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| Strand: Number | | Topic: Addition and subtraction |
| Foundation Level: Level statement  Students are developing a notion of counting and an awareness of number and money. Number names are becoming more meaningful. | | |
| Example learning outcomes:  Students show an awareness of ‘more’, ‘less’ and ‘same’ in life situations. | | |
| Elaborations — To support investigations that emphasise thinking, reasoning and working mathematically | | |
| Students know:  ‘more’ means adding some to a collection  ‘same’ means collections match  everyday language that relates to ‘more’ (adding on) and ‘taking away’ (items covered or removed from a collection). | Students may:  participate in familiar songs and games that involve adding more to a collection and taking away one or some  notice/request ‘more’ in familiar situations (e.g. serving food or drinks, sharing toys or stickers)  notice when one person is given ‘more’ of something than another person  indicate that one collection has ‘more’ when two collections have significantly different quantities  notice/request ‘same’ in familiar situations (e.g. serving food or drinks, sharing toys or stickers)  indicate that two collections have the ‘same’ quantity by matching items one to one  notice that when two collections are significantly different in quantity they are ‘not the same’  indicate ‘take away’ by covering or removing objects from a collection in familiar situations. | |

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| Level 1: Level statement  Students are developing a sense of number by knowing number names and counting in sequence. They recognise, compare, order and represent small whole numbers and use concrete materials to explore the concept of parts of a whole. They are developing an awareness of the cost of goods and recognise and represent notes and coins.  Students identify and distinguish between situations that require them to add or subtract, to share equally or to create equal groups. | | |
| Core learning outcome: N 1.2  Students identify and solve addition and subtraction problems involving small whole numbers. | | |
| **Elaborations — To support investigations that emphasise thinking, reasoning and working mathematically** | | **Core content** |
| Students know:  addition involves joining two or more numbers to find a total  subtraction involves taking one quantity away from another  how to distinguish between situations that require addition or subtraction of whole numbers  addition and subtraction are the inverse of each other  mental computation strategies and computation methods for solving addition and subtraction problems  how to solve addition and subtraction problems involving small whole numbers. | Students may:  identify ways to solve problems  explain the reasons for choosing an operation to solve a problem  calculate solutions mentally  calculate solutions using written methods  identify the number that results when numbers are joined together or identify what is left after items are covered up  explain the addition or subtraction strategy used to solve a problem  describe what is happening to the numbers when adding or subtracting  explain that subtraction undoes addition and vice versa  check the reasonableness of answers using different computation strategies  check answers using alternative computation methods or using the inverse operation  use and explain different combinations of numbers that make the same total  pose problems involving addition and subtraction using everyday language  identify the number patterns or the skip counting sequence (e.g. counting in 2s, 3s)  relate patterns to the counting sequence to 100  explore the use of known strategies and computation methods for extensions to larger numbers. | Addition  totals to 10  joining model  language of joining  two or more addends  Subtraction  whole numbers to 10  take away model  language of take away  Connections  inverse   * addition undoes subtraction * subtraction undoes addition   Mental computation strategies  count on (in 1s, 2s)  count back (in 1s, 2s)  Computation methods  mental computations  written recordings   * words for addition (add) * words for subtraction (cover up, take away, left)   calculators, computers  symbols   * addition (+) * subtraction (–) |
| At each level, investigations should occur in a range of contexts. For example, students could investigate:  number of items to be ordered for the school tuckshop  number of squares that could be combined to make a patchwork quilt  amount of ingredients added or removed from labelled containers  ingredients that need to be added for a recipe  musical games and rhymes involving numbers  a set number of cards dealt in two or three rounds  combinations of tokens or materials to be allocated for activities  how to create work groups of a specified size  payment for goods using whole dollars  gardening activities, such as planting borders or edible gardens  number patterns on a computer or calculator. | | |

