DEVELOPING MATHEMATICAL INQUIRY COMMUNITIES

Number: Multiplication and Division

Level 2 (Year 3 - 4)

Teacher Booklet

Level 2 Year 3-4: Number: Multiplication and Division

Task 1	What a bossy ant the littlest ant is. She likes the ants to be organised in rows no matter how many ants there are. If there 5 rows of ants and 10 ants in each row, how many ants are there altogether? If there 8 rows of ants and 4 ants in each row, how many ants are there altogether? If there 15 rows of ants and 4 ants in each row, how many ants are there altogether? Make sure that you can explain and justify your reasoning with both a picture and numbers.
Big ideas	Numbers can be partitioned and combined to solve more complex addition and subtraction and simple multiplication and division problems. Numbers can be represented in a variety of ways. Equations show relationships of equality between parts on either side of the equal sign. Patterns and relationships can be used, represented and generalised in a variety of ways. Multiplying whole numbers by the base results in one place value shift to the right, dividing whole numbers by the base results in one place value shift to the left. Repeated addition is the same as multiplication. Repeated subtraction is the same as division. The commutative property means that 3x6 is the same as 6x3 so 6 x 3 = 3 x 6. The associative property of multiplication is as follows, e.g., (2 × 2) × 6 = 2 × (2 × 6), used in repeated doubling when finding the product of 4 and 6. The distributive property is as follows, e.g., 7 × 7 = (7 × 5) + (7 × 2) = 35 + 14 = 49.
Curriculum links	**NA2-6:** Communicate and interpret simple additive strategies using words, diagrams (pictures) and symbols. **NA2-7:** Generalise that whole numbers can be partitioned in many ways. **NA3-1:** Use a range of additive and simple multiplicative strategies with whole numbers, fractions, decimals, and percentages. **NA3-7:** Generalise the properties of addition and subtraction with whole numbers.
Learning Outcomes: Students will be able to:	• Represent and explain how an array represents a group. • Represent an array in a structured way. • Explain and justify how numbers can be grouped in an infinite number of ways-the number in a set remains the same no matter how it is arranged or represented.

	• Explain and justify the commutative property of multiplications. • Represent, explain, and justify relationships between numbers in an operation.
Mathematical language	Times, multiply, equals, repeat, multiplication, lots of, sets of, arrays, same as
Sharing back/Connect	Select students to share who can explain their reasoning through using drawings or counters in arrays and symbols of what they are explaining. **Connect:** Have we still got the same number of ants if we say 2 rows of 3 ants or 3 rows of 2 ants. Use the counters to justify your reasoning. Can you make a conjecture about what can you see in the array and the numbers?
Teacher Notes	• Read the book One Hundred Hungry Ants or watch (https://www.youtube.com/watch?v=KXLNe5zfrvc) as a shared book during a literacy session • During the launch, revisit One Hundred Hungry Ants and some of the patterns the bossy little ant made them use as they marched for the food. • Have available counters which students can use to group in an array. • Facilitate the students to organise the materials in an array rather than discrete sets XXXX XXXX XXXX • Notice the students who use 'lots of' or sets of to describe the groups and reinforce this language. Use this to introduce the multiplication symbol to represent these if the students do not use it.
Independent Tasks	Aunty has 22 feijoas in one bag and 14 feijoas in another bag. How many feijoas does aunty have altogether? Mona collected 54 shells and her cousin collected some more. Now they have 92 shells. How many did cousin collect? Mere has 37 pink beads in one bag. She also has some yellow beads in another bag. Altogether she has 76 beads. How many yellow beads does she have? Koru picked 31 lemons from his tree. He kept some lemons and gave 16 to the neighbour. How many lemons did Koru keep?

Level 2 Year 3-4: Number: Multiplication and Division

	Niko had 24 plums in a bag. He picked some more plums and now he has 73 plums. How many plums did Niko pick?
Anticipations	

Level 2 Year 3-4: Number: Multiplication and Division

Task 2	That bossy little ant is at it again. This time she wants to organise all the other ants into rows. If there are 100 marching ants what are all the different ways she can organise them so that there are no ants left over? Make sure you can explain and justify your solutions using number sentences.
Big ideas	Numbers can be partitioned and combined to solve more complex addition and subtraction and simple multiplication and division problems. Numbers can be represented in a variety of ways. Equations show relationships of equality between parts on either side of the equal sign. Patterns and relationships can be used, represented and generalised in a variety of ways. Multiplying whole numbers by the base results in one place value shift to the right, dividing whole numbers by the base results in one place value shift to the left. Repeated addition is the same as multiplication. Repeated subtraction is the same as division. The commutative property means that 3x6 is the same as 6x3 so 6 x 3 = 3 x 6. The associative property of multiplication is as follows, e.g., (2 × 2) × 6 = 2 × (2 × 6), used in repeated doubling when finding the product of 4 and 6. The distributive property is as follows, e.g., 7 × 7 = (7 × 5) + (7 × 2) = 35 + 14 = 49.
Curriculum links	**NA2-6:** Communicate and interpret simple additive strategies using words, diagrams (pictures) and symbols. **NA2-7:** Generalise that whole numbers can be partitioned in many ways. **NA3-1:** Use a range of additive and simple multiplicative strategies with whole numbers, fractions, decimals, and percentages. **NA3-7:** Generalise the properties of addition and subtraction with whole numbers.
Learning Outcomes: Students will be able to:	• Represent and explain how an array represents a group. • Represent an array in a structured way. • Explain and justify how numbers can be grouped in an infinite number of ways-the number in a set remains the same no matter how it is arranged or represented. • Explain and justify the commutative property of multiplications. • Represent, explain, and justify relationships between numbers in an operation.
Mathematical language	Times, multiply, equals, repeat, multiplication, lots of, sets of, arrays, same as, factors, product
Sharing back/Connect	Select students to share who can explain their reasoning through using arrays and symbols of what they are explaining.

