**Mathematics TEACHING AND LEARNING OVERVIEW Lesson 1 Stage 2**

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| TERM: | WEEK: 1 | | STRAND: NUMBER | **SUB-STRAND:** ADDITION AND SUBTRACTION 1 | **WORKING MATHEMATICALLY:** |
| OUTCOMES: | | * uses appropriate terminology to describe, and symbols to represent, mathematical ideas MA2-1WM * selects and uses appropriate mental or written strategies, or technology, to solve problems MA2-2WM * checks the accuracy of a statement and explains the reasoning used MA2-3WM * uses mental and written strategies for addition and subtraction involving two-, three-, four- and five-digit numbers MA2-5NA * MA2-2WM selects and uses appropriate mental or written strategies, or technology, to solve problems * MA2-3WM checks the accuracy of a statement and explains the reasoning used * MA2-5NA uses mental and written strategies for addition and subtraction involving two-, three-, four- and five-digit | | | |
| **CONTENT:** | | Students:  **Recall addition facts for single-digit numbers and related subtraction facts to develop increasingly efficient mental strategies for computation (ACMNA055)**  add three or more single-digit numbers  model and apply the [associative](http://syllabus.bos.nsw.edu.au/glossary/mat/associative/?ajax) property of addition to aid mental computation, eg 2 + 3 + 8 = 2 + 8 + 3 = 10 + 3 = 13  apply known single-digit addition and subtraction facts to mental strategies for addition and subtraction of two-, three- and four-digit numbers, including: CCT  the jump strategy on an empty [number line](http://syllabus.bos.nsw.edu.au/glossary/mat/number-line/?ajax), eg 823 + 56: 823 + 50 = 873, 873 + 6 = 879  the split strategy, eg 23 + 35: 20 + 30 + 3 + 5 = 58  bridging the decades, eg 34 + 26: 34 + 6 = 40, 40 + 20 = 60  changing the order of addends to form [multiples](http://syllabus.bos.nsw.edu.au/glossary/mat/multiple/?ajax) of 10, eg 16 + 8 + 4: add 16 to 4 first  using [place value](http://syllabus.bos.nsw.edu.au/glossary/mat/place-value/?ajax) to [partition](http://syllabus.bos.nsw.edu.au/glossary/mat/partitioning/?ajax) numbers, eg 2500 + 670: 2500 + 600 + 70 = 3170  partitioning numbers in non-standard forms, eg 500 + 670: 670 = 500 + 170, so 500 + 670 = 500 + 500 + 170, which is 1000 + 170 = 1170  select, use and record a variety of mental strategies to solve addition and subtraction problems, including word problems, with numbers of up to four digits CCT  give a reasonable estimate for a problem, explain how the estimate was obtained, and check the solution (Communicating, Reasoning) CCT  **Recognise and explain the connection between addition and subtraction** (ACMNA054)  demonstrate how addition and subtraction are inverse operations  explain and check solutions to problems, including by using the inverse operation CCT  **Represent money values in multiple ways and count the change required for simple transactions to the nearest five cents** (ACMNA059)  perform simple calculations with money, including finding change, and [round](http://syllabus.bos.nsw.edu.au/glossary/mat/rounding/?ajax) to the nearest five cents PSCWE  calculate mentally to give change | | | |

**Mathematics TEACHING AND LEARNING OVERVIEW Lesson 1 Stage 2**

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| ASSESSMENT FOR LEARNING (PRE-ASSESSMENT) | Add three or more single digits. Subtraction of one digit from a two-digit number. Review friends of ten and twenty. Review doubles  Present students with examples of addition of 3 to 4 single digits and subtraction. Ask students how they would solve them.  Eg. 3+4+5+4=\_\_\_\_ 7+3+5+4= \_\_\_\_ 17+8+3=\_\_\_\_ 12+9+8=\_\_\_\_ 18-9=\_\_\_ 17-6=\_\_\_\_ 27-8=\_\_\_\_  **Two and three digit addition and subtraction** Provide the students with a blank piece of paper and ask them to fold the paper into quarters. Write on the board two addition and two subtraction problems, eg 78 + 36, 348 + 189, 95 – 46 and 800 – 241.  Ask the students to solve each problem, using a quarter of the paper, recording the strategy they used. | | |
| WARM UP / DRILL | Counting by 2, 5 and by 10 on and off the decade. Charts that range up to 1 000. Students jump by ten on and off the decade. eg. 345+10=355  Roll two dice and Add  This is a whole class activity where students sit in a circle and two six-sided dice are thrown. Students share strategies for adding the numbers together. This activity can be played using subtraction and can be extended by changing the dice to eight- or ten-sided dice or by adding in a third dice. The third dice will provide opportunities for students to look for doubles, or friends of ten or to use known facts. | | |
| TENS ACTIVITYNEWMAN’S PROBLEMINVESTIGATION | Students in pairs are given a pack of cards. **Teeny tiny ten-frames** Organise the students into groups of four. Provide each group of students with a pack of cards in the range 1 to 9. Each player draws a card from the deck and decides if the number they have drawn will represent ones or tens. For example, if a five is drawn it can represent five or fifty. The players take a second draw from the pack, again nominating if the number represents tens or ones and adds the number to their first card. Have the students record their total on an empty number line. Continue the activity until each student has drawn four cards. The player with the highest total not exceeding 100 wins. Use these activities to practise mental strategies for addition and subtraction. (Developing Efficient Numeracy Strategies Stage 2 DENS 2, p. 90)\  There are 125 students attending a disco from Year 3 and 78 from Year 4.How many students will be attending the disco altogether?  At an organised party 350 chairs were organised neatly in a room. 47 people did not arrive at the part. How many chairs remained unfilled? | | |
| QUALITY TEACHING ELEMENTS | **INTELLECTUAL QUALITY** | **QUALITY LEARNING ENVIRONMENT** | **SIGNIFICANCE** |
| * Deep knowledge * Deep understanding * Problematic knowledge * Higher-order thinking * Metalanguage * Substantive communication | * Explicit quality criteria * Engagement * High expectations * Social support * Students’ self-regulation * Student direction | * Background knowledge * Cultural knowledge * Knowledge integration * Inclusivity * Connectedness * Narrative |
| RESOURCES | DENS Stage 2  Interactive hundreds chart. [Hundred chart ideas](http://www.schools.nsw.edu.au/learning/7-12assessments/naplan/teachstrategies/yr2013/images/hundredchartideas.notebook)  Hundreds charts  Expanded hundreds charts showing numbers to 1 000. | | |

