
* MA4-3WM recognises and explains mathematical relationships using reasoning

MA4-21SP represents probabilities of simple and compound events**Investigating Data**MA4-1WM  communicates and connects mathematical ideas using appropriate terminology, diagrams and symbols  * MA4-2WM  applies appropriate mathematical techniques to solve problems
* MA4-3WM  recognises and explains mathematical relationships using reasoning

MA4-20SP analyses single sets of data using measures of location, and rangeMA4-1WM  communicates and connects mathematical ideas using appropriate terminology, diagrams and symbols  * MA4-3WM  recognises and explains mathematical relationships using reasoning

MA4-19SP collects, represents and interprets single sets of data, using appropriate statistical displays |
| **Connectedness****Why does this learning matter?** | **Students learn to:****Probability:**- Construct [sample spaces](https://syllabus.bostes.nsw.edu.au/glossary/mat/sample-space/?ajax) for single-step experiments with [equally likely outcomes](https://syllabus.bostes.nsw.edu.au/glossary/mat/equally-likely-outcomes/?ajax)- Assign [probabilities](https://syllabus.bostes.nsw.edu.au/glossary/mat/probability/?ajax) to the outcomes of [events](https://syllabus.bostes.nsw.edu.au/glossary/mat/event/?ajax) and determine probabilities for events- Identify [complementary events](https://syllabus.bostes.nsw.edu.au/glossary/mat/complementary-events/?ajax) and use the [sum](https://syllabus.bostes.nsw.edu.au/glossary/mat/sum/?ajax) of probabilities to solve problems- Describe [events](https://syllabus.bostes.nsw.edu.au/glossary/mat/event/?ajax) using language of 'at least', exclusive 'or' (A or B but not both), inclusive 'or' (A or B or both) and 'and'- Represent events in [two-way tables](https://syllabus.bostes.nsw.edu.au/glossary/mat/two-way-table/?ajax) and [Venn diagrams](https://syllabus.bostes.nsw.edu.au/glossary/mat/venn-diagram/?ajax) and solve related problems**Investigating Data:*** Investigate techniques for collecting [data](https://syllabus.bostes.nsw.edu.au/glossary/mat/data/?ajax), including [census](https://syllabus.bostes.nsw.edu.au/glossary/mat/census/?ajax), sampling and observation
* Explore the practicalities and implications of obtaining data through sampling using a variety of investigative processes
* Identify and investigate issues involving [numerical data](https://syllabus.bostes.nsw.edu.au/glossary/mat/numerical-data/?ajax) collected from primary and secondary sources
* Construct and compare a range of data displays, including [stem-and-leaf plots](https://syllabus.bostes.nsw.edu.au/glossary/mat/stem-and-leaf-plot/?ajax) and [dot plots](https://syllabus.bostes.nsw.edu.au/glossary/mat/dot-plot/?ajax)
 | **Students learn about:****Probability:*** use the term 'chance experiment' when referring to actions such as tossing a coin, rolling a die, or randomly selecting an object from a bag
* use the term 'outcome' to describe a possible result of a chance experiment and list all of the possible outcomes for a single-step experiment
* use the term 'sample space' to describe a list of all of the possible outcomes for a chance experiment
* distinguish between equally likely outcomes and outcomes that are not equally likely in single-step chance experiments
* establish that the sum of the probabilities of all of the possible outcomes of a single-step experiment is 1
* identify and describe the complement of an event
* express the probability of an event, given a finite number of equally likely outcomes in the sample space
* use the term 'event' to describe either one outcome or a collection of outcomes in the sample space of a chance experiment
* difference between [mutually exclusive](https://syllabus.bostes.nsw.edu.au/glossary/mat/mutually-exclusive-events/?ajax) and non-mutually exclusive events
* describe compound events using the following terms: least, most, not likely, chance
* classify compound events using inclusive 'or' and exclusive 'or'
* interpret Venn diagrams involving two or three attributes
* construct Venn diagrams to represent all possible combinations of two attributes from given or collected [data](https://syllabus.bostes.nsw.edu.au/glossary/mat/data/?ajax)
* interpret given two-way tables representing non-mutually exclusive attributes
* construct two-way tables to represent the relationships between attributes

**Investigating Data:*** determine the mode, median, mode and range for sets of data
* identify any clusters, gaps and outliers in sets of data
* recognise and explain the difference between a '[population](https://syllabus.bostes.nsw.edu.au/glossary/mat/population/?ajax)' and a '[sample](https://syllabus.bostes.nsw.edu.au/glossary/mat/sample/?ajax)' selected from a population when collecting data
* collect data using a random process
* identify the difference between data collected from primary and secondary sources
* construct appropriate survey questions and a related recording sheet in order to collect both numerical and categorical data about a matter of interest
