**Unit NO3: Multiplicative Thinking**

Primary Years

Noarlunga Cluster

***Numeracy Planner***

**Big Idea: Multiplicative Thinking**  **Focus/Goal of unit: To develop an understanding of arrays**

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| **Lesson Sequence** | **Stage A: Building the field** | **Stage 1** | **Stage 2** | **Stage 3** | **Stage 4** |
| Recap last lesson  Low Order / Intro Activity (5-10mins) | Array flash cards.  What can you see?  How many?  How arranged? | Array flash cards  How many rows/columns  Groups? (countable unit) | Array flash cards | Recap building arrays | Recap recognition of and building arrays |
| Goal / Purpose of lesson  Make explicit to the students the purpose of the lesson, what they will know by the end and why. | To develop an understanding of what an array is.  (Organising same sized groups) | Continue to develop an understanding of an array and what an array tells us. | Consolidate understanding of an array and that you can add more row or columns to continue counting in multiples. | Introduce the concept of commutativity. | To demonstrate an understanding of arrays by using arrays and the concept of commutativity |
| High Order / Modelling (10-15mins) | Pile of counters. Organise them into same sized groups  in rows or columns.  Students help do this.  Discuss the configuration.  What do we see? How many rows?  What is the countable unit? | Array Play  Use a handful of counters and place them on a grid to make an array.  Explain that an array is a rectangle or a square made up of rows and columns. Explain that some numbers can be arranged in more than one way to make an array. Demonstrate building arrays by adding columns to count in 2’s, 4’s, 5’s etc. | Hurray for Arrays.  Flash an array card to students. Students then make the array they have seen and report back in terms of rows and columns,  e.g.” 3 fours,12”  Continue with other arrays.  Once students have demonstrated an understanding of this process show another card and ask “How many would there be if there were two more rows?”  e.g. “3 fives, 15, 2more fives,10 so 25 altogether”  Repeat for other arrays | Roll dice to get 2 numbers.  (six sided and 10 sided)  6,4: Make an array 6 fours  Reverse 4 sixes.  Do we have the same amount?  How do you know?  Discuss. Demonstrate some more arrays and reverse. | Multiplication toss .Model the roll of two dice and then draw that array on the grid paper.  e.g. a 3 and a 6 are thrown. This can be used to construct 3 sixes or 6 threes. Shade the array and roll a new one. Continue making arrays and shading grid paper to fill up all the spaces. Record in the shaded area the array e.g. 3 sixes. Demonstrate trying to predict what you might need to fill up a space. Discuss potential problems that may occur when arrays won’t fit. |
| Application (20 mins)  Children set to task as teacher observes, assesses & scaffolds as needed. | Students repeat activity with a partner. | Students work with a partner taking a pile of counters and repeating teacher modelled activity on grid paper. | Students work with a partner posing similar scenarios using array cards or making arrays on whiteboards for each other to add onto. | Work with a partner. Roll the dice. Make the array on whiteboard. Partner reverses the array on own whiteboard. | Students work on one grid with a partner taking turns to roll dice and make array. Give an allotted time.  Aim is to fill up the grid. Continue until grid is full or time expires. |
| Joint conceptualising / meaning making (10 mins) | Students share what they have done and how they did it. What was their thinking?  (Good to photograph their results for future reference) | Students share what they have done. What array have they made? What is the countable unit?( grouping)  Could they make it a different way? | Students share what they have done. Discuss variety of arrays made .Ask for different strategies used. Were there any arrays that were more difficult than others? | Bring whiteboards to floor for sharing. Discuss what they have discovered. Does it always work? How do you know? What was your thinking? What have you learnt? | Discus variety of arrays made by students. Share different strategies used. What happened when there were smaller sections of the grid left over? Were students able to break arrays into smaller parts? E.g. 3 sixes into 1 six and 2 sixes? |
| Equipment/Resources needed in lesson | Array cards or Interactive white board display, Counters (Lots!) | Counters, 2cm grid paper,  Array cards or Interactive white board display | Array cards, whiteboards markers and erasers | Dice, whiteboards, markers and erasers. | 1cm. Square grid paper  Coloured pencils  6sided and 10 sided dice |
| New Language introduced | Array rows columns  Countable units |  | multiples | commutative |  |

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**Big Idea: Multiplicative Thinking (Continued)**  **Focus/Goal of unit: To develop an understanding of Prime and Composite numbers.**