**TEACHING AND LEARNING EXPERIENCES**

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| WHOLE CLASS INSTRUCTION MODELLED ACTIVITIES | GUIDED & INDEPENDENT ACTIVITIES | |
| Modelled Activities\*choose and apply efficient strategies for addition and subtraction (Problem Solving) \*discuss and compare different methods of addition and subtraction (Communicating) Firstly the jump strategy for subtraction is demonstrated.  Using a Number Line for difference  Use a 1 to 100 number line (commercially made, drawn on the board, created on the IWB or simply use a tape measure/ one metre ruler). Mark the place of two numbers, e.g. 32 and 41 Have students come out and work out the difference between the two numbers. Be aware that although we generally relate difference to subtraction, some students will use a 'count on' not 'count back' strategy to solve the problem and therefore it can be related to addition as well. Have students write number sentence to match the working out.  e.g. 41 – 32 = 9  http://www.schools.nsw.edu.au/learning/7-12assessments/naplan/teachstrategies/yr2013/images/nn_numb_s1d_12_5.jpg  Students can also write sentences using words to describe the working out.  e.g. "The difference between 32 and 42 is ten, so the difference between 32 and 41 must be nine. | LEARNING SEQUENCERemediationS1 | Using the hundreds chart students add and subtract two-digit numbers.  [Hundred chart ideas](http://www.schools.nsw.edu.au/learning/7-12assessments/naplan/teachstrategies/yr2013/images/hundredchartideas.notebook)  Teacher demonstrates the addition and subtraction of two-digit numbers using the hundreds chart.  Students play the game **Eggsactly p.82-82 DENS Stage 2.** Students use strips of ten dots on **p.151 in DENS Stage 2** |
| LEARNING SEQUENCEEarly S2 | **Subtraction of two-digit numbers**  Students play the game ‘I Want, I Have I Need’ **p. 186-187** **DENS Stage 2** Students draw out two cards each and record the number in the ‘I Have’ box on the BLM. The students then reverse their cards and record their new number in the ‘I Want’ box on BLM. They subtract the two 2-digit numbers and record the difference in the ‘I Need’ box. Record their subtraction on an empty number line.  **Addition of two-digit numbers**  Students play the game ‘Empty Number Line’ p**. 188-189 DENS Stage 2** Students draw out four cards to make two 2-digit numbers. Have the students use the empty number line to record their methods.  Investigation: Students explain how they arrived at their answers. Encourage students to build to the next decade and then count on by tens.  Assessment **p.243 DENS Stage 2** |

**TEACHING AND LEARNING EXPERIENCES**

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| WHOLE CLASS INSTRUCTION MODELLED ACTIVITIES | GUIDED & INDEPENDENT ACTIVITIES | |
| The jump strategy for addition is demonstrated.   * *Jump strategy* where a number line is used to count forwards or backwards first by tens then ones (the ones may be split to bridge to a decade)   http://www.schools.nsw.edu.au/learning/7-12assessments/naplan/teachstrategies/yr2013/images/nn_numb_s2a_12_1.jpg   * *Split Strategy* where the tens are grouped and the ones are grouped.   30 + 20 = 50 and 8 + 3 = 11  50 + 11 is the same as 60 + 1  40-15=25 is same as 40-10-5  When children understand how these strategies work using the concrete representations they are able to mentally manipulate the groups. This underpins using mental strategies. |  |  |
| LEARNING SEQUENCEExtensionLater S2 | Demonstrate the addition and subtraction of three-digit numbers using the Split Strategy. eg. 245+354= 200+300+40+50+5+4=\_\_\_ 672-329=672-300-29=\_\_\_\_ Link this to the Jump Strategy so students jump back these numbers.   * Expand the hundreds chart into the number system so that students can use it to add and subtract larger numbers, such as 235 + 78. Create different charts that range from 101- 200, 201- 300 and so on… * Remove the hundreds chart and ask the students to visualise it. Then ask students to add and subtract. Link this to the jump method of addition. Some students may require a blank hundreds chart grid to represent where the numbers are as a visual assistance. * Ask students to mentally work out some addition and subtraction number sentences, such as 249 + 321. 342-219. * Ask students to add and subtract four-digit numbers using the split and jump strategies. |
| **EVALUATION & REFLECTION** | Evaluate whether students could:   * use a range of mental strategies for addition and subtraction involving two, three and four digit numbers. * explain and record methods for adding and subtracting. |

* All assessment tasks should be written in **red** and planning should be based around developing the skills to complete that task.
* Assessment rubrics or marking scale should be considered.