* construct and interpret [frequency histograms](https://syllabus.bostes.nsw.edu.au/glossary/mat/histogram/?ajax) and polygons, dot points, stem-and-leaf plots
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| **Background and Key Ideas** | Students understand the concept of chance, most likely, least likely. This topic is to aid students in applying probability and statistics into data and reasons why it is being used. |
| **Literacy Continuum** | Reading Texts | Comprehension | Vocabulary Knowledge | Aspects of Writing | Aspects of Speaking | Phonics | Phonemic Awareness | Concepts About Print |
| Clusters: range 7- 11Activities linked to program to increase learning:* Students are to read text from the textbook and worksheets
* Students will look into graphs, tables and different forms of print text, as well as creating their own
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| **Numeracy Continuum** | Counting Sequences | Counting as Problem Solving | Pattern and Number Structure | Place Value | Multiplication and Division | Fraction Units | Length, Area and Volume |
| Elements: range 3- 5Activities linked to program to increase learning:* Students to count and identify numbers from 0-1000
* Uses facts, number structure and other strategies to solve problems
* Understands the structural properties of numbers
* Understands the positional value of decimals
* Coordinates two composite units as a operation
* Coordinates composition of partitioning
 |
| **Quality Teaching** |
| **Intellectual Quality** | **Quality Learning Environment** | **Significance** |
| * IQ1 Deep Knowledge
* IQ2 Deep Understanding
* IQ3 Problematic Knowledge
* IQ4 Higher-order Thinking
* IQ5 Metalanguage
* IQ6 Substantive Communication
 | * QLE1 Explicit Quality Criteria
* QE2 Engagement
* QE3 High Expectations
* QE4 Social Support
* QE5 Students’ Self-regulation
* QE6 Student Direction
 | * S1 Background Knowledge
* S2 Cultural Knowledge
* S3 Knowledge Integration
* S4 Inclusively
* S5 Connectedness
* S6 Narrative
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| **Teaching and Learning Lesson Overview** |
| **The Elements of Learning & Achievement**F:\Mock ups\Square elements\Numeracy.jpgE:\Final V1\Final sq NO border\Sq Technology no bdr.jpg | **Probability****Week 1****Lesson 1: Definition of Probability****Introduction: Background knowledge**Teacher will be introducing the topic of probability to the students. Teacher will get students’ background knowledge of probability. Teacher will ask questions like:What is probability?What does it involve?What are ways that probability is used?What are some ways that probability can be seen in our daily lives?**Body: Definition of probability**Students will write down the definition of probability and the formula of how to work out the probability of an event occurring. Teacher is to write on the whiteboard the definition. Students are to copy the following into their books: Probability is the expected chance of events written as fractions, decimals or percentages. It compares how many times a particular event can happen with all the possible outcomes. Probability of an event: P(E)= number of favourable outcomes Total number of outcomes≈ P(E) means the probability of an event occurringWhen students copy the definition into their books the students will complete a worksheet on probability. The worksheet consists of students rolling a dice, tossing a coin etc.**Conclusion: Understanding**Teacher will check students understanding of probability. This can be done as a class by going through answers on the worksheet. **Lesson 2: Reinforcement of probability****Introduction/ Body: Activity**Teacher will re-cap from last lesson on what probability is. Teacher to answer any question students may have. Teacher to hand out worksheet from the textbook. Students will complete the textbook exercise 12-01 pg 463.**Conclusion: Checking answers**When students have finished the worksheet, the teacher will go through the answers with the students.**Lesson 3: Complementary Events****Introduction/ Body: Definition**Teacher to inform students that complementary events is an extension of probability. Teacher to write on the white board the definition of complementary events. Students are to copy the following into their books:Complementary events are events that together make up all the possible outcomes, such as a head and tail when tossing a coin. Complementary events can be written in many different forms.When students write down the definition, the teacher will hand out a worksheet. In the worksheet students will be able to use terminology that is used in probability.**Conclusion: Checking answers**Teacher will go through answers with the students on the worksheet. Teacher to answer any questions students may have, to allow further understanding.**Week 2****Lesson 1: Venn Diagram****Introduction: Venn diagram definition**Teacher will ask students if they have heard of a Venn diagram?What does it consist of?What does it look like?