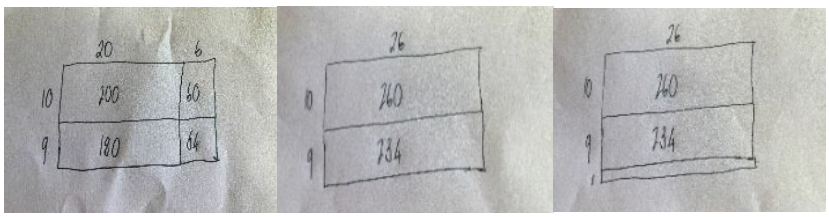
Level 2 Year 3-4: Number: Multiplication and Division

	Connect: What are the different ways that bossy little ant could organise 12 ants in equal rows? What about 20 ants? What about 30 ants? Can you name all the factors of 12? 20? 30? How would you explain what factors are to a younger person?
Teacher Notes	• Have available squared paper or dotted paper students can use to cut up and identify the different groupings they can name. • Facilitate the students to identify that an array can be described in more than one way. • Notice the students who identify all the possible groupings and use this to introduce the term factors and products. • Take notice of students who use gesturing to indicate the commutative property and build on their reasoning. • For the independent task, have counters available.
Independent Tasks	Have we still got the same number of ants if we say 2 rows of 3 ants or 3 rows of 2 ants? What about 3 rows of 4 ants and 4 rows of 3 ants? What about 6 rows of 2 ants and 2 rows of 6 ants? Use the counters to justify your reasoning. Record the array. Can you make a conjecture about what can you see in the array and the numbers?
Anticipations	

Level 2 Year 3-4: Number: Multiplication and Division

Task 3	The bossy little ant likes watching the legs of all the ants as they march in rows. She starts to wonder how many ant legs there are marching past her. Ants all have 6 legs. If there are 2 rows of 10 ants, how many legs go past? If there are 2 rows of 6 ants, how many legs go past? If there are 3 rows of 5 ants, how many legs go past? Be ready to explain and justify your solution using 2 different ways.
Big ideas	Numbers can be partitioned and combined to solve more complex addition and subtraction and simple multiplication and division problems. Numbers can be represented in a variety of ways. Equations show relationships of equality between parts on either side of the equal sign. Patterns and relationships can be used, represented and generalised in a variety of ways. Multiplying whole numbers by the base results in one place value shift to the right, dividing whole numbers by the base results in one place value shift to the left. Repeated addition is the same as multiplication. Repeated subtraction is the same as division. The commutative property means that 3x6 is the same as 6x3 so 6 x 3 = 3 x 6. The associative property of multiplication is as follows, e.g., (2 × 2) × 6 = 2 × (2 × 6), used in repeated doubling when finding the product of 4 and 6. The distributive property is as follows, e.g., 7 × 7 = (7 × 5) + (7 × 2) = 35 + 14 = 49.
Curriculum links	**NA2-6:** Communicate and interpret simple additive strategies using words, diagrams (pictures) and symbols. **NA2-7:** Generalise that whole numbers can be partitioned in many ways. **NA3-1:** Use a range of additive and simple multiplicative strategies with whole numbers, fractions, decimals, and percentages. **NA3-7:** Generalise the properties of addition and subtraction with whole numbers.
Learning Outcomes: Students will be able to:	• Represent and explain how an array represents a group. • Represent an array in a structured way. • Explain and justify how numbers can be grouped in an infinite number of ways-the number in a set remains the same no matter how it is arranged or represented. • Explain and justify the commutative property of multiplications.

Level 2 Year 3-4: Number: Multiplication and Division

	• Represent, explain, and justify relationships between numbers in an operation.
Mathematical language	Times, multiply, equals, repeat, multiplication, lots of, sets of, arrays, same as, factors, product, splitting, partitioning, area, distributive property, commutative property, flip around, turn around
Sharing back/Connect	Select students to share who can explain their reasoning through using drawings, and notation as both repeated addition and multiplication. **Connect:** What are the different ways you could multiply 6 by 12? Did you think of splitting the 12 into 10 and 2 or 5 and 5 and 2? What are the different ways you could multiply 13 by 7? How could you split 13 into other factors you would find easier to use? How could you explain why splitting larger factors into smaller factors works?
Teacher Notes	• In the launch revisit the concept of factors. Discuss what the factors of 8 are. Record as a pot and label on it the number 8. Have balloons coming from the pot with 1, 4, 2, 8 (factors of 8). Repeat with other numbers. • Facilitate the students to notice that they can group in different ways. Re-record their different groupings as an area model as illustrated below for 26 x 19 as a model for students to use  • Monitor for students using vocabulary which describes splitting or partitioning factors into smaller factors and place value. Introduce the term distributive property to describe the splitting of factors. • Expect students to represent using drawings and notation including using a number sentence with three factors.
Independent Tasks	What are the different ways that bossy little ant could organise 12 ants in equal rows? What about 20 ants? What about 30 ants?