**Mathematics TEACHING AND LEARNING OVERVIEW Lesson 2 Stage 2**

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| TERM: | WEEK: 2 | STRAND: NUMBER | **SUB-STRAND:** ADDITION AND SUBTRACTION 1 | **WORKING MATHEMATICALLY:** |
| OUTCOMES: | | * uses appropriate terminology to describe, and symbols to represent, mathematical ideas MA2-1WM * selects and uses appropriate mental or written strategies, or technology, to solve problems MA2-2WM * checks the accuracy of a statement and explains the reasoning used MA2-3WM * uses mental and written strategies for addition and subtraction involving two-, three-, four- and five-digit numbers MA2-5NA * MA2-2WM selects and uses appropriate mental or written strategies, or technology, to solve problems * MA2-3WM checks the accuracy of a statement and explains the reasoning used  MA2-5NA uses mental and written strategies for addition and subtraction involving two-, three-, four- and five-digit | | |
| **CONTENT:** | | Students:  **Recall addition facts for single-digit numbers and related subtraction facts to develop increasingly efficient mental strategies for computation (ACMNA055)**  add three or more single-digit numbers  model and apply the [associative](http://syllabus.bos.nsw.edu.au/glossary/mat/associative/?ajax) property of addition to aid mental computation, eg 2 + 3 + 8 = 2 + 8 + 3 = 10 + 3 = 13  apply known single-digit addition and subtraction facts to mental strategies for addition and subtraction of two-, three- and four-digit numbers, including: CCT  the jump strategy on an empty [number line](http://syllabus.bos.nsw.edu.au/glossary/mat/number-line/?ajax), eg 823 + 56: 823 + 50 = 873, 873 + 6 = 879  the split strategy, eg 23 + 35: 20 + 30 + 3 + 5 = 58  bridging the decades, eg 34 + 26: 34 + 6 = 40, 40 + 20 = 60  changing the order of addends to form [multiples](http://syllabus.bos.nsw.edu.au/glossary/mat/multiple/?ajax) of 10, eg 16 + 8 + 4: add 16 to 4 first  using [place value](http://syllabus.bos.nsw.edu.au/glossary/mat/place-value/?ajax) to [partition](http://syllabus.bos.nsw.edu.au/glossary/mat/partitioning/?ajax) numbers, eg 2500 + 670: 2500 + 600 + 70 = 3170  partitioning numbers in non-standard forms, eg 500 + 670: 670 = 500 + 170, so 500 + 670 = 500 + 500 + 170, which is 1000 + 170 = 1170  select, use and record a variety of mental strategies to solve addition and subtraction problems, including word problems, with numbers of up to four digits CCT  give a reasonable estimate for a problem, explain how the estimate was obtained, and check the solution (Communicating, Reasoning) CCT  **Recognise and explain the connection between addition and subtraction** (ACMNA054)  demonstrate how addition and subtraction are inverse operations  explain and check solutions to problems, including by using the inverse operation CCT  **Represent money values in multiple ways and count the change required for simple transactions to the nearest five cents** (ACMNA059)  perform simple calculations with money, including finding change, and [round](http://syllabus.bos.nsw.edu.au/glossary/mat/rounding/?ajax) to the nearest five cents PSCWE  calculate mentally to give change | | |

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| ASSESSMENT FOR LEARNING (PRE-ASSESSMENT) | Review the jump and split strategies.  Jump strategy 38+23= 38+10+10+3=61; 41-29=41-10-10-9=12 Split strategy: 27+45=27+40+5; 66-27=66-20-7=39  Provide students with a set of playing cards excluding the Kings, Queens and Jacks. Ace=1 Joker=0  Students flip 4 cards and show on the number line how they added or subtracted the numbers. Teacher makes observations and students explain how they solved the number sentence. | | |
| WARM UP / DRILL | Counting by 2, 5 and by 10 on and off the decade. Charts that range up to 1 000. Students jump by ten on and off the decade. eg. 345+10= or 263-10=  **Whole Class activity Students** are given addition and subtraction number sentences one at a time and hundreds charts. Students add and subtract numbers on the hundreds chart using the split and jump strategy.  Quick calculation quiz: <http://www.abcya.com/math_quiz.htm> | | |
| TENS ACTIVITYNEWMAN’S PROBLEMINVESTIGATION | In pairs students share a box of dominoes. Each domino is a two-digit number. Students are given a worksheet to record number sentence and answer.  Students take out two dominoes and add or subtract the 2-digit number. An extension would be two dominoes and two playing cards to make 3-digits.  **Problems**  **James has 25 cards and Susan has 39 cards. How many cards were there altogether?**  **Charles collected stamps 235 stamps and he sold 129 of them. How many did he have left?** | | |
| QUALITY TEACHING ELEMENTS | **INTELLECTUAL QUALITY** | **QUALITY LEARNING ENVIRONMENT** | **SIGNIFICANCE** |
| * Deep knowledge * Deep understanding * Problematic knowledge * Higher-order thinking * Metalanguage * Substantive communication | * Explicit quality criteria * Engagement * High expectations * Social support * Students’ self-regulation * Student direction | * Background knowledge * Cultural knowledge * Knowledge integration * Inclusivity * Connectedness * Narrative |
| RESOURCES | DENS Stage 2  Interactive hundreds chart. [Hundred chart ideas](http://www.schools.nsw.edu.au/learning/7-12assessments/naplan/teachstrategies/yr2013/images/hundredchartideas.notebook)  Hundreds charts  Expanded hundreds charts showing numbers to 1 000. | | |