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| Level 2: Level statement  Students demonstrate their developing number sense by comparing, ordering and representing whole numbers to 999 and understanding that the value of a digit in a number determines its place value. They understand that a whole can be made up of equal parts and use concrete materials to represent halves and quarters. When using money to purchase goods, they tender different combinations of notes and coins.  Students are beginning to recall or work out some addition, subtraction and multiplication number facts. They use a range of computation methods, including mental, written and calculator, to solve problems. | | |
| Core learning outcome: N 2.2  Students identify and solve addition and subtraction problems involving whole numbers, selecting from a range of computation methods, strategies and known number facts. | | |
| **Elaborations — To support investigations that emphasise thinking, reasoning and working mathematically** | | **Core content** |
| Students know:  how to distinguish between situations that require addition or subtraction of whole numbers  addition and subtraction are the inverse of each other  numbers can be added together in any order  addition and subtraction facts  mental computation strategies and computation methods for solving addition and subtraction problems  how to solve addition and subtraction problems involving whole numbers. | Students may:   * identify whether problems encountered are solved by addition or subtraction and explain reasons for  the decision * identify number patterns created when working out addition facts to 9 + 9 * identify and explain how different strategies — such as doubles and their inverses, near doubles and make to 10 — could be used when calculating a solution * solve addition and subtraction problems using identified strategies and computation methods * explain different ways of solving problems, including the turnaround strategy * represent a problem visually using a five or ten frame, number line, hundred board or student-generated model * identify extensions of mental computation strategies and computation methods, such as make to 100 or 1000, and explain the similarities and differences * check the reasonableness of answers and justify reasoning * check answers using alternative computation methods or using the inverse operation * use and explain different combinations of numbers to make the same total * pose problems involving addition and subtraction using everyday language * explore the use of known strategies and computation methods for extensions to larger numbers. | Addition  totals to 999  two or more addends  recall or work out addition facts  to 9 + 9  Subtraction  whole numbers to 999  models and language   * take away * missing addend * comparison (difference)   recall or work out subtraction facts  Connections  missing addend  inverse (backtracking)   * related addition and subtraction facts   Mental computation strategies  to work out basic facts   * count on * count back * doubles * near doubles * make to 10 * turnarounds (commutativity)   generalisations about addition and subtraction  extension of strategies to larger numbers  student-generated  Computation methods  mental computations  written recordings   * student-generated * traditional methods   calculators, computers |
| At each level, investigations should occur in a range of contexts. For example, students could investigate:  number of students in the school or year group ordering burgers for a burger and free drink day  people or objects required for a team  groups of workers or players required for a game or activity  the number of people or objects needed to leave a bus or lift for safety reasons  symmetrical aspects of the natural or built environments (doubles or near doubles)  combinations of art prints or objects in a ten frame  lunch packages of 10 items  children absent from the class group at particular times during the day  regular savings for a particular purchase. | | |

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| Level 3: Level statement  Students compare, order and represent whole numbers to 9 999, common and decimal fractions and recognise the value of each digit. They tender appropriate amounts of money for cash transactions and identify other methods of paying for goods and services.  Students recall or work out all addition, subtraction and multiplication number facts and some division facts. They use a range of computation methods, including mental, written and calculator, to solve problems that involve whole numbers and decimal fractions in context. | | |
| Core learning outcome: N 3.2  Students identify and solve addition and subtraction problems involving whole numbers and decimal fractions in context, selecting from a range of computation methods, strategies and known number facts. | | |
| **Elaborations — To support investigations that emphasise thinking, reasoning and working mathematically** | | **Core content** |
| Students know:  how to distinguish between situations that require addition or subtraction of whole numbers and decimal fractions  how to use the inverse relationship between addition and subtraction to solve problems  addition and subtraction facts  mental computation strategies and computation methods for solving addition and subtraction problems involving whole numbers and decimal fractions in context  how to apply and interpret decimal fractions in context  how to solve addition and subtraction problems involving whole numbers and decimal fractions in context. | Students may:   * identify whether problems encountered require addition and/or subtraction * explain whether exact or approximate answers are required * decide on the most efficient method of performing the computation required to solve a problem (e.g. mental, written or calculator) * select from a range of computation methods and strategies to solve problems and give reasons for the selection * make numbers manageable where necessary and explain the process e.g. make to nearest thousand, nearest one * select from known number facts when calculating * explain the relationship between addition and subtraction facts and check computations using backtracking (inverse relationship) * pose addition or subtraction problems involving whole numbers and decimal fractions in context using everyday language. | Numeration  totals to 9 999  decimals to 2 places in context with the same number of places  recall addition facts to 9 + 9  Subtraction  whole numbers to 9 999  mental computations with money (change)  recall subtraction facts  Connections  inverse (backtracking)   * related addition and subtraction facts   Mental computation strategies  for larger numbers and decimal fractions in context   * making numbers manageable * count on and back * doubles * changing operations * turnarounds (commutativity)   generalisations about addition and subtraction  student-generated  Computation methods  mental computations   * exact * approximate   written recordings   * student-generated * traditional methods   calculators, computers |
| At each level, investigations should occur in a range of contexts. For example, students could investigate:   * resources for class craft activities * set and prop construction for drama performances * purchasing goods directly or ordering from a catalogue within a set budget * catering costs for a school or class activity * measurement problems involving lengths of sides and boundaries * shopping situations involving change * travel distances using road maps. | | |