Level 2 Year 3-4: Number: Multiplication and Division

	Record all the factors of: 8 12 16 20 30 45 80 How would you explain what factors are to a younger person?
Anticipations	

Level 2 Year 3-4: Number: Multiplication and Division

Task 4	Ants can move very fast towards food especially when Little Ant is organising them. They can run 14 metres every minute towards bread. How far can they run in 9 minutes? They get even more excited with cake and run 23 metres every minute. How far can they run in 9 minutes now? Make sure you can explain and justify your explanation in different ways.
Big ideas	Numbers can be partitioned and combined to solve more complex addition and subtraction and simple multiplication and division problems. Numbers can be represented in a variety of ways. Equations show relationships of equality between parts on either side of the equal sign. Patterns and relationships can be used, represented and generalised in a variety of ways. Multiplying whole numbers by the base results in one place value shift to the right, dividing whole numbers by the base results in one place value shift to the left. Repeated addition is the same as multiplication. Repeated subtraction is the same as division. The commutative property means that 3x6 is the same as 6x3 so 6 x 3 = 3 x 6. The associative property of multiplication is as follows, e.g., $(2 \times 2) \times 6 = 2 \times (2 \times 6)$, used in repeated doubling when finding the product of 4 and 6. The distributive property is as follows, e.g., $7 \times 7 = (7 \times 5) + (7 \times 2) = 35 + 14 = 49$.
Curriculum links	**NA2-6:** Communicate and interpret simple additive strategies using words, diagrams (pictures) and symbols. **NA2-7:** Generalise that whole numbers can be partitioned in many ways. **NA3-1:** Use a range of additive and simple multiplicative strategies with whole numbers, fractions, decimals, and percentages. **NA3-7:** Generalise the properties of addition and subtraction with whole numbers.
Learning Outcomes: Students will be able to:	• Represent and explain how an array represents a group. • Represent an array in a structured way. • Explain and justify how numbers can be grouped in an infinite number of ways-the number in a set remains the same no matter how it is arranged or represented. • Explain and justify the commutative property of multiplications.

Level 2 Year 3-4: Number: Multiplication and Division

	• Represent, explain, and justify relationships between numbers in an operation.
Mathematical language	Times, multiply, equals, repeat, multiplication, lots of, sets of, arrays, same as, factors, product, splitting, partitioning, area, distributive property, commutative property, flip around, turn around
Sharing back/Connect	Select students to share who can explain their reasoning through using notation in different ways which illustrate the use of the distributive property of multiplication. **Connect:** Look at the table we can use to show the distance ants can travel. 1:14 2:28 3:42 Can you complete this table? 1:5 2: 3: 4: 5: 10: What did you notice about the pattern?
Teacher Notes	• During the launch, show students of different arrays (e.g., lines of people, windows in an apartment block, coconut trees in lines). Ask them if there is a quick way of working out how many objects there are without counting them all. Explore the commutative property by having them name both multiplication equations 10 x 3 =3 x10. • Have paper and pens available. Have times table charts available for them to use as needed. Also have discrete materials but only if the students ask for it. Instead press students to use different forms of notation including distributing the factors using basic facts that they know. • Facilitate the students to notice that they are solving rate problems and that these can be shown as ratios.
Independent Tasks	What are the different ways you could multiply 6 by 12? Did you think of splitting the 12 into 10 and 2 or 5 and 5 and 2? What are the different ways you could multiply 13 by 7? How could you split 13 into other factors you would find easier to use?

Level 2 Year 3-4: Number: Multiplication and Division

	What are the different ways you could multiply 15 by 6? How could you split 15 into other factors you would find easier to use? What are the different ways you could multiply 36 by 3? How could you split 36 into other factors you would find easier to use? How could you explain why splitting larger factors into smaller factors works? Record your ideas.
Anticipations	

Level 2 Year 3-4: Number: Multiplication and Division

Task 5	Last week Little Ant made all the ants line up in 21 rows. This week Little Ant is making them line up in 7 rows. How many times more lines did Little Ant use last week than this week? Can you write an equation to use to solve this question? Little Ant had made all the ants line up in 200 rows last week and this week made them line up in 10 rows. How many more lines did Little Ant use last week than this week? Can you write an equation to use to solve this question?
Big ideas	Numbers can be partitioned and combined to solve more complex addition and subtraction and simple multiplication and division problems. Numbers can be represented in a variety of ways. Equations show relationships of equality between parts on either side of the equal sign. Patterns and relationships can be used, represented and generalised in a variety of ways. Multiplying whole numbers by the base results in one place value shift to the right, dividing whole numbers by the base results in one place value shift to the left. Repeated addition is the same as multiplication. Repeated subtraction is the same as division. The commutative property means that 3x6 is the same as 6x3 so 6 x 3 = 3 x 6. The associative property of multiplication is as follows, e.g., (2 × 2) × 6 = 2 × (2 × 6), used in repeated doubling when finding the product of 4 and 6. The distributive property is as follows, e.g., 7 × 7 = (7 × 5) + (7 × 2) = 35 + 14 = 49.
Curriculum links	**NA2-6:** Communicate and interpret simple additive strategies using words, diagrams (pictures) and symbols. **NA2-7:** Generalise that whole numbers can be partitioned in many ways. **NA3-1:** Use a range of additive and simple multiplicative strategies with whole numbers, fractions, decimals, and percentages. **NA3-7:** Generalise the properties of addition and subtraction with whole numbers.
Learning Outcomes: Students will be able to:	• Represent and explain how an array represents a group. • Represent an array in a structured way. • Explain and justify how numbers can be grouped in an infinite number of ways-the number in a set remains the same no matter how it is arranged or represented. • Explain and justify the commutative property of multiplications. • Represent, explain, and justify relationships between numbers in an operation.