**Body/Conclusion: Definition**Teacher to write on the whiteboard the definition of a Venn diagram. Students will copy the following into their book:A Venn diagram is a diagram of circles (usually overlapping) for grouping items into categories. A rectangle represents the whole group while the circles represent categories. Items common to two or more categories are placed in the intersection (overlapping region) of the circles. When students write the definition down, the teacher will provide an example from the textbook. The students are to copy the example into their books.**Lesson 2: ‘And’ verses ‘or’****Introduction/ Body: Understanding the Venn diagram**Teacher to explain to students how a Venn diagram is broken down and the preferred events that goes into the diagram. Teacher will write down on the whiteboard for students to copy into their books:For two categories or events A and B, the phrase ‘A and B’ means to have both of them occurring together. If A and B are overlapping, the phase ‘A or B’ means to have A or B or both. In this case, ‘A or B’ actually includes ‘A and B’ so this is an example of an inclusive ‘or’ If A and B are mutually exclusive, this means that they are not overlapping and appear as two separate circles. When students have written the definition into their books, the teacher will write up an example on the whiteboard so students can get a better understanding.**Lesson 3: Worksheet****Introduction/ Body: Worksheet activity**Teacher to hand out worksheet to students. In the worksheet students will be able to read a Venn diagram through answering questions. Also students will be making their own Venn diagrams by interpreting the information given. **Conclusion: Checking answers**As a class teacher is to go through the answers to gain the understanding of students’ knowledge in Venn diagrams.**Week 3****Lesson 1, 2, 3: Two-way tables****Introduction: Background knowledge**Teacher will ask students if they have heard of two-way tables?What does it consist of?What does it look like?**Body (lesson 1): Definition, worksheet and activity**Teacher will write a short definition of what a two-way table is. Student will copy the following into their books:A two-way table is another way of grouping items into overlapping categories, especially when there are many overlaps that cannot easily be represented by Venn diagrams.When students have completed the definition the teacher will write an example on the board for students to copy and gain an understanding of how two-way tables function.**Body (lesson 2): Worksheet**Teacher will hand out the worksheet from the textbook. The worksheet allows students to read and interpret a two-way table and also to create their own table.**Body (lesson 3): Activity**In this lesson students will make their own two-way table. Students will conduct a survey of their choosing. Students will pick two characteristics fro example playing sport and going to movies, eye colour and hair colour. Students will ask question to their classmates. When students have gathered their information they will place it into a two-way table.**Week 4****Lesson 1: Two-step experiments****Introduction: Definitions**Students will write down the definition of two-step experiments. Teacher will write on the whiteboard:A two-step experiment is a chance experiment that had two parts or stages, fro example: rolling two dice, throwing a coin and die together, drawing two prizes in a raffle. The outcome of the second step may or may not be affected by the outcome of the first step. The sample space for a two-step experiment can be displayed using lists, tables or trees.**Body/ Conclusion: Lists**Teacher will write an example of how two-step experiments are shown in a list. Students will copy the example into their books.**Lesson 2: Tables****Introduction/ Body/ Conclusion: Example table**Teacher will write an example of how two-step experiments are shown in a table. Students will copy the example into their books.**Lesson 3: Tree Diagrams****Introduction: Tree diagram definition**Teacher will write down on the white board the definition of a tree diagram. Students are to copy the following in their books:A tree diagram lists all possible outcomes of each stage. Branches stretch out to show the possible pathways of outcomes at each step or stage. An outcomes column at the end of the diagram lists the sample space.**Body: Worksheet**When students have written down the definition, the teacher will hand out the worksheet. In the worksheet students will answer questions on two-step experiments, including tables, lists, and tree diagrams. Students will interpret and draw their own tables, lists and tree diagrams.**Conclusion: Checking answers**Teacher is to go through the answers with students. The teacher is to gain an understanding of students’ knowledge in two-step experiments.