Developed to benchmark, inform teaching and learning, the behaviours of learning that students demonstrate during an activity. These activities are only a guide and/or suggestion, selecting an activity from the classroom program may provide this opportunity

Numeracy Learning Plans and Embedded assessment tasks

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| Aspect 1A Forward number word sequences | | | | | | |
| **Where are they now?** | Emergent – 0  MAe-4NA  Cannot count to 10. | Initial (10) – 1  MAe-4NA  Counts to 10. Cannot say the number word just after a given number word in the range 1-10. Dropping back to 1 does not appear at this level. | Intermediate(10) - 2  MAe-4NA  Counts to 10.Says the number word just after a given number word, but drops back to ‘one’ when doing so. | Facile (10) – 3  MAe-4NA  Counts to 10.Says the number word just after a given number word in the range 1-10 without dropping back. | Facile (30) – 4  MAe-4NA  Counts to 30.Says the number word just after a given number word in the range 1-30 without dropping back. | Facile (100) –5  MA1-4NA  Counts to 100.Says the number word just after a given number word in the range 1-100 without dropping back. |
| **Student**  **names** |  |  |  |  |  |  |
| **Where to next?** | Can count to 10 but cannot give the number after. | Can count to 10 and give the number after, but counts from 1. | Can count to 10 and give the number after. | Counts to 30 and gives the number after. | Counts to 100 and gives the number after | Counts to 1000 and gives the number after. |
| **Teaching resources and activities** | Sample Units of Work, pp. 13-15  DENS Stage 1,  pp. 22 -31  Feather drop,  DENS Stage 1,  pp. 22-23  Handful of teddies, DENS Stage 1, p. 24  Coat hangers,  DENS Stage 1, p. 28  **Learning objects** Penguin count Number grid Washing line | Sample Units of Work,  pp. 13-15  DENS Stage 1,  pp. 22-31  Musical cushions,  DENS Stage 1, p. 31  Physical activities,  DENS Stage 1, p. 30  **Learning objects**  Penguin count Number grid Washing line | Sample Units of Work, pp. 13-15  DENS Stage 1,  pp. 78-81  Zap, DENS Stage 1,  pp. 78-79  **Learning objects**  Penguin count Number grid Washing line  **SMART notebook** Forward number word sequences | Sample Units of Work, pp. 13-15  DENS Stage 1,  pp. 78-81  Maths tipping,  DENS Stage 1,  pp. 80-81  **Learning objects**  Penguin count Number grid Washing line  **SMART notebook** Number before, number after | DENS Stage 1,  pp. 148-157  Bucket count on, DENS Stage 1, pp.156-157  Collections,  DENS Stage1, pp.148-149  **Learning objects**  Penguin count Number grid Hundred chart windows | DENS Stage 1,  pp. 220-231  Celebrity head, DENS Stage 1,  pp. 220-221  Guess my number, DENS Stage 1,  pp. 222-223  **Learning object**  Number grid |

How to find out where they are up to on 1A FNWS?

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| --- | --- | --- | --- | --- | --- |
| Emergent – 0  MAe-4NA  Cannot count to 10. | Initial (10) – 1  MAe-4NA  Counts to 10. Cannot say the number word just after a given number word in the range 1-10. Dropping back to 1 does not appear at this level. | Intermediate(10) - 2  MAe-4NA  Counts to 10.Says the number word just after a given number word, but drops back to ‘one’ when doing so. | Facile (10) – 3  MAe-4NA  Counts to 10.Says the number word just after a given number word in the range 1-10 without dropping back. | Facile (30) – 4  MAe-4NA  Counts to 30.Says the number word just after a given number word in the range 1-30 without dropping back. | Facile (100) –5  MA1-4NA  Counts to 100.Says the number word just after a given number word in the range 1-100 without dropping back. |