**TEACHING AND LEARNING EXPERIENCES**

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| WHOLE CLASS INSTRUCTION MODELLED ACTIVITIES | GUIDED & INDEPENDENT ACTIVITIES | |
| Modelled Activities **Whole class activities**  **\*choose and apply efficient strategies for addition and subtraction (Problem Solving) \*discuss and compare different methods of addition and subtraction (Communicating)**  **bridging the decades**  eg 34 + 17; 34 + 10 is 44, 44 + 7 = 51  Students are asked to calculate 34 + 17 in their heads. They are then asked to record the strategy they used. This process is repeated for other problems, such as:  73 – 25 162 – 69  63 + 29 188 – 89  Students discuss which methods are the most efficient.  *Extension:* Students are given increasingly more difficult  problems to solve mentally. Students explain and discuss the strategies they use eg for ‘188 – 89 = ?’ A student may say, ‘I took away 88 and that was easy because it left 100 but I had to take away one more, because 88 + 1 = 89, so the answer is 99.’ Students record the mental strategies they use.  Possible questions include:  ❚ is there a better strategy?  ❚ what is the best method to solve this problem?  **Recording on Empty Number Lines**  Students are shown the number sentence 157 + 22 and an  empty number line. The teacher marks the number 157 on the number line.  Possible questions include:  ❚ what is the next multiple of ten after 157?  ❚ how many do you add on to get that number?  Students record their answers on the number line.  Possible questions include:  ❚ can you work it out with fewer steps?  ❚ can you visualise the number line in your head and do it?  ❚ can you write the numbers to help you keep track? | LEARNING SEQUENCERemediationS1 | **Toss and Add**  Students toss three standard dice and race to see who can state the total number of dots first.  Students are asked to share and explain their strategies  Varation: Dice Students could repeat the activity using numbered  dice or dice with larger numbers |
| LEARNING SEQUENCEEarly S2 | **Linking 3**  Students record sixteen different numbers between 1 and 50  in a 4 4 grid **Students use the bridging strategy to find the answer.**  eg   |  |  |  |  | | --- | --- | --- | --- | | 19 | 28 | 17 | 13 | | 2 | 18 | 41 | 5 | | 16 | 1 | 38 | 49 | | 15 | 26 | 40 | 7 |   Students link and add three numbers vertically or horizontally.  Possible questions include: \*can you find links that have a total of more than 50? \*can you find links that have a total of less than 50? \*how many links can you find that have a total that is a  multiple of 10? \*what is the smallest/largest total you can find? \*can you find ten even/odd totals?  **For further resources go to on Bridging the Tens go to:**  [**http://www.primaryresources.co.uk/maths/mathsC1b.htm**](http://www.primaryresources.co.uk/maths/mathsC1b.htm) |

**TEACHING AND LEARNING EXPERIENCES**

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| WHOLE CLASS INSTRUCTION MODELLED ACTIVITIES | GUIDED & INDEPENDENT ACTIVITIES | |
| Modelled Activities **Whole class activities**  **\*choose and apply efficient strategies for addition and subtraction (Problem Solving) \*discuss and compare different methods of addition and subtraction (Communicating)**  **bridging the decades**  eg 34 + 17; 34 + 10 is 44, 44 + 7 = 51  Students are asked to calculate 34 + 17 in their heads. They are then asked to record the strategy they used. This process is repeated for other problems, such as:  73 – 25 162 – 69  63 + 29 188 – 89  Students discuss which methods are the most efficient.  *Extension:* Students are given increasingly more difficult  problems to solve mentally. Students explain and discuss the strategies they use eg for ‘188 – 89 = ?’ A student may say, ‘I took away 88 and that was easy because it left 100 but I had to take away one more, because 88 + 1 = 89, so the answer is 99.’ Students record the mental strategies they use.  Possible questions include:  ❚ is there a better strategy?  ❚ what is the best method to solve this problem?  **Recording on Empty Number Lines**  Students are shown the number sentence 157 + 22 and an  empty number line. The teacher marks the number 157 on the number line.  Possible questions include:  ❚ what is the next multiple of ten after 157?  ❚ how many do you add on to get that number?  Students record their answers on the number line.  Possible questions include:  ❚ can you work it out with fewer steps?  ❚ can you visualise the number line in your head and do it?  ❚ can you write the numbers to help you keep track? | LEARNING SEQUENCEEarly S2 | **Cross-over**  In pairs, students each choose a number between 1 and 1000.  The student with the larger number always subtracts a number from their chosen number. The student with the smaller number always adds a number to their chosen number. The student who is adding must always have a number less than their partner’s answer. The student who is subtracting must always have a number more than their partner’s answer. Play continues until one student is forced to ‘cross over’ their partner’s number. The student who crosses over their partner’s number loses  **Possible questions include:**  **❚ what strategy did you use in solving the addition or subtraction problems?**  **❚ can you find a quicker way to add/subtract?**  **❚ can you explain to a friend what you did?**  **❚ how can you show that your answer is correct?**  **❚ does the rule always work?**  **❚ can you use a different method?** |