Level 2 Year 3-4: Number: Multiplication and Division

Mathematical language	Times, multiply, equals, repeat, multiplication, lots of, sets of, arrays, same as, factors, product, splitting, partitioning, area, distributive property, commutative property, flip around, turn around, common factors
Sharing back/Connect	Select students to share who can explain their reasoning through drawing on the relationship between the two pieces of table and present it in an organised way. **Connect:** If you read 9 books last week and 3 books this week how many times more books did you read last week? If you read 30 books last week and 3 books this week how many times more books did you read last week? If you read 45 books last week and 9 books this week how many times more books did you read last week? What patterns can you notice? Explain why.
Teacher Notes	• During the launch, revisit the factor balloons. Have students draw the balloon factors separately for 12 and 20 (using times table charts as needed). When completed ask them to circle the common factors of 12 and 20. • Have Multiplication charts freely available for the students to use. Encourage students to use these because they are learning the process of multiplication and not their basic facts. • Facilitate the students to notice that this is a similar problem to the one they solved previously and that they need to organise their data carefully to explain and justify what they have done. • Expect students to represent using drawings and notation.
Independent Tasks	Look at the table we can use to show the distance ants can travel. 1:14 2:28 3:42 Can you complete this table? 1:8 2: 3: 4: 5: 10: What did you notice about the pattern?

Level 2 Year 3-4: Number: Multiplication and Division

	Record your ideas using pictures, symbols, and notation.
Anticipations	

Level 2 Year 3-4: Number: Multiplication and Division

Task 6	All the ants have got into rows to march to get food. There are 36 ants, and they get into rows of 7. How many rows altogether will there be? Will the queen be cross because there are left over ants? If there are, how many are left over? How could they be organised into rows so that there are no ants left over? Be ready to explain and justify your reasoning in different ways.
Big ideas	Numbers can be partitioned and combined to solve more complex addition and subtraction and simple multiplication and division problems. Numbers can be represented in a variety of ways. Equations show relationships of equality between parts on either side of the equal sign. Patterns and relationships can be used, represented and generalised in a variety of ways. Multiplying whole numbers by the base results in one place value shift to the right, dividing whole numbers by the base results in one place value shift to the left. Repeated addition is the same as multiplication. Repeated subtraction is the same as division. The commutative property means that 3x6 is the same as 6x3 so 6 x 3 = 3 x 6. The associative property of multiplication is as follows, e.g., $(2 \times 2) \times 6 = 2 \times (2 \times 6)$, used in repeated doubling when finding the product of 4 and 6. The distributive property is as follows, e.g., $7 \times 7 = (7 \times 5) + (7 \times 2) = 35 + 14 = 49$.
Curriculum links	**NA2-6:** Communicate and interpret simple additive strategies using words, diagrams (pictures) and symbols. **NA2-7:** Generalise that whole numbers can be partitioned in many ways. **NA3-1:** Use a range of additive and simple multiplicative strategies with whole numbers, fractions, decimals, and percentages. **NA3-7:** Generalise the properties of addition and subtraction with whole numbers.
Learning Outcomes: Students will be able to:	• Represent and explain how an array represents a group. • Represent an array in a structured way. • Explain and justify how numbers can be grouped in an infinite number of ways-the number in a set remains the same no matter how it is arranged or represented. • Represent, explain, and justify relationships between numbers in an operation.

Level 2 Year 3-4: Number: Multiplication and Division

Mathematical language	Times, multiply, equals, repeat, multiplication, lots of, sets of, arrays, same as, factors, product, splitting, partitioning, area, distributive property, commutative property, flip around, turn around, common factors, divide, inverse property, dividend, divisor
Sharing back/Connect	Select students to share who can explain and justify their reasoning through multiple representations including repeated subtraction or repeated addition or forms of multiplication to subtract partial products. **Connect:** Look at the pattern If we know that 9 x 4 = 36 Then 36 ÷ 9 = 4 And 36 ÷ 4 = 9 What can you say if you know that 3 x 2 = 6? What can you say if you know that 4 x 5 = 20? What can you say if you know that 3 x 25 = 75? What do you notice about the pattern you can see?
Teacher Notes	• Read A Remainder of One or watch (https://www.youtube.com/watch?v=eQyVIJlrUxc) as part as a shared book in literacy and discuss the concepts in it. • During the launch, have students complete the following equivalence sentences. Explore the use of factors. 3 x 4 = 2 x ? x 3 5 x 4 = 5 x ? x ? 5 x 10 = 5 x ? x ? 10 x 10 = ? x 5 x 2 • Have Multiplication charts freely available for the students to use. Encourage students to use these because they are learning the process of multiplication and not their basic facts. • Facilitate the students to notice that when they share out a group of objects, they measure them out and work backwards to find out how many groups they have made. Rewrite these using division notation and repeated subtraction. • Notice students who recognise that division is the same as repeated subtraction. Use a numberline to illustrate how they are repeatedly taking away and how in multiplication they are repeatedly adding.
Independent Tasks	If you read 5 books last week and 3 books this week how many times more books did you read last week?

