WEEK 5

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| **Week Ending:** | | **DAY:** | | **Subject:** Mathematics | | | |
| **Duration:** 60MINS | | | | **Strand:** HANDLING DATA | | | |
| **Class:** B9 | | **Class Size:** | | **Sub Strand:** Chance or Probability | | | |
| **Content Standard:**  B9.4.2.1Identify the sample space for a probability experiment involving two dependent events and express the probabilities of given events as fractions, decimals, percentages and/or ratios to solve problems. | | | **Indicator:**  B9.4.2.1.1. Perform a probability experiment involving two dependent events e.g. drawing coloured bottle tops from a bag without replacement | | | | **Lesson:**  1 of 1 |
| **Performance Indicator:**  Learners can design and conduct a probability experiment involving dependent events and calculate the probability of dependent events using conditional probability. | | | | | **Core Competencies:**  Communication and Collaboration (CC) Critical Thinking and Problem solving | | |
| **References:** Mathematics Curriculum Pg. | | | | | | | |
| **New words:** | | | | | | | |
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| Phase/Duration | Learners Activities | | | | | Resources | |
| PHASE 1: **STARTER** | Simulate a coin toss experiment (heads or tails) a few times. Ask learners to predict the outcome of the second toss after seeing the result of the first toss.  Discuss how the outcome of the first toss (heads or tails) affects the possibilities for the second toss (remaining coin). | | | | |  | |
| PHASE 2: **NEW LEARNING** | Introduce the concept of dependent events in probability. Explain that dependent events are events where the outcome of one event affects the probability of the other event occurring.  Use the coin toss example to illustrate how knowing the result of the first toss influences the possibilities remaining for the second toss.  Introduce the experiment involving the bag and colored bottle tops. Explain that learners will be drawing bottle tops one at a time, without replacing them. This means the remaining bottle tops in the bag will change after each draw, making the events dependent.  Demonstrate how to label the bag and show the different colored bottle tops.  Decide on the number of bottle tops to use (e.g., 5 red, 3 blue). Record the initial number of each color in a table on the board or worksheet.  Explain that the first draw represents Event A (e.g., drawing a red bottle top).  Discuss all possible outcomes for Event A (drawing red or blue). Calculate the initial probability of Event A (e.g., if there are 5 red bottle tops, P(A) = number of red bottle tops / total number of bottle tops = 5/8).  Explain that the second draw represents Event B (e.g., drawing another red bottle top after already drawing a red one). Since the first red bottle top is not replaced, there are now fewer red bottle tops remaining. This makes Event B dependent on Event A (having already drawn red).  Introduce the concept of conditional probability. Explain that to calculate the probability of Event B happening given that Event A already happened (P(B|A)), we need to consider the number of remaining favorable outcomes (red bottle tops left) after the first draw and the new total number of bottle tops left.  Conduct the experiment as a class or in small groups. Draw a bottle top, record its color, and update the table (if used) with the remaining number of each color.  Calculate the conditional probability of drawing another red bottle top after taking out a red one first (P(B|A) = number of red bottle tops left / total number of bottle tops left after first draw).  Repeat the process, drawing another bottle top, updating the table, and calculating the conditional probability each time based on the previous outcome.  Assessment  Experiment: Drawing two colored bottle tops from a bag without replacement (red, blue, green)  Sample Space (Possible Outcomes): {RR, RB, RG, BR, BB, BG, GR, GB, GG}  Let Event A = drawing a red bottle top on the first draw  Let Event B = drawing a blue bottle top on the second draw.  Probability of Event A: P(A) = Number of red bottle tops / Total number of bottle tops  Probability of Event B given Event A: P(B|A) = Number of blue bottle tops remaining / Number of bottle tops remaining after Event A.  For example, if there are 4 red, 3 blue, and 2 green bottle tops initially:  P(A) = 4/9 (drawing a red top on the first draw)  P(B|A) = 3/8 (drawing a blue top on the second draw given that a red top was drawn first) | | | | | Bag (opaque)  Colored bottle tops (at least 2 different colors, e.g., red and blue) | |
| PHASE 3: **REFLECTION** | Use peer discussion and effective questioning to find out from learners what they have learnt during the lesson.  Take feedback from learners and summarize the lesson. | | | | |  | |