**Week 5****Lesson 1, 2: Topic overview****Introduction/Body: Re-cap of topic**Teacher to re-cap from previous lessons on probability. Teacher will provide students with examples and worksheets that will allow the students to practise for the topic test next lesson.**Conclusion: Student Knowledge**Teacher to answer any questions and assist students in studying for the topic test.**Lesson 3: Topic Test****Introduction/ Body/ Conclusion: Topic test**Students will sit a topic test. The test will consist of multiple choice and students to construct one of the tables that was previously taught.**Week 6****Lesson 1, 2, 3: Mean, median, mode****Introduction: Background knowledge**Teacher will be introducing the topic of investigating data statistics to the students. Teacher will get students’ background knowledge of statistics. Teacher will ask questions like:What is statistics?What does it involve?What are ways that statistics used?What are some ways that statistics can be seen in our daily lives?**Body: Mean, median, mode**Teacher to in introduce the concepts of mean, median and mode. The teacher is to give definitions of each concept. The students are to copy each of the definitions into their books. The mean, median and mode are called measures of location because they give an indication of a central value (or average) of a set data.Mean: Is the average numbers in a set of data. The mean is calculated through adding up all the numbers, then dividing by the quantity of numbers.Mean= sum of scores Number of scoresMedian: is the middle number in a set of data. The median is calculated through placing all the numbers in the set of data in order and then the middle number is the median.Mode: The mode is the score (or scores) that occur most often.When students have finished writing down the definitions. The teacher will hand out a worksheet, which allows students to work out the mean, median, and mode from a set of data.**Conclusion: Discussion**Teacher will discuss any question from students about their understanding of the mean, median and mode.**Week 7****Lesson 1: Frequency Histograms and polygons****Introduction/ Body: Definitions**Teacher to write definitions of a frequency histogram and frequency polygon. Students to copy the following into their books:A frequency histogram is a column graph of numerical data where the columns stand together without gaps between them.A frequency polygon is a line graph that is constructed by joining the midpoint of the tops of the columns of a frequency histogram, starting and ending on the horizontal axis.**Conclusion: Examples**Teacher to write up an example of a frequency histogram and polygon. Students will draw both to show how information is interpreted in the graph.**Lesson 2: Stem and Leaf plot and Back-to-back stem and leaf plots****Introduction/Body:**Teacher is to write on the whiteboard the definition of a stem and leaf plots. Students will copy down the following into their books:A stem and leaf plot lists the scores of a data set, usually in order. It shows: * any clusters, where scores are grouped or bunched together
* any outliers
* how the scores are spread out

Back-to-back stem and leaf plots lists the scores of data set when two related sets of data are compared.**Conclusion: Examples**Teacher to write up an example of a stem and leaf and back-to-back stem and leaf plot. Students will draw both to show how information is interpreted in the graph.**Lesson 3: Exercise****Introduction/Body: Activity**Teacher is to hand out the worksheet relating to histograms and stem and leaf plots. In the worksheet students will be able to answer questions that will allow them to read the two types of graphs. Students will also be able to draw both types of graphs and get familiar with this type of data representation.**Conclusion: Discussion and checking of answers**As a class teacher is to go through the answers of the worksheet. This will allow students to get a better understanding of the content and to ask questions that the students find difficult.**Week 8****Lesson 1: Shape of a distribution****Introduction/Body: definition and activity**Teacher to write on the whiteboard the meaning of having certain shapes when looking at the distribution in graphs. Students are to copy the following into their books:A statistical distribution is the way the scores of a data set are arranged, especially when graphed. When looking t histograms, dot plot ans stem and leaf plots, an overall pattern can be seen from the shape of the display.The shape of a statistical distribution shows how the data is spread and can be seen by drawing a curve around the graph or display.A distribution is symmetrical if the data is evenly spread or balanced about the centre.Teacher is to show examples of histogram and stem and leaf plot graphs to the students.**Conclusion: Examples**Students will be given a worksheet where they will draw the curve on graphs to represent the distribution.**Lesson 2: Comparing data sets****Introduction/Body/Conclusion: Worksheet**Teacher will hand a worksheet to students that will allow them to practice and visualise how to compare two results formed into one graph. The teacher will also show examples of different graphs with two different data.**Lesson 3: Sampling and types of data****Introduction/Body: sample vs census, data**Teacher will write on the board ways in which data can be collected. Students are to copy the following into their books:A census is a survey of the entire population. If the population is too large or difficult to survey, then a sample of the population is selected instead. The sample must be representative of the population, by being:* random