Level 2 Year 3-4: Number: Multiplication and Division

	If you read 30 books last month and 12 books this month how many times more books did you read last month? If you read 45 books last term and 29 books this term how many times more books did you read last term? What patterns can you notice? Explain why.
Anticipations	

Level 2 Year 3-4: Number: Multiplication and Division

Task 7	Oh no! The race is on to get into rows and get marching towards the most scrumptious cakes someone has laid out for a big party. There are 130 ants, and they decide to have 15 ants in every row. How many rows will they have? Will there be any ants left over? How many rows would they have if they decided to have 25 ants in every row? Will there be any ants left over? How many in each row would they need to have so that no one is left over?
Big ideas	Numbers can be partitioned and combined to solve more complex addition and subtraction and simple multiplication and division problems. Numbers can be represented in a variety of ways. Equations show relationships of equality between parts on either side of the equal sign. Patterns and relationships can be used, represented and generalised in a variety of ways. Multiplying whole numbers by the base results in one place value shift to the right, dividing whole numbers by the base results in one place value shift to the left. Repeated addition is the same as multiplication. Repeated subtraction is the same as division. The commutative property means that 3x6 is the same as 6x3 so 6 x 3 = 3 x 6. The associative property of multiplication is as follows, e.g., $(2 \times 2) \times 6 = 2 \times (2 \times 6)$, used in repeated doubling when finding the product of 4 and 6. The distributive property is as follows, e.g., $7 \times 7 = (7 \times 5) + (7 \times 2) = 35 + 14 = 49$.
Curriculum links	**NA2-6:** Communicate and interpret simple additive strategies using words, diagrams (pictures) and symbols. **NA2-7:** Generalise that whole numbers can be partitioned in many ways. **NA3-1:** Use a range of additive and simple multiplicative strategies with whole numbers, fractions, decimals, and percentages. **NA3-7:** Generalise the properties of addition and subtraction with whole numbers.
Learning Outcomes: Students will be able to:	• Represent and explain how an array represents a group. • Represent an array in a structured way. • Explain and justify how numbers can be grouped in an infinite number of ways-the number in a set remains the same no matter how it is arranged or represented. • Represent, explain, and justify relationships between numbers in an operation.

Level 2 Year 3-4: Number: Multiplication and Division

Mathematical language	Times, multiply, equals, repeat, multiplication, lots of, sets of, arrays, same as, factors, product, splitting, partitioning, area, distributive property, commutative property, flip around, turn around, common factors, divide, inverse property, dividend, divisor
Sharing back/Connect	Select students to share who can explain and justify their reasoning through multiple representations including repeated subtraction or repeated addition or forms of multiplication to subtract partial products. **Connect**: Write these as a subtraction equation. $9 \div 3 = 3$ $20 \div 4 = 5$ $50 \div 10 = 5$ Write these as an addition equation. $3 \times 4 = 12$ $2 \times 10 = 20$ $2 \times 9 = 18$ What do you notice about the patterns you can see? Make a conjecture about what you can see.
Teacher Notes	• Have Multiplication charts freely available for the students to use. Encourage students to use these because they are learning the process of multiplication and not their basic facts. • Facilitate the students to notice that when they share out a group of objects, they measure them out and work backwards to find out how many groups they have made. These can be re-represented by the teacher as division notation and repeated subtraction. • Notice students who recognise that division is the same as repeated subtraction and addition as repeated addition and build on this reasoning.
Independent Tasks	Look at the pattern: If we know that $9 \times 4 = 36$ Then $36 \div 9 = 4$ And $36 \div 4 = 9$ What can you say if you know that $6 \times 2 = 12$? What can you say if you know that $12 \times 5 = 60$? What can you say if you know that $3 \times 25 = 75$? What do you notice about the pattern you can see?

Level 2 Year 3-4: Number: Multiplication and Division

Anticipations	

Level 2 Year 3-4: Number: Multiplication and Division

Task 8	Oh, dear what a commotion! Now the queen has decided to put the ants into rows herself. She decides that she will put out 4 cones to mark where each row will be. She sees that she has 40 ants ready to march and so she carefully lines them up fairly in each row. How many ants does she put in each row? What fraction of the ants does she put in each row? The queen has decided to put the ants into rows herself. She decides that she will put out 3 cones and to mark where each row will go. She sees that she has 15 ants ready to march and so she carefully lines them up fairly in each row. How many ants does she put in each row? What fraction of the ants does she put in each row? The queen has decided to put the ants into rows herself. She decides that she will put out 2 cones and to mark where each row will go. She sees that she has 24 ants ready to march and so she carefully lines them up fairly in each row. How many ants does she put in each row? What fraction of the ants does she put in each row?
Big ideas	Numbers can be partitioned and combined to solve more complex addition and subtraction and simple multiplication and division problems. Numbers can be represented in a variety of ways. Equations show relationships of equality between parts on either side of the equal sign. Patterns and relationships can be used, represented and generalised in a variety of ways. Multiplying whole numbers by the base results in one place value shift to the right, dividing whole numbers by the base results in one place value shift to the left. Repeated addition is the same as multiplication. Repeated subtraction is the same as division. The commutative property means that 3x6 is the same as 6x3 so 6 x 3 = 3 x 6. The associative property of multiplication is as follows, e.g., $(2 \times 2) \times 6 = 2 \times (2 \times 6)$, used in repeated doubling when finding the product of 4 and 6. The distributive property is as follows, e.g., $7 \times 7 = (7 \times 5) + (7 \times 2) = 35 + 14 = 49$.
Curriculum links	**NA2-6:** Communicate and interpret simple additive strategies using words, diagrams (pictures) and symbols. **NA2-7:** Generalise that whole numbers can be partitioned in many ways. **NA3-1:** Use a range of additive and simple multiplicative strategies with whole numbers, fractions, decimals, and