**TEACHING AND LEARNING EXPERIENCES**

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| WHOLE CLASS INSTRUCTION MODELLED ACTIVITIES | GUIDED & INDEPENDENT ACTIVITIES | |
| Modelled Activities **Whole class activities**  **\*choose and apply efficient strategies for addition and subtraction (Problem Solving) \*discuss and compare different methods of addition and subtraction (Communicating)**  **bridging the decades**  eg 34 + 17; 34 + 10 is 44, 44 + 7 = 51  Students are asked to calculate 34 + 17 in their heads. They are then asked to record the strategy they used. This process is repeated for other problems, such as:  73 – 25 162 – 69  63 + 29 188 – 89  Students discuss which methods are the most efficient.  *Extension:* Students are given increasingly more difficult  problems to solve mentally. Students explain and discuss the strategies they use eg for ‘188 – 89 = ?’ A student may say, ‘I took away 88 and that was easy because it left 100 but I had to take away one more, because 88 + 1 = 89, so the answer is 99.’ Students record the mental strategies they use.  Possible questions include:  ❚ is there a better strategy?  ❚ what is the best method to solve this problem?  **Recording on Empty Number Lines**  Students are shown the number sentence 157 + 22 and an  empty number line. The teacher marks the number 157 on the number line.  Possible questions include:  ❚ what is the next multiple of ten after 157?  ❚ how many do you add on to get that number?  Students record their answers on the number line.  Possible questions include:  ❚ can you work it out with fewer steps?  ❚ can you visualise the number line in your head and do it?  ❚ can you write the numbers to help you keep track? | LEARNING SEQUENCEEarly S2 | **Tracks**  Organise the students into pairs and provide them with a copy of *Tracks*  BLM, a set of numeral cards 0–9 and a hundred chart. Have the students take turns to draw two cards from the deck to make a two-digit number. The student who has drawn the cards records this number on the “Tracks” sheet as their starting number. The partner then fills in the boxes on the sheet with three directional arrows. The first student locates the starting number on the hundred chart and  follows the directional arrows to determine the number they would  finish on.  **Developing Efficient Numeracy Strategies 2 (DENS 2) pg 86-87**  Tracks Blackline Master pg 154  **Take-away Reversals Students use the empty number line to show bridging of tens strategy.**  In pairs, students choose a three-digit number without repeating any digit and without using zero eg 381. The  student reverses the order of the digits to create a second number ie 183. The student subtracts the smaller number  from the larger and records this as a number sentence. The answer is used to start another reversal subtraction. Play  continues until zero is reached. The process could be repeated for other three-digit numbers. Students discuss their work and any patterns they have observed.  **Addition reversals**  In pairs, students choose a three-digit number without repeating any digit and without using zero eg 381. The  student reverses the order of the digits to create a second number ie 183. The student adds the smaller number  with the larger and records this as a number sentence. The answer is used to start another reversal addition. Play  continues until zero is reached. The process could be repeated for other three-digit numbers. Students discuss their work and any patterns they have observed.  **Changing the order of addends**  Roll three 20-sided die and record answers to show that the order of the addends has been changed to add the numbers.  **Number Cards**  Students make number cards from 1 to 9 as shown.  Students use these cards to make two three-digit numbers that add to give the largest total possible and the smallest total possible eg Given 4, 5, 2 and 3, 1, 6:  Largest total possible is 542 + 631 = 1173  Smallest total possible is 245 + 136 = 381  Students arrange the cards to make three three-digit numbers that add up to 999. Students are challenged to find as many solutions as they can.  Telephone Number Challenge (Louise Pickering) [**PDF**](http://www.primaryresources.co.uk/maths/pdfs/telephone_number.pdf)http://www.primaryresources.co.uk/images/year/4.gifAdding Several Numbers (LA) (Jocelyn Hook) [**DOC**](http://www.primaryresources.co.uk/maths/docs/AddingSeveralNumbers.doc) |

**TEACHING AND LEARNING EXPERIENCES**

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| WHOLE CLASS INSTRUCTION MODELLED ACTIVITIES | GUIDED & INDEPENDENT ACTIVITIES | |
| **Differences on Number Lines**  Teacher draws an empty number line. A student chooses two three-digit numbers and places them on the number line.  As a class the number line is used to work out and record the difference between the two numbers. Students explain the mental strategies they used to find the answer. They reflect on their method, considering whether it can be improved.  **changing the order of addends to form multiples**  **of 10 eg 16 + 8 + 4; add 16 and 4 first**  17+6+3=17+3+6=26; 27+15+13=27+13+15=55  234+112+236=234+236+112=570+112=682  **Using place value to partition numbers**  2 500+670=500+170  **Partitioning numbers in non-standard form**  500+670=500+500+170=1 000+`170= 1 170  <http://www.learningresources.com/text/pdf/Exclusive/2176_Place_Value_WEB_activities.pdf>  **Further resources on partitioning**  <http://www.primaryresources.co.uk/maths/mathsC1b.htm>  <http://www.scootle.edu.au/ec/viewing/R10912/index.html> | LEARNING SEQUENCEExtensionLater S2 | Bridging through 10 (Rachael Wilkie) [**DOC**](http://www.primaryresources.co.uk/maths/docs/bridgingthrough10.doc) in [**http://www.primaryresources.co.uk/maths/mathsC1b.htm**](http://www.primaryresources.co.uk/maths/mathsC1b.htm)  **Trading Games**  The trading games Win 500 or Lose 500 can be adapted for Stage 2 by adding and subtracting two-digit numbers using,, recording and evaluating mental strategies. Students are given a pack of playing cards with the tens and the picture cards removed. The Aces are is retained and represent 1 and the Jokers are retained and represents 0. Students flip two cards and assign place values to the numbers turned over. Students play Win 5000/50 000 and Lose 5000/50 000 to add and subtract three-digit and four-digit numbers. Students could use a calculator to check their answer. Students are encouraged to pose problems, including money problems, using their numbers.  **Take-away and Addition Reversals Students use the empty number line to show bridging of tens strategy.**  Students use four-digit numbers.  **Cross-over**  In pairs, students each choose a number between 1 and 1000.  The student with the larger number always subtracts a number from their chosen number. The student with the smaller number always adds a number to their chosen number. The student who is adding must always have a number less than their partner’s answer. The student who is subtracting must always have a number more than their partner’s answer. Play continues until one student is forced to ‘cross over’ their partner’s number. The student who crosses over their partner’s number loses  **Possible questions include:**  **❚ what strategy did you use in solving the addition or subtraction problems?**  **❚ can you find a quicker way to add/subtract?**  **❚ can you explain to a friend what you did?**  **❚ how can you show that your answer is correct?**  **❚ does the rule always work?**  **❚ can you use a different method** |
| **EVALUATION & REFLECTION** | Evaluate whether students could:   * use the bridging of tens for addition and subtraction involving two, three and four digit numbers. * Partition numbers by using place value and using a non-standard form. |

* All assessment tasks should be written in **red** and planning should be based around developing the skills to complete that task.
* Assessment rubrics or marking scale should be considered.