**SENA 1 Forward number word sequences**

*Start counting from … I’ll tell you when to stop.*

**1................32**

*What is the next number after …?*

**5 ? 9 ? 13 ?** **19 ?**  **27 ?**

*Start counting from … I’ll tell you when to stop.*

**62.................73**

*What is the next number after …?*

**80?** **69 ?**  **46 ?**

*Start counting from … I’ll tell you when to stop.*

**96.................113**

***Extension- Counts to 1 000...***

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| Aspect 1B Backward number word sequences | | | | | | |
| **Where are they now?** | Emergent – 0  MAe-4NA  Cannot count backward from 10 to 1. | Initial (10) – 1  MAe-4NA  Counts backward from 10 to 1.Cannot say the number word just before a given number word in the range 1-10. Dropping back to 1 does not appear at this level. | Intermediate(10) - 2  MAe-4NA  Counts backward from 10 to 1.Says the number word just before a given number word, but drops back to ‘one’ when doing so. | Facile (10) – 3  MAe-4NA  Counts backward from 10 to 1.Says the number word just before a given number word in the range 1-10 without dropping back. | Facile (30) – 4  MAe-4NA  Counts backward from 30 to 1.Says the number word just before a given number word in the range 1-30 without dropping back. | Facile (100) –5  MA1-4NA  Counts backward from 100 to 1.Says the number word just before a given number word in the range 1-100 without dropping back. |
| **Student**  **names** |  |  |  |  |  |  |
| **Where to next?** | Counts backward from 10 to 1.  Cannot say the number word just before a given number word in the range 1-10. Dropping back to 1 does not appear at this level. | Counts backward from 10 to 1.  Says the number word just before a given number word, but drops back to ‘one’ when doing so. | Counts backward from 10 to 1.Says the number word just before a given number word in the range 1-10 without dropping back. | Counts backward from 30 to 1.Says the number word just before a given number word in the range 1-30 without dropping back. | Counts backward from 100 to 1.Says the number word just before a given number word in the range 1-100 without dropping back. |  |
| **Teaching resources and activities** | Sample Units of Work, pp. 13-15  DENS Stage 1,  pp. 22 -31  Feather drop,  DENS Stage 1,  pp. 22-23  Handful of teddies, DENS Stage 1, p. 24  Coat hangers,  DENS Stage 1, p. 28  **Learning objects** Penguin count Number grid Washing line | Sample Units of Work,  pp. 13-15  DENS Stage 1,  pp. 22-31  Musical cushions,  DENS Stage 1, p. 31  Physical activities,  DENS Stage 1, p. 30  **Learning objects**  Penguin count Number grid Washing line | Sample Units of Work, pp. 13-15  DENS Stage 1,  pp. 78-81  Zap, DENS Stage 1,  pp. 78-79  **Learning objects**  Penguin count Number grid Washing line  **SMART notebook** Forward number word sequences | Sample Units of Work, pp. 13-15  DENS Stage 1,  pp. 78-81  Maths tipping,  DENS Stage 1,  pp. 80-81  **Learning objects**  Penguin count Number grid Washing line  **SMART notebook** Number before, number after | DENS Stage 1,  pp. 148-157  Bucket count on, DENS Stage 1, pp.156-157  Collections,  DENS Stage1, pp.148-149  **Learning objects**  Penguin count Number grid Hundred chart windows | DENS Stage 1,  pp. 220-231  Celebrity head, DENS Stage 1,  pp. 220-221  Guess my number, DENS Stage 1,  pp. 222-223  **Learning object**  Number grid |

How to find out where they are up to on 1B BNWS?

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| Emergent – 0  MAe-4NA  Cannot count backward from 10 to 1. | Initial (10) – 1  MAe-4NA  Counts backward from 10 to 1.Cannot say the number word just before a given number word in the range 1-10. Dropping back to 1 does not appear at this level. | Intermediate(10) - 2  MAe-4NA  Counts backward from 10 to 1.Says the number word just before a given number word, but drops back to ‘one’ when doing so. | Facile (10) – 3  MAe-4NA  Counts backward from 10 to 1.Says the number word just before a given number word in the range 1-10 without dropping back. | Facile (30) – 4  MAe-4NA  Counts backward from 30 to 1.Says the number word just before a given number word in the range 1-30 without dropping back. | Facile (100) –5  MA1-4NA  Counts backward from 100 to 1.Says the number word just before a given number word in the range 1-100 without dropping back. |