	percentages. **NA3-7:** Generalise the properties of addition and subtraction with whole numbers.
Learning Outcomes: Students will be able to:	• Represent and explain how an array represents a group. • Represent an array in a structured way. • Explain and justify how numbers can be grouped in an infinite number of ways-the number in a set remains the same no matter how it is arranged or represented. • Represent, explain, and justify relationships between numbers in an operation. • Use additive thinking to find fractions of sets.
Mathematical language	Times, multiply, equals, repeat, multiplication, lots of, sets of, arrays, same as, factors, product, splitting, partitioning, area, distributive property, commutative property, flip around, turn around, common factors, divide, inverse property, dividend, divisor
Sharing back/Connect	Select students to share who can explain their reasoning through multiple ways including materials, drawings, and notation. **Connect:** If we have 12 jellybeans to share fairly on two sides of a small cake, how many jellybeans would there be on each side? What is a half of 6? Record as ½ of 6 is 3 6 ÷ 2 = 3 If we have 20 jellybeans to share fairly on 4 sides of a small cake, how many jellybeans would there be on each side? What is a half of 20? Record as ½ of 20 is 10 20 ÷ 2 = 10 What do you notice?
Teacher Notes	• Facilitate the students to notice that when you are talking about a set of ants that the set is one whole and that they are finding a fraction of that set. Also, draw attention to the denominator as naming what the whole is divided into. • Notice students who can identify the relationship between finding a fraction of a set and division.
Independent Tasks	Write these as a subtraction equation. 6 ÷ 3 = 2 24 ÷ 6 = 4 60 ÷ 10 = 6 Write these as an addition equation. 3 x 4 = 12

Level 2 Year 3-4: Number: Multiplication and Division

	2 x 30 = 60 3 x 9 = 27 What do you notice about the patterns you can see? Make a conjecture about what you can see.
Anticipations	

Level 2 Year 3-4: Number: Multiplication and Division

Task 9	Joe has had enough. He is going to take charge. He is waiting for a baker to finish baking so that he can lead the ants over to eat the crumbs. He notices that the baker uses trays to bake cupcakes on and that the baker has cooked 28 cupcakes. He has shared them equally on 2 trays. Can you tell Joe ant what fraction of the cupcakes are on each tray? How many cupcakes are on each tray? What if the baker has 65 cupcakes and shares them equally across 5 trays? What fraction of the cupcakes are on each tray? How many cupcakes are on each tray?
Big ideas	Numbers can be partitioned and combined to solve more complex addition and subtraction and simple multiplication and division problems. Numbers can be represented in a variety of ways. Equations show relationships of equality between parts on either side of the equal sign. Patterns and relationships can be used, represented and generalised in a variety of ways. Multiplying whole numbers by the base results in one place value shift to the right, dividing whole numbers by the base results in one place value shift to the left. Repeated addition is the same as multiplication. Repeated subtraction is the same as division. The commutative property means that 3x6 is the same as 6x3 so 6 x 3 = 3 x 6. The associative property of multiplication is as follows, e.g., (2 × 2) × 6 = 2 × (2 × 6), used in repeated doubling when finding the product of 4 and 6. The distributive property is as follows, e.g., 7 × 7 = (7 × 5) + (7 × 2) = 35 + 14 = 49.
Curriculum links	**NA2-6:** Communicate and interpret simple additive strategies using words, diagrams (pictures) and symbols. **NA2-7:** Generalise that whole numbers can be partitioned in many ways. **NA3-1:** Use a range of additive and simple multiplicative strategies with whole numbers, fractions, decimals, and percentages. **NA3-7:** Generalise the properties of addition and subtraction with whole numbers.
Learning Outcomes: Students will be able to:	• Represent and explain how an array represents a group. • Represent an array in a structured way. • Explain and justify how numbers can be grouped in an infinite number of ways-the number in a set remains the same no matter how it is arranged or represented. • Represent, explain, and justify relationships between numbers in an operation.

Level 2 Year 3-4: Number: Multiplication and Division

	• Use additive thinking to find fractions of sets.
Mathematical language	Times, multiply, equals, repeat, multiplication, lots of, sets of, arrays, same as, factors, product, splitting, partitioning, area, distributive property, commutative property, flip around, turn around, common factors, divide, inverse property, dividend, divisor
Sharing back/Connect	Select students to share who can explain their reasoning through multiple ways including materials, drawings, and notation. **Connect:** What is a half of 28? Record as $\frac{1}{2}$ of 28 = 14 28 ÷ 2 = 14 What is a quarter of 120? Record as $\frac{1}{4}$ of 120 = 30 120 ÷ 4 = 30 What patterns and relationships do you notice?
Teacher Notes	• Facilitate the students to notice that when you are talking about a set of cupcakes that the set is one whole and that they are finding a fraction of that one whole set. • Also, draw attention to the denominator as naming what the whole is divided into and that there is a relationship between fractions and division.
Independent Tasks	Solve: 1. If we have 22 jellybeans to share fairly on two sides of a cake, how many jellybeans would there be on each side? 2. What is a half of 24? Record as $\frac{1}{2}$ of 24 is __ 24 ÷ __ = ___ 3. If we have 20 jellybeans to share fairly on 4 sides of a small cake, how many jellybeans would there be on each side? 4. What is a half of 36? Record as $\frac{1}{2}$ of 36 is ___ 36 ÷ ___ = ___ What do you notice?