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| **Duration:** 60MINS | | | | **Strand: H**ANDLING DATA | | | |
| **Class:** B9 | | **Class Size:** | | **Sub Strand:** Chance or Probability | | | |
| **Content Standard:**  B9.4.2.1Identify the sample space for a probability experiment involving two dependent events and express the probabilities of given events as fractions, decimals, percentages and/or ratios to solve problems. | | | **Indicator:**  B9.4.2.1.2. Express the probabilities of the events as fractions, decimals, percentages and/or ratios; e.g. using a tree diagram, table or another graphic organizer | | | | **Lesson:**  1 of 1 |
| **Performance Indicator:**  Learners can revisit the concept of probability and different ways to express probabilities (fractions, decimals, percentages, ratios). | | | | | **Core Competencies:**  Communication and Collaboration (CC) Critical Thinking and Problem solving | | |
| **References:** Mathematics Curriculum Pg. 219 -220 | | | | | | | |
| **New words:** | | | | | | | |
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| Phase/Duration | Learners Activities | | | | | Resources | |
| PHASE 1: **STARTER** | Quickly review the concept of probability and different ways to express probabilities (fractions, decimals, percentages, ratios).  Show examples of each method (e.g., probability of rolling a 6 on a die = 1/6 as a fraction, 0.1667 as a decimal, 16.67% as a percentage, or 1 to 5 as a ratio). | | | | |  | |
| PHASE 2: **NEW LEARNING** | Present different scenarios and ask learners to express the probability of the event happening in various forms (fraction, decimal, percentage, ratio). For example, probability of drawing a heads on a fair coin toss.  Introduce tree diagrams as a visual tool to represent the possible outcomes of multiple events, especially dependent events.  Explain how each branch represents a possible outcome, and probabilities can be assigned to each branch.  Present the example scenario: Anita picks one bottle top, in three trials, from a bag containing 3 red, 2 green, and 1 pink bottle top, without replacement.  Ask learners to list all the elements (possible outcomes) of the sample space for this experiment.  The sample space includes all combinations of picking a color in three trials, considering the bag's contents change after each pick (dependent events). (Sample space: RRR, RRG, RGR, RGG, GRR, GGR, GRG, GGG, PRR, PRG, GPR, PPG, etc.)  Start building a tree diagram on the board (or use pipe cleaners/straws to represent branches).  The first level represents the initial draw (three branches for red, green, and pink).  For each branch, add subsequent levels representing the remaining colors Anita can pick in the following trials (considering the color taken in the previous draw is no longer available).  Guide learners to calculate the probability of each outcome (picking a specific color combination) at the end of each branch.  For the first draw, the probability of picking red is 3/6 (3 red out of 6 total), green is 2/6, and pink is 1/6 (written as fractions on the corresponding branches).  Since it's without replacement, emphasize how the probabilities change for subsequent draws based on the previous outcome.  For example, if the first draw is red, there are only 5 bottle tops remaining (2 green and 1 pink), affecting the probabilities in the following levels of that branch.  Encourage learners to convert the fractional probabilities on the branches to decimals (dividing numerator by denominator) and percentages (multiplying by 100%).  Ratios can also be expressed based on the favorable outcomes compared to the total possible outcomes at each stage. | | | | | Pipe cleaners or straws | |
| PHASE 3: **REFLECTION** | Use peer discussion and effective questioning to find out from learners what they have learnt during the lesson.  Take feedback from learners and summarize the lesson. | | | | |  | |

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| **Content Standard:**  B9.4.2.1Identify the sample space for a probability experiment involving two dependent events and express the probabilities of given events as fractions, decimals, percentages and/or ratios to solve problems. | | | **Indicator:**  B9.4.2.1.2. Express the probabilities of the events as fractions, decimals, percentages and/or ratios; e.g. using a tree diagram, table or another graphic organiser | | | | **Lesson:**  1 of 1 |
| **Performance Indicator:**  Learners can calculate probabilities of two-event scenarios involving dependent events and express probabilities as fractions, decimals, percentages, and ratios. | | | | | **Core Competencies:**  Communication and Collaboration (CC) Critical Thinking and Problem solving | | |
| **References:** Mathematics Curriculum Pg. 219 -220 | | | | | | | |
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| Phase/Duration | Learners Activities | | | | | Resources | |
| PHASE 1: **STARTER** | Briefly review the concept of tree diagrams and how they represent dependent events. Remind learners that in dependent events, the outcome of one event affects the possibilities for subsequent events. | | | | |  | |
| PHASE 2: **NEW LEARNING** | Present the scenario: Calculate the probability of drawing two Aces (in two trials) from a standard deck of cards, without replacing the drawn card.  Guide learners to construct a tree diagram on the board (or use pipe cleaners/straws).  The first level represents the initial draw (four branches for each suit's Ace: Spades, Hearts, Diamonds, Clubs).  The second level represents the second draw, considering there are only 51 cards left (and three Aces remaining) after the first Ace is taken.  At each level, ask learners to calculate the probability of each outcome (picking a specific Ace).  For the first draw, the probability of picking any Ace is 4/52 (written as a fraction on each Ace branch). For the second draw, the probability of picking another Ace depends on the first Ace drawn (only 3 Aces left).  Encourage learners to convert the fractional probabilities on the branches to decimals (dividing numerator by denominator) and percentages (multiplying by 100%).  Ratios can also be expressed based on the favorable outcomes (drawing another Ace) compared to the total possible outcomes at the second draw (considering one Ace is already gone)  By combining the probabilities along each successful branch (picking an Ace twice), the overall probability of drawing two Aces in two trials is the product of the individual probabilities (4/52 \* 3/51). Calculate the final probability as a fraction, decimal, and percentage.  Present a new scenario: Calculate the probability of drawing an Ace and then a Jack (in two trials) from a standard deck of cards, without replacement.  Ask learners to modify the existing tree diagram. The first level remains the same (four branches for Aces). The second level now represents drawing a Jack (considering there are 4 Jacks and 51 cards remaining after the Ace is drawn).  Guide learners through calculating probabilities on each branch. The probability of drawing an Ace in the first draw is still 4/52. The probability of drawing a Jack in the second draw is 4/51.  Similar to the previous example, convert the fractional probabilities on the branches to decimals, percentages, and ratios.  The overall probability of drawing an Ace followed by a Jack is the product of the individual probabilities (4/52 \* 4/51). Calculate the final probability in all three forms. | | | | | Pipe cleaners or straws (to represent branches in the tree diagram)  Standard deck of cards | |
| PHASE 3: **REFLECTION** | Use peer discussion and effective questioning to find out from learners what they have learnt during the lesson.  Take feedback from learners and summarize the lesson. | | | | |  | |