**Mathematics TEACHING AND LEARNING OVERVIEW Lesson 3 Stage 2**

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| TERM: | WEEK: 3 | STRAND: NUMBER | **SUB-STRAND:** ADDITION AND SUBTRACTION 1 | **WORKING MATHEMATICALLY:** |
| OUTCOMES: | | * uses appropriate terminology to describe, and symbols to represent, mathematical ideas MA2-1WM * selects and uses appropriate mental or written strategies, or technology, to solve problems MA2-2WM * checks the accuracy of a statement and explains the reasoning used MA2-3WM * uses mental and written strategies for addition and subtraction involving two-, three-, four- and five-digit numbers MA2-5NA * MA2-2WM selects and uses appropriate mental or written strategies, or technology, to solve problems * MA2-3WMchecks the accuracy of a statement and explains the reasoning used  MA2-5NA uses mental and written strategies for addition and subtraction involving two-, three-, four- and five-digit | | |
| **CONTENT:** | | Students:  **Recall addition facts for single-digit numbers and related subtraction facts to develop increasingly efficient mental strategies for computation (ACMNA055)**  add three or more single-digit numbers  model and apply the [associative](http://syllabus.bos.nsw.edu.au/glossary/mat/associative/?ajax) property of addition to aid mental computation, eg 2 + 3 + 8 = 2 + 8 + 3 = 10 + 3 = 13  apply known single-digit addition and subtraction facts to mental strategies for addition and subtraction of two-, three- and four-digit numbers, including: CCT  the jump strategy on an empty [number line](http://syllabus.bos.nsw.edu.au/glossary/mat/number-line/?ajax), eg 823 + 56: 823 + 50 = 873, 873 + 6 = 879  the split strategy, eg 23 + 35: 20 + 30 + 3 + 5 = 58  bridging the decades, eg 34 + 26: 34 + 6 = 40, 40 + 20 = 60  changing the order of addends to form [multiples](http://syllabus.bos.nsw.edu.au/glossary/mat/multiple/?ajax) of 10, eg 16 + 8 + 4: add 16 to 4 first  using [place value](http://syllabus.bos.nsw.edu.au/glossary/mat/place-value/?ajax) to [partition](http://syllabus.bos.nsw.edu.au/glossary/mat/partitioning/?ajax) numbers, eg 2500 + 670: 2500 + 600 + 70 = 3170  partitioning numbers in non-standard forms, eg 500 + 670: 670 = 500 + 170, so 500 + 670 = 500 + 500 + 170, which is 1000 + 170 = 1170  select, use and record a variety of mental strategies to solve addition and subtraction problems, including word problems, with numbers of up to four digits CCT  give a reasonable estimate for a problem, explain how the estimate was obtained, and check the solution (Communicating, Reasoning) CCT  **Recognise and explain the connection between addition and subtraction** (ACMNA054)  demonstrate how addition and subtraction are inverse operations  explain and check solutions to problems, including by using the inverse operation CCT  **Represent money values in multiple ways and count the change required for simple transactions to the nearest five cents** (ACMNA059)  perform simple calculations with money, including finding change, and [round](http://syllabus.bos.nsw.edu.au/glossary/mat/rounding/?ajax) to the nearest five cents PSCWE  calculate mentally to give change | | |

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| ASSESSMENT FOR LEARNING (PRE-ASSESSMENT) | \*demonstrate how addition and subtraction are inverse operations \*explain and check solutions to problems, including by using the inverse operation CCT  Students are given an addition number sentence eg. 22+34= They are asked ‘How can we check to see if this answer is correct?’  Some results may be each time one of the addends is subtracted from the total, one of the addends is the result. | | |
| WARM UP / DRILL | Counting by 2, 5 and by 10 on and off the decade. Charts that range up to 1 000. Students jump by ten on and off the decade. eg. 345+10= or 263-10=  <http://splash.abc.net.au/res/i/L1084/index.html>  **Whole Class activity Students** are given addition and subtraction number sentences one at a time and hundreds charts. Students add and subtract numbers on the hundreds chart using the split, bridging tens and jump strategy.  Quick calculation quiz: <http://mrnussbaum.com/third-grade-math/> | | |
| TENS ACTIVITYNEWMAN’S PROBLEMINVESTIGATION | In pairs students have a set of numeral cards 1-50. Each students draws out two cards and adds the two numbers. They then reverse the numbers and add again to show that the total will remain the same. They then subtract one of the addends from the total to show that addition and subtraction are inverse operations.  **Problems**  Students are told that a sofa and a desk cost $1116. If the sofa costs $700 more than the desk, how much does the desk cost?  Students discuss. Students could pose other similar problems to solve such as ‘What does each item cost if together they cost $1054 and one was $643 more than the other?’  Possible questions include: | | |
| QUALITY TEACHING ELEMENTS | **INTELLECTUAL QUALITY** | **QUALITY LEARNING ENVIRONMENT** | **SIGNIFICANCE** |
| * Deep knowledge * Deep understanding * Problematic knowledge * Higher-order thinking * Metalanguage * Substantive communication | * Explicit quality criteria * Engagement * High expectations * Social support * Students’ self-regulation * Student direction | * Background knowledge * Cultural knowledge * Knowledge integration * Inclusivity * Connectedness * Narrative |
| RESOURCES | DENS Stage 2  Interactive hundreds chart. [Hundred chart ideas](http://www.schools.nsw.edu.au/learning/7-12assessments/naplan/teachstrategies/yr2013/images/hundredchartideas.notebook)  Hundreds charts  Expanded hundreds charts showing numbers to 1 000. websites | | |