Level 2 Year 3-4: Number: Multiplication and Division

Anticipations	

Level 2 Year 3-4: Number: Multiplication and Division

Task 10	All the ants are milling around and need to be put in rows so that they can march quickly to get the food. Quick we need some order here and only YOU can help! If there are 60 ants what are all the different ways, they can be put in rows without anyone left out? Can you write down a multiplication sentence, a division sentence, and a fraction sentence for each way the ants can be organised into rows.
Big ideas	Numbers can be partitioned and combined to solve more complex addition and subtraction and simple multiplication and division problems. Numbers can be represented in a variety of ways. Equations show relationships of equality between parts on either side of the equal sign. Patterns and relationships can be used, represented and generalised in a variety of ways. Multiplying whole numbers by the base results in one place value shift to the right, dividing whole numbers by the base results in one place value shift to the left. Repeated addition is the same as multiplication. Repeated subtraction is the same as division. The commutative property means that 3x6 is the same as 6x3 so 6 x 3 = 3 x 6. The associative property of multiplication is as follows, e.g., (2 × 2) × 6 = 2 × (2 × 6), used in repeated doubling when finding the product of 4 and 6. The distributive property is as follows, e.g., 7 × 7 = (7 × 5) + (7 × 2) = 35 + 14 = 49.
Curriculum links	**NA2-6:** Communicate and interpret simple additive strategies using words, diagrams (pictures) and symbols. **NA2-7:** Generalise that whole numbers can be partitioned in many ways. **NA3-1:** Use a range of additive and simple multiplicative strategies with whole numbers, fractions, decimals, and percentages. **NA3-7:** Generalise the properties of addition and subtraction with whole numbers.
Learning Outcomes: Students will be able to:	• Represent and explain how an array represents a group. • Represent an array in a structured way. • Explain and justify how numbers can be grouped in an infinite number of ways-the number in a set remains the same no matter how it is arranged or represented. • Represent, explain, and justify relationships between numbers in an operation. • Use additive thinking to find fractions of sets. • Write statements as notations

Level 2 Year 3-4: Number: Multiplication and Division

Mathematical language	Times, multiply, equals, repeat, multiplication, lots of, sets of, arrays, same as, factors, product, splitting, partitioning, area, distributive property, commutative property, flip around, turn around, common factors, divide, inverse property, dividend, divisor
Sharing back/Connect	Select students to share who have used multiple ways to organise the rows and can explain their reasoning through using multiplication, division, and fractions. **Connect:** What are the different ways you could organise 12 ants? Record the different ways for example as 2 x 6 and 6 x 2; 12 ÷ 6 and 12 ÷ 2; $\frac{1}{2}$ of 12 is 6 Can you make a conjecture about the patterns and relationships you notice?
Teacher Notes	• Facilitate the students to notice that in multiplication the commutative property applies, and that division undoes multiplication as the inverse. • Notice students who can identify the relationships between multiplication, division, and fractions of a set
Independent Tasks	Record the following as division and as fractions: Example: What is a half of 60? $\frac{1}{2}$ of 60 = 30 60 ÷ 2 = 30 What is half of 80? What is one quarter of 40? What is half of 50? What is half of 100? What is a quarter of 100? What is half of 120? What is one quarter of 120? What patterns and relationships do you notice?
Anticipations	

Level 2 Year 3-4: Number: Multiplication and Division

Task 11 (optional)	Oh dear, ants may be able to be very organised, but they can get very confused as we already know! Can you help them to say which of these are true and which are false? 10 x 9 = 10 x 4 x 4 89 + 89 + 89 + 89 + 89 = 89 x 5 18 ÷ 2 = 16 100 = 200 ÷ 2 $\frac{1}{4}$ of 40 = 4 $\frac{1}{4}$ of 48 = 12 200 ÷ 10 = 190 1000 ÷ 100 = 10 18 = $\frac{1}{2}$ of 36
Big ideas	Numbers can be partitioned and combined to solve more complex addition and subtraction and simple multiplication and division problems. Numbers can be represented in a variety of ways. Equations show relationships of equality between parts on either side of the equal sign. Patterns and relationships can be used, represented and generalised in a variety of ways. Multiplying whole numbers by the base results in one place value shift to the right, dividing whole numbers by the base results in one place value shift to the left. Repeated addition is the same as multiplication. Repeated subtraction is the same as division. The commutative property means that 3x6 is the same as 6x3 so 6 x 3 = 3 x 6. The associative property of multiplication is as follows, e.g., (2 × 2) × 6 = 2 × (2 × 6), used in repeated doubling when finding the product of 4 and 6. The distributive property is as follows, e.g., 7 × 7 = (7 × 5) + (7 × 2) = 35 + 14 = 49.
Curriculum links	**NA2-6:** Communicate and interpret simple additive strategies using words, diagrams (pictures) and symbols. **NA2-7:** Generalise that whole numbers can be partitioned in many ways. **NA3-1:** Use a range of additive and simple multiplicative strategies with whole numbers, fractions, decimals, and percentages. **NA3-7:** Generalise the properties of addition and subtraction with whole numbers.
Learning Outcomes: Students will be able to:	• Represent and explain how an array represents a group. • Represent an array in a structured way. • Explain and justify how numbers can be grouped in an infinite number of ways-the number in a set remains the same no matter how it is arranged or represented.