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| Level 4: Level statement  Students compare and order whole numbers and common and decimal fractions. They identify fractions expressed in different ways and make connections between common fractions, decimal fractions and percentages. They identify a range of factors such as advertising, discounts and methods of payment that may influence financial decisions.  Students recall all addition, subtraction, multiplication and division number facts. They use a range of computation methods to solve problems that involve whole numbers, common and decimal fractions, percentages and rates. | | |
| Core learning outcome: N 4.2  Students identify and solve addition and subtraction problems involving whole numbers and common and decimal fractions, selecting from a range of computation methods, strategies and known number facts. | | |
| **Elaborations — To support investigations that emphasise thinking, reasoning and working mathematically** | | **Core content** |
| Students know:  how to distinguish between situations involving any whole numbers and common and decimal fractions that require addition or subtraction  how to use the inverse relationship between addition and subtraction to solve problems  addition and subtraction facts  mental computation strategies and computation methods for solving addition and subtraction problems involving whole numbers and common and decimal fractions  how to solve addition and subtraction problems involving whole numbers and common and decimal fractions. | Students may:   * identify whether problems encountered require addition and/or subtraction * explain how to add and/or subtract common fractions * explain how to add and/or subtract decimal fractions involving different numbers of decimal places such  as hundredths and thousandths * explain whether exact or approximate answers are required * decide on the most efficient method of performing the computation required to solve a problem  (e.g. mental, written or calculator) * select from a range of computation methods and strategies to solve problems and give reasons for the selection * make numbers manageable where necessary and explain the process e.g. make to nearest thousand or nearest one * select from known number facts when calculating * use the relationship (inverse relationship) between addition and subtraction to check computations * pose addition and subtraction problems involving whole numbers and common and decimal fractions. | Addition and subtraction  whole numbers  common fractions (same denominators)  decimal fractions including different numbers of decimal places  Connections  inverse (backtracking)  Mental computation strategies  for whole numbers and decimal fractions   * making numbers manageable * count on and back * doubling * changing operations   for common fractions  generalisations about addition and subtraction  Computation methods  mental computations   * exact * approximate   written recordings   * student-generated * traditional methods   calculators, computers |
| At each level, investigations should occur in a range of contexts. For example, students could investigate:  global population and production patterns  total rainfalls for specific time periods  tallying amounts of money or measurements  catering costs for a function  measurements of track and field events to determine places and margins  distances to and between planets. | | |

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| Level 5: Level statement  Students compare and order positive and negative integers and explain and record index notation. They interpret and use conventions for expressing rates and ratios. They identify methods of saving and investigate the factors affecting debit and credit transactions. They understand that the purchase of goods and services may attract fees or charges.  Students use a range of computation methods to solve problems that involve positive rational numbers, rates, ratios and direct proportions. | | |
| Core learning outcome: N 5.2  Students identify and solve addition and subtraction problems involving positive rational numbers using a range of computation methods and strategies. | | |
| **Elaborations — To support investigations that emphasise thinking, reasoning and working mathematically** | | **Core content** |
| Students know:  how to identify situations involving positive rational numbers that require addition or subtraction or both  mental computation strategies and computation methods for solving addition and subtraction problems involving positive rational numbers  common or related denominators are required for addition and subtraction of common fractions  how to add and subtract common fractions  how to solve addition and subtraction problems involving positive rational numbers. | Students may:  explain whether an exact or approximate answer is required  select and justify computation methods and strategies used to solve problems  explain how to solve problems involving rational numbers including index notation  pose and solve real-life problems involving addition and subtraction of positive rational numbers  decide if common or related denominators are required for common fractions and explain reasoning  check reasonableness of solutions. | Addition and subtraction  positive rational numbers   * whole numbers * decimal fractions * common fractions * related denominators   Connections  inverse (backtracking)  Mental computation strategies  relevant to whole numbers, common fractions and decimal fractions  generalisations about addition and subtraction  Computation methods  mental computations   * exact * approximate   written recordings   * student-generated * traditional methods   calculators, computers |
| At each level, investigations should occur in a range of contexts. For example, students could investigate:  financial transactions involving profit or personal bank balances  budgeting for a range of personal needs  mobile phone plans  quantities required for catering for large numbers at school events  distances covered during legs of car rallies. | | |

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| Level 6: Level statement  Students compare and order rational numbers and use scientific notation as a short-hand method of representing very large or very small numbers. They develop personal plans, consider financial options and monitor financial situations using available information.  Students use a range of computation methods and strategies to solve problems that involve rational numbers, rates, ratios and direct and inverse proportions. | | |
| Core learning outcome: N 6.2  Students identify and solve addition and subtraction problems involving rational numbers using a range of computation methods and strategies. | | |
| **Elaborations — To support investigations that emphasise thinking, reasoning and working mathematically** | | **Core content** |
| Students know:  how to identify situations involving rational numbers that require addition or subtraction, or both  mental computation strategies and computation methods for solving addition and subtraction problems involving rational numbers  how to solve addition and subtraction problems involving rational numbers. | Students may:   * explain whether an exact or approximate answer is required * select and justify computation methods and strategies used to solve problems * check reasonableness of solutions * check solutions using alternative computation methods for solving problems * pose and solve real-life problems involving addition and subtraction of rational numbers. | Addition and subtraction  rational numbers  Connections  inverse (backtracking)  Mental computation strategies  relevant to integers and whole numbers, common fractions and decimal fractions  generalisations about addition and subtraction  Computation methods  mental computations   * exact * approximate   written recordings   * student-generated * traditional methods   calculators, computers |
| At each level, investigations should occur in a range of contexts. For example, students could investigate:  weather patterns such as the Southern Oscillation Index  financial transactions involving profit and loss  bank balances  temperatures in outer space  exploration of outer space  water usage in domestic and commercial situations  mass of electrons. | | |