**TEACHING AND LEARNING EXPERIENCES**

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| WHOLE CLASS INSTRUCTION MODELLED ACTIVITIES | GUIDED & INDEPENDENT ACTIVITIES | |
| Modelled Activities **Whole class activities**  **Recognise and explain the connection between addition and subtraction (ACMNA054)**  **\***demonstrate how addition and subtraction are inverse operations  \*explain and check solutions to problems, including by using the inverse operation CCT  Inverse Operations (Debbie Jones) [MS Powerpoint](http://www.primaryresources.co.uk/maths/powerpoint/inverse.ppt)  **Inverse operations**  Students need to opportunities to demonstrate how addition and subtraction are inverse operations. This video shows a series of three different clips of real life situations are shown in a quiz situation to help the participants work out number facts related to adding and subtracting. They work out the matching number facts which illustrate that subtraction is the inverse of addition. Adding and then subtracting the same amount gets you back to where you started.  **http://www.bbc.co.uk/learningzone/clips/addition-and-subtraction-inverse-operations/3134.html**  **Sum Cloud challenge**  <http://www.curriculumsupport.education.nsw.gov.au/countmein/children_sum_cloud_challenge.html>  Further resources  <http://www.primaryresources.co.uk/maths/mathsC1b.htm> | LEARNING SEQUENCERemediationS1 | **Four Turns to 100**  <http://www.curriculumsupport.education.nsw.gov.au/countmein/children_4_turns_to_100.html>  **The Inverse Monster** (Antoinette Payne) [**DOC**](http://www.primaryresources.co.uk/maths/docs/inverse_monster.doc) |
| LEARNING SEQUENCEEarly S2 | **Adding calendar numbers**  <http://www.curriculumsupport.education.nsw.gov.au/countmein/children_calendar.html>  Each time the target number is achieved students check using subtraction to show inverse operations.    **Addition Wheels**  [**http://www.curriculumsupport.education.nsw.gov.au/countmein/children\_addition\_wheel.html**](http://www.curriculumsupport.education.nsw.gov.au/countmein/children_addition_wheel.html)  Each time a student is successful, the answer is checked by subtracting one of the addends.  **To understands that subtraction is the inverse of addition**  Choose 3 of the given number cards (numbers in the range of 10-20) to write an addition number  and the corresponding subtraction number sentence  Reverse Addition (Lynne Hardwidge) [**PDF**](http://www.primaryresources.co.uk/maths/pdfs/LH_reverseaddition.pdf)  Reverse Subtraction (Lynne Hardwidge) [**PDF**](http://www.primaryresources.co.uk/maths/pdfs/LH_reversesubtraction.pdf) |
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**TEACHING AND LEARNING EXPERIENCES**

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| WHOLE CLASS INSTRUCTION MODELLED ACTIVITIES | GUIDED & INDEPENDENT ACTIVITIES | |
|  | LEARNING SEQUENCEExtensionLater S2 | **Number Cards**  Students make number cards from 1 to 9 as shown.  Students use these cards to make two three-digit numbers that add to give the largest total possible and the smallest total possible eg Given 4, 5, 2 and 3, 1, 6:  Largest total possible is 542 + 631 = 1173  Smallest total possible is 245 + 136 = 381  Students arrange the cards to make three three-digit numbers that add up to 999. Students are challenged to find as many solutions as they can.  **Checking inverse operations**  Function Machines (Paula Whysall) [**PDF**](http://www.primaryresources.co.uk/maths/pdfs/14function.pdf) |
| **EVALUATION & REFLECTION** | Evaluate whether students could:   * Show that subtraction is the inverse operation of addition * Check answers with two-and three-digit addition by using subtraction. |

* All assessment tasks should be written in **red** and planning should be based around developing the skills to complete that task.
* Assessment rubrics or marking scale should be considered.

**Mathematics TEACHING AND LEARNING OVERVIEW Lesson 4 Stage 2**

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| TERM: | WEEK: 4 | STRAND: NUMBER | **SUB-STRAND:** ADDITION AND SUBTRACTION 1 | **WORKING MATHEMATICALLY:** |
| OUTCOMES: | | * uses appropriate terminology to describe, and symbols to represent, mathematical ideas MA2-1WM * selects and uses appropriate mental or written strategies, or technology, to solve problems MA2-2WM * checks the accuracy of a statement and explains the reasoning used MA2-3WM * uses mental and written strategies for addition and subtraction involving two-, three-, four- and five-digit numbers MA2-5NA * MA2-2WM selects and uses appropriate mental or written strategies, or technology, to solve problems * MA2-3WMchecks the accuracy of a statement and explains the reasoning used  MA2-5NA uses mental and written strategies for addition and subtraction involving two-, three-, four- and five-digit | | |
| **CONTENT:** | | Students:  **Recall addition facts for single-digit numbers and related subtraction facts to develop increasingly efficient mental strategies for computation (ACMNA055)**  add three or more single-digit numbers  model and apply the [associative](http://syllabus.bos.nsw.edu.au/glossary/mat/associative/?ajax) property of addition to aid mental computation, eg 2 + 3 + 8 = 2 + 8 + 3 = 10 + 3 = 13  apply known single-digit addition and subtraction facts to mental strategies for addition and subtraction of two-, three- and four-digit numbers, including: CCT  the jump strategy on an empty [number line](http://syllabus.bos.nsw.edu.au/glossary/mat/number-line/?ajax), eg 823 + 56: 823 + 50 = 873, 873 + 6 = 879  the split strategy, eg 23 + 35: 20 + 30 + 3 + 5 = 58  bridging the decades, eg 34 + 26: 34 + 6 = 40, 40 + 20 = 60  changing the order of addends to form [multiples](http://syllabus.bos.nsw.edu.au/glossary/mat/multiple/?ajax) of 10, eg 16 + 8 + 4: add 16 to 4 first  using [place value](http://syllabus.bos.nsw.edu.au/glossary/mat/place-value/?ajax) to [partition](http://syllabus.bos.nsw.edu.au/glossary/mat/partitioning/?ajax) numbers, eg 2500 + 670: 2500 + 600 + 70 = 3170  partitioning numbers in non-standard forms, eg 500 + 670: 670 = 500 + 170, so 500 + 670 = 500 + 500 + 170, which is 1000 + 170 = 1170  select, use and record a variety of mental strategies to solve addition and subtraction problems, including word problems, with numbers of up to four digits CCT  give a reasonable estimate for a problem, explain how the estimate was obtained, and check the solution (Communicating, Reasoning) CCT  **Recognise and explain the connection between addition and subtraction** (ACMNA054)  demonstrate how addition and subtraction are inverse operations  explain and check solutions to problems, including by using the inverse operation CCT  **Represent money values in multiple ways and count the change required for simple transactions to the nearest five cents** (ACMNA059)  perform simple calculations with money, including finding change, and [round](http://syllabus.bos.nsw.edu.au/glossary/mat/rounding/?ajax) to the nearest five cents PSCWE  calculate mentally to give change | | |