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| **Lesson Sequence** | **Stage 6** | **Stage 7** | **Stage8** | **Stage 9** | **Stage10** |
| Recap last lesson  Low Order / Intro Activity (5-10mins) | Recap concept of commutativity | Skip counting. Counting in multiples starting anywhere on 100 square. | Review what students know about prime and composite numbers. Game to 50 only | Pick a number game. Is it prime or composite? Explain how you know | Recap factors  What is a factor? |
| Goal / Purpose of lesson  Make explicit to the students the purpose of the lesson, what they will know by the end and why. | To introduce and form an understanding of what constitutes a prime or composite number. | To reinforce the understanding of prime and composite numbers | As previous stage using an interesting activity. | Building an understanding of factors. | Building an understanding of factors in relationship to prime and composite numbers |
| High Order / Modelling (10-15mins) | Roll a 20 sided die.  With students helping make as many different arrays as possible for that number.  Do several times. What do you notice? Some numbers have lots of different arrays (Composite) some have only 2(Prime). | Review last lesson. How do we know if a number is prime or composite? Choose a number between 3 and 50. Make an array (rectangle).e.g. 10 fives decorate and cut out writing the number 50 in the middle Students think of other rectangles for 50 e.g.2 twenty fives , 5 tens. Make and cut out. These will all be stuck on class composite quilt. | Introduction to Eratosthenes’s Sieve. (Can look this up on Google!)  Discuss who he was and what the sieve does.  Review multiples relate to x tables.  Demonstrate some of the divisibility rules. E.G. even numbers can be divided by 2. Numbers ending with 5 or 0 can be divided by 5. | Repeat modelling as in stage 6 and introduce and use the word factor in relation to arrays.  Roll a number. Let’s look for the factors.  How can we find out  Discuss strategies. | Repeat modelling using the term factors.  Investigate factors of prime numbers and composite numbers.  Reinforce number2 only prime even number.  Reinforce not all odd numbers are prime |
| Application (20 mins)  Children set to task as teacher observes, assesses & scaffolds as needed. | Students repeat teacher modelled activity on own or in pairs.Record on grid paper making as many arrays for that number as they can. Label number Prime or Composite. | Students repeat activity using own choice of number (all different).  Single rows(one square deep or wide) are not allowed on the quilt so they need to start again with another number. (Some will make squares!) | Using a 100 square, students follow the instructions to sieve out all the composite numbers. Prime numbers to 100 should be left. | In pairs students roll dice to make arrays and record factors. | Students investigate further with numbers recording factors of each one looking for the difference between prime and composite numbers. |

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| Joint conceptualising / meaning making (10 mins) | What differences did you discover between prime and composite numbers?  Anyone find a composite number that was odd?  (2 is the only even prime all other primes are odd but not ALL odd numbers are prime!) | Bring cut outs to floor to share findings. Stick rectangles on quilt. Some students will have squares. E.G. 3 threes. Discuss these are square numbers.These are composite numbers. Are there any more composite numbers to 50? How do we know? Which numbers can’t we stick on? How do we know? | Discuss what we have discovered. Does it only work to 100? How can you find out? | Look together at the factors of different numbers.  How do you know they are factors? Do all numbers have the same amount of factors? | Do all composite numbers have the same amount of factors? How do we know?  Do all prime numbers have the same amount of factors? How do we know |
| Equipment/Resources needed in lesson | Dice, grid paper, coloured pencils | Grid paper, scissors ,glue | Copy of Eratosthenes’s sieve, 100 squares, coloured pencils  Individual tables charts | Dice, Whiteboards ,markers erasers, grid paper /books | Dice, whiteboards, markers, erasers, books /grid paper |
| New Language introduced | Composite, prime, odd, even |  | Eratosthenes,  sieve | factors |  |

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**Big Idea: Multiplicative Thinking**  **Focus/Goal of unit: To develop mental strategies for multiplication**