Level 2 Year 3-4: Number: Multiplication and Division

	• Represent, explain, and justify relationships between numbers in an operation. • Use additive thinking to find fractions of sets. • Write statements as notations
Mathematical language	Times, multiply, equals, repeat, chunking, multiplication, lots of, sets of, twice, double, half, same as, rows, turn around, flip, array, skip count, measuring, tens, dividing, divide, undoing, fair share, fraction
Sharing back/Connect	Select students to share who are able to explain and justify their reasoning using materials, pictures and numbers **Connect:** 3 x 2 = 6 and 2 x 3 = 6 so we can say 3 x 2 = 2 x 3? What about 6 ÷ 2 = 3? Can we say 3 ÷ 2 = 6? Why or why not? Can you make a conjecture about what you have noticed?
Teacher Notes	• Facilitate the students to notice the commutative property only applies to addition and multiplication and that it does not apply to division.
Independent Tasks	Record the different ways you could organise 12 ants? Record as multiplication: Record as division: Record as fractions: Record the different ways you could organise 18 ants? Record as multiplication: Record as division: Record as fractions: Record the different ways you could organise 36 ants? Record as multiplication: Record as division: Record as fractions: Record the different ways you could organise 54 ants? Record as multiplication: Record as division: Record as fractions: Make a conjecture about the patterns and relationships you notice?
Anticipations	

Level 2 Year 3-4: Number: Multiplication and Division

Task 12 (optional)	The ants are calling on you for your help again! They are in ant school and the ant teacher has told them to write these addition sentences as multiplication and the subtraction sentences as division and then solve them. Can you help them? 12 + 12 + 12 + 12 + 12 = 42 + 42 + 42 + 42 = 23 + 23 + 23 = 100 x 100 = 21 x 14 = 224 ÷ 2 = 124 ÷ 3 = 69 – 13 -13 – 13 – 13 – 13 = 500 – 100 – 100 – 100 – 100 – 100 =
Big ideas	Numbers can be partitioned and combined to solve more complex addition and subtraction and simple multiplication and division problems. Numbers can be represented in a variety of ways. Equations show relationships of equality between parts on either side of the equal sign. Patterns and relationships can be used, represented and generalised in a variety of ways. Multiplying whole numbers by the base results in one place value shift to the right, dividing whole numbers by the base results in one place value shift to the left. Repeated addition is the same as multiplication. Repeated subtraction is the same as division. The commutative property means that 3x6 is the same as 6x3 so 6 x 3 = 3 x 6. The associative property of multiplication is as follows, e.g., (2 × 2) × 6 = 2 × (2 × 6), used in repeated doubling when finding the product of 4 and 6. The distributive property is as follows, e.g., 7 × 7 = (7 × 5) + (7 × 2) = 35 + 14 = 49.
Curriculum links	**NA2-6:** Communicate and interpret simple additive strategies using words, diagrams (pictures) and symbols. **NA2-7:** Generalise that whole numbers can be partitioned in many ways. **NA3-1:** Use a range of additive and simple multiplicative strategies with whole numbers, fractions, decimals, and percentages. **NA3-7:** Generalise the properties of addition and subtraction with whole numbers.
Learning Outcomes: Students will be able to:	• Explain and justify how numbers can be grouped in an infinite number of ways-the number in a set remains the same no matter how it is arranged or represented. • Explain the commutative property of multiplication. • Explain the reverse property of division.

Level 2 Year 3-4: Number: Multiplication and Division

	• Represent, explain, and justify relationships between numbers in an operation involving multiplication and division. • Use additive thinking to find fractions of sets. • Write statements as notations
Mathematical language	Times, multiply, equals, repeat, chunking, multiplication, lots of, sets of, twice, double, half, same as, rows, turn around, flip, array, skip count, measuring, tens, dividing, divide, undoing, fair share, fraction
Sharing back/Connect	Select students to share who are able to explain and justify their reasoning using materials, pictures and numbers **Connect:** What did you notice in the different patterns? Can you make a conjecture about multiplication and division in what you have noticed?
Teacher Notes	• Facilitate the students to notice the commutative property only applies to addition and multiplication and that it does not apply to division. Discuss the way in which multiplication is repeated addition and division is repeated subtraction.
Independent Tasks	3 x 2 = 6 and 2 x 3 = 6 so we can say 3 x 2 = 2 x 3? What about 6 ÷ 2 = 3? Can we say 3 ÷ 2 = 6? Why or why not? 4 x 3 = 12 and 3 x 4 = 12 so we can say 3 x 4 = 4 x 3? What about 12 ÷ 4 = 3? Can we say 4 ÷ 3 = 12? Why or why not? Can you make a conjecture about what you have noticed? Record and represent your ideas. <u>OR</u> Select one or more of the following assessment tasks (attached at the end of the document) as the independent activity: • N16A Multiplication and Division
Anticipations	

DMIC

DEVELOPING MATHEMATICAL INQUIRY COMMUNITIES
ASSESSMENT TASK

NUMBER - MULT / DIV: LEVEL 2 Task N16A

Nancy is practising her netball shots from 5 positions in the circle. She practised 16 shots at each position. How many shots did she practise?

Liliana has 72 carrot seeds to plant. She has space for 4 rows. How many carrot seeds will she plant in each row?

In the hall, there were 14 rows with 19 chairs in each row? How many chairs were there?

Write your own multiplication or division problems. Show how you would solve them.