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| ASSESSMENT FOR LEARNING (PRE-ASSESSMENT) | **Represent money values in multiple ways and count the change required for simple transactions to the nearest five cents**  \*perform simple calculations with money, including finding change, and [round](http://syllabus.bos.nsw.edu.au/glossary/mat/rounding/?ajax) to the nearest five cents PSCWE  \*calculate mentally to give change **(ACMNA059)**  Students are given an addition number sentence eg. 22+34= They are asked ‘How can we check to see if this answer is correct?’  Some results may be each time one of the addends is subtracted from the total, one of the addends is the result. | | |
| WARM UP / DRILL | Counting by 2, 5 and by 10 and 100 on and off the decade. Charts that range up to 1 000. Students jump by ten on and off the decade. eg. 345+10= or 263-10=  <http://splash.abc.net.au/res/i/L1084/index.html>  Quick calculation quiz: <http://mrnussbaum.com/third-grade-math/> | | |
| TENS ACTIVITYNEWMAN’S PROBLEMINVESTIGATION | In pairs students have a hundreds chart, counters and a variety of coins-5c, 10c and 20c. Students draw out three coins from a bag and add them using the hundreds chart.  **Problems**  **Sheep and ducks** I can count 20 legs in the paddock. How many ducks and how many sheep are in the paddock? How many solutions can you find? The farmer is taking ducks and sheep to market. Altogether there are 15 heads and 52 legs in the truck. How many ducks and how many sheep are going to market? | | |
| QUALITY TEACHING ELEMENTS | **INTELLECTUAL QUALITY** | **QUALITY LEARNING ENVIRONMENT** | **SIGNIFICANCE** |
| * Deep knowledge * Deep understanding * Problematic knowledge * Higher-order thinking * Metalanguage * Substantive communication | * Explicit quality criteria * Engagement * High expectations * Social support * Students’ self-regulation * Student direction | * Background knowledge * Cultural knowledge * Knowledge integration * Inclusivity * Connectedness * Narrative |
| RESOURCES | DENS Stage 2  Interactive hundreds chart. [Hundred chart ideas](http://www.schools.nsw.edu.au/learning/7-12assessments/naplan/teachstrategies/yr2013/images/hundredchartideas.notebook)  Hundreds charts  Expanded hundreds charts showing numbers to 1 000. Websites  Further resources in: <http://www.makingcents.com.au/nsw/stage2/makingcentsbudgeting.pdf> | | |

**TEACHING AND LEARNING EXPERIENCES**

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| WHOLE CLASS INSTRUCTION MODELLED ACTIVITIES | GUIDED & INDEPENDENT ACTIVITIES | |
| Modelled Activities **Whole class activities**  **The following notebook lessons introduce addition and subtraction of Australian currency.**      Money activities in scootle  <https://www.scootle.edu.au/ec/resolve/view/M012292?accContentId=ACMNA034> | LEARNING SEQUENCERemediationS1 | **Money Game**  **Students have brown paper bags containing a variety of coins. They draw out three coins and use the hundreds chart to assist them with their additions.**  **Looking at money**  <https://www.scootle.edu.au/ec/viewing/S0369/notes.html> |
| LEARNING SEQUENCEEarly S2 | **Money Game**  **Demonstrate on a number line how amounts are added and change is calculated to the dollar.**  Students are given playing cards excluding kings, queens, jacks and tens. Students in pairs draw out four playing cards to have two 2-digit numbers. Eg 23+44=67c. Students round the amount to the next ten or five.  Using a numbers line calibrated into fives and tens up to 100, students find the change from one dollar and record their answer onto a recording sheet.  **Practise adding and subtracting amounts and giving change**.  <http://au.ixl.com/math/year-3>  <http://www.mathnook.com/math/countingmoneybas.html>  **Demonstrate on a number line calibrated by 5 and 10 to 100 to show how amounts are added and change is calculated to the two dollars.**  **Students choose a one dollar coin and three other coins in range of 5c to 20c. Add the amounts and jump along a number line which is calibrated to 200 to find the change from $2. A worksheet is prepared showing other amounts to be added below $1 and students calculate the change to $1.**  **Number line is calibrated to 500 by 5 and 10**  **Students choose $2 and $1 coin and three other coins(50c, 20c, 10c). These are added together and the change is calculated to $5. A worksheet is prepared showing other amounts to be added below $5 and students calculate the change to $5.**  Observe worksheets that demonstrate calculations. |

**TEACHING AND LEARNING EXPERIENCES**

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| WHOLE CLASS INSTRUCTION MODELLED ACTIVITIES | GUIDED & INDEPENDENT ACTIVITIES | |
|  | LEARNING SEQUENCEExtensionLater S2 | Practise giving change from larger amounts.  <http://www.mathnook.com/math/countingmoneyadv.html>  **Finding change from $20, $50 and $100.**  **Teacher demonstrates the adding of amounts and finding the change to the next dollar and then counting on to the higher amounts. Eg. $4.45+13.65= $18.10 add 90c to $19 and $1 to $20=$1.90. Examples are also given for $50 and $100**  **Students are given a worksheet with amounts and the change is calculated to $20, $50 or $100 mentally.** |
| **EVALUATION & REFLECTION** | Evaluate whether students could:   * Can calculate amounts of money. * Change can be calculated. |

* All assessment tasks should be written in **red** and planning should be based around developing the skills to complete that task.
* Assessment rubrics or marking scale should be considered.