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| **Lesson Sequence** | **Stage 11**  **Old lesson 4**  **Double Trouble** | **Stage12**  **Old lesson5**  **Double Trouble 2** | **Stage 13**  **Multiplying mentally** | **Stage14**  **Card Multiplication game** | **Stage15**  **Multiplication and place value ideas** |
| Recap last lesson  Low Order / Intro Activity (5-10mins) | Multiplication Toss – half size grid paper version of yesterday’s lesson | Flash cards to 20 and students write doubles | Mental maths – doubles, doubles plus one and double-doubles | Mental maths – doubles, doubles plus one and double-doubles | Mental maths – doubles, doubles plus one and double-doubles |
| Goal / Purpose of lesson  Make explicit to the students the purpose of the lesson, what they will know by the end and why. |  |  |  |  |  |
| High Order / Modelling (10-15mins) | Double Trouble. Review doubles to 10 using ten frames e.g. 6 is double 3, 8 is double 4) then review doubles to 20. Demonstrate 2 threes by shading 2 rows of three on a grid as an array. Then shade 4 threes. Explain that 4 threes are just double 2 threes. Provide more examples of ‘double-doubles’. Students can then shade their own arrays of various numbers chosen by the teacher or through the roll of a dice. | Double Trouble 2.  Revisit previous lesson.  In pairs students take turns to throw a 10 sided dice, calculating 4 times the number thrown using the double double strategy. Products can be shown on 1cm grid paper and then recorded on a strip of paper and summed progressively. The winner is the person with the highest total. This also provides students with an opportunity to practice renaming skills when adding. | Multiplying Mentally  Roll two 10 sided dice to create a two digit number. Construct a model of this number with MAB. Ask students to think about double this number and model it with the MAB. Students work in pairs and throw their own dice to create 2 digit numbers. | Card Multiplication Game  Using the Cuisenaire rods, select “two of anything” and describe e.g. 2 sevens could be described as double seven. Repeat selecting ‘three of something’ (double and one more group) and ‘four of something’ (double double). Select two playing cards from the deck. Using the 2 cards make the largest number and then double it. Work in pairs. Students get one point each time they get the biggest number. | Multiplication and Place Value Ideas  Using 6x14 and 14x6 as an example, show and explain the different ways in which equations can be modelled. Present as 6 fourteens and 14 sixes using Cuisenaire rods. Discuss which is more efficient / easier and why. Share the different ways that this can be conceptualised e.g. for 6 fourteens: 6 tens, 60 and 6 fours, 24 so total 84 etc |
| Application (20 mins)  Children set to task as teacher observes, assesses & scaffolds as needed. |  |  |  |  |  |
| Joint conceptualising / meaning making (10 mins) | Discuss the variety of arrays made by students. Ask for different strategies used. Was it easier to calculate mentally or using grids? | Discuss the variety of arrays made by students. Ask for different strategies used. Was it easier to calculate mentally or using grids? | Encourage students to identify and justify their thinking. | Model activity again and ask students to discuss their strategies. | Discuss other ways that this problem can be approached. Discuss efficient strategies |
| Equipment/Resources needed in lesson | 10 sided dice  Square grid paper | 10 sided dice  Square grid paper  Strip of paper | MAB  10 sided dice | MAB, Cuisenaire Rods  Playing Cards, Paper  Pencils | MAB or Cuisenaire Rods |
| New Language introduced |  |  |  |  |  |

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**Big Idea: Multiplicative Thinking** **Focus/Goal of unit: To develop mental and formal strategies for multiplication when solving**

**word problems.**

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| **Lesson Sequence** | **Stage 16**  **Old lesson 10**  **School Rubbish** |  |  |  |  |
| Recap last lesson  Low Order / Intro Activity (5-10mins) | Mental maths – doubles, doubles plus one and double-doubles |  |  |  |  |
| Goal / Purpose of lesson  Make explicit to the students the purpose of the lesson, what they will know by the end and why. |  |  |  |  |  |
| High Order / Modelling (10-15mins) | School Rubbish  Pose the following problem to the students: “There are 28 students in a small rural school. If each person creates 3 pieces of rubbish from their lunch box, how many pieces of rubbish does the whole school produce in one day?” Discuss and model mental strategies that can be used to solve the problem and then move on to recording using a formal method. Use MAB to model. Provide other word problems for students to solve – working in pairs initially. |  |  |  |  |

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| Application (20 mins)  Children set to task as teacher observes, assesses & scaffolds as needed. |  |  |  |  |  |
| Joint conceptualising / meaning making (10 mins) | Review method and allow students to demonstrate their strategies and recording on the board. |  |  |  |  |
| Equipment/Resources needed in lesson | Concrete materials representing ‘rubbish’  MAB, White board |  |  |  |  |
| New Language introduced |  |  |  |  |  |