* unbiased
* large as it will be more representative

Types of DataThere are two types of data:Categorical data are usually words and can be grouped into categories, such as a person’s hair colour or cultural backgroundNumerical data are numbers describing things that can be counted or measured, like the number of goal scored or a person’s height. Numerical data is either discrete or continuous.Discrete data are counted or measured and can only take on separate, distinct values, with ‘gaps’ or ‘jumps’Continuous data are measured on a smooth scale with no gaps or jumps between values.**Week 9****Lesson 1: Bias sampling****Introduction/ Body: Definition of bias sampling**Teacher to remind students the ways in which data is collected. Teacher to tell students that when collecting samples for data there are times it can be biased.When taking a sample, it is important that each item in the population has an equal chance of being chosen to be surveyed. This is called random sampling. A sample that is not random is called a biased sample, and is not truly representative of the population.**Conclusion: Example**Teacher will show students an example and write it on the board. This will allow students to gain a better understanding of how sample can be biased.**Lesson 2: Designing a Questionnaire****Introduction/ Body: Definition**Teacher is going to show ways in which questions are asked when people are doing a sample. Questionnaires are often use to collect information. When designing a questionnaire, it is important that the questions asked are clear, fair, and not biased.* questions should be clear, and are not vague or have no double meaning
* ask for only one piece of information per question
* don’t not allow for too many different answers, provide choices
* don’t ask personal questions
* determine how you are going to present and use the data you collect.

**Conclusion: Introduce Assessment**After the lesson teacher is to let students know that they would be doing an assessment task, where they would need to make a questionnaire, collect data, and place it into graphs, determine the mean, median, mode.**Week 10****Lesson 1, 2: working on assessment task****Introduction/Body/Conclusion:**In this lesson students will be creating their own questionnaire. It can be a topic of their choosing. Students will need to design questions that will suit for the students at the school. The students will collet data and dissect it into graphs and determine the mean, median and mode.**Lesson 3: Topic Test****Introduction/Body/ Conclusion: topic test**Students will be given a topic test that will consist of 20 questions ranging from multiple choice and short answer response.  | **Aboriginal 8 Ways of Learning***The following ways of learning are incorporated throughout the program through pedagogical practices*4_symbol.jpgSymbols & Images7_deconstruct.jpgDeconstruct/ Reconstruct |
| **Special Needs Adjustments** | **School to Work** |
| 1:1 support where requiredDiscussion basedScaffolded responsesExtensive positive reinforcement | Comprehension skillsUnderstanding of others positionsBackground knowledge of probability terminologyBackground knowledge of different forms of graphsImpact of what their choices could have |
| **Assessments** |
| **Tasks** | **Weigthing** | **Outcomes** |
|  1. Depth of understanding in verbal communication and discussion | 5% |  |
| 2. Data collection assessments | 5% |  |
| 3. 2 Topic test | 10% |  |
| **Roles and Responsibilities** |
| **Teacher** | **SLSO** | **Student** |
| Engaging class discussionsCreating safe working environmentsProvide assistance in student learning | Support teacher in class decisionsSupport students in learningProvide 1:1 support for students | Gain understanding and knowledge of answering questions verbally and writtenFurther skills in verbal and written language |

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| **Teacher Evaluation****Comments / Variations** |
| Guiding QuestionsWhat worked well?What needed to be changed?What do I think the students gained from this lesson?How well did this unit match the Elements of Learning and Achievement?What did I learn?How will I use this experience to extend my practice in the future?  |
| **Date Commenced**:  | **Date Finished**:  |
| **Teachers Signature**: | **Assistant Principals Signature**: |