**SENA 1 Backward number word sequences**

*Count backwards from … I’ll tell you when to stop.*

**10...............1**

*What number comes before…?*

**5 ?**  **9 ?**

*Count backwards from … I’ll tell you when to stop.*

**23...............16**

*What number comes before…?*

**16 ? 13 ?**  **20 ?**

*Count backwards from … I’ll tell you when to stop.*

**103...............98**

*What number comes before…?*

**47 ?** **70 ?** **31 ?**

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| **Aspect 1B Numeral identification** | | | | | | |
| **Where are they now?** | **Emergent – Level 0**  MAe-4NA  May identify some, but not all numerals in the range 1 to 10 | **1-10 – Level 1**  MAe-4NA  Identifies all numerals in range from 1 to 10. | **1-20 – Level 2**  MAe-4NA MA1-4NA    Identifies all numerals in the range from 1 to 20. | **1-100 – Level 3**  MA1-4NA  Identifies numerals in the range from 1 to 100. | **1 -1 000 – Level 4**  MA1-4NA  Identifies numerals in the range from 1 to 1000. | **1 – 10 000 Level 5**  MA1-4NA Identifies numerals in the range from 1 to 10000. |
| **Student**  **names** |  |  |  |  |  |  |
| **Where to next?** | Can identify all numerals 1-10. | Can identify all numerals 1-20. | Can identify numerals 1-100. | Identifies one-, two- and three- digit numerals. | Identifies numerals in the range from 1 to 10000. | Identifies any size numeral. |
| **Teaching resources and activities** | Sample Units of Work, pp. 13-15  DENS Stage 1, pp. 32-72  Hang it on the line, Guess the number, DENS Stage 1, p. 37  **Learning objects**  Penguin count Number grid Washing line | Sample Units of Work, pp. 13-15  DENS Stage 1, pp. 82-115  Teen Bingo, Before and after, DENS Stage1, pp. 86-87  **Learning objects**  Penguin count Number grid Washing line | Sample Units of Work, pp. 13-15  DENS Stage 1, pp. 116-133,  pp. 154-203  Hundred chart, DENS Stage1,  pp. 160-161  **Learning objects**  Penguin count Number grid Washing line | DENS Stage 1, pp. 154-203,  pp. 220-231  The price is right, DENS Stage1, pp. 222-223  **Learning objects**  Penguin count Number grid | DENS 1 |  |

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How to find out where they are up to on 1C Numeral Identification?

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| **Emergent – Level 0**  **MAe-4NA**  May identify some, but not all numerals in the range 1 to 10. | **1-10 – Level 1**  **MAe-4NA**  Identifies all numerals in range from 1 to 10. | **1-20 – Level 2**  **MAe-4NA, Ma1-4NA**  Identifies all numerals in the range from 1 to 20. | **1-100 – Level 3**  **MA1-4NA**  Identifies numerals in the range from 1 to 100. | **1 -1 000 – Level 4**  **MA1-4NA**  Identifies numerals in the range from 1 to 1000. | **1 – 10 000 Level 5**  **MA1-4NA**  Identifies numerals in the range from 1 to 10000. |

**SENA 1 Numeral Identification-**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 3 | 6 | 10 | 2 | 9 | 8 | 5 | 0 | 7 |
| 4 | 23 | 15 | 12 | 43 | 13 | 20 | 100 | 66 |

\*Note: Sometimes it is necessary to check on all teen numerals by adding extra numerals.

**SENA 1 Numeral Identification-**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 90 | 59 | 101 | 400 | 263 |
| 607 | 310 | 1 000 | 4237 | 3 060 |

\*Note: You may want to add or change the numerals slightly on each revisit if you think it is necessary.

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| **Aspect 1D - Counting by 10’s and 100’s** | | | |
| **Where are they now?** | **Level 1**  Counts forward and backwards by 10s to 100,  Counts forwards and backwards by 100s to 1000  **MA1-4NA** | **Level 2**  Counts forwards and backwards by 10’s and 5’s, off the decade to 100,  Eg 2, 12, 22 …92  **MA1-4NA** | **Level 3**  Counts forwards and backwards by 10s, off the decade in the range 1- 1000, e.g. 367, 377, 387  Counts forwards and backwards by 100s, off the 100, and on or off the decade to 1000, eg. 24,124,224, 924.  **MA1-4NA** |
| **Student names** |  |  |  |
| **Where to next?** | Counts forwards and backwards by 10’s and 5’s, off the decade to 100 | Counts forwards and backwards by 100s, off the 100, and on or off the decade to 1000 |  |
| **Teaching resources and activities** |  |  |  |

How to find out where they are up to on 1D counting by tens and hundreds?

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| **Level 1**  Counts forward and backwards by 10s to 100,  Counts forwards and backwards by 100s to 1000  **MA1-4NA** | **Level 2**  Counts forwards and backwards by 10’s and 5’s, off the decade to 100,  Eg 2, 12, 22 …92  **MA1-4NA** | **Level 3**  Counts forwards and backwards by 10s, off the decade in the range 1- 1000, e.g. 367, 377, 387  Counts forwards and backwards by 100s, off the 100, and on or off the decade to 1000, eg. 24,124,224, 924  **MA1-4NA** |

\*Note: This aspect is currently not included on the Class Analysis Sheet for Early Stage One BS Software BUT this does not mean there are not students in ES1 who could not do this aspect. Some of these questions were taken from the SENA 2.

**Counting by 10s and 100s**

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| **Level 1**  Can you start from 10 and count forwards by 10s and I’ll tell you when to stop? Stop at 100.  Can you start from 100 and count backwards 10s? Stop at zero.  Can you start from 100 and count forwards by 100s and I’ll tell you when to stop? Stop at 1 000.  Can you start at 1 000 and count backwards by 100s and I’ll tell you when to stop? Stop at zero. | **Level 2**  Can you start from 2 and count forwards by 10s and I’ll tell you when to stop? Stop at 92.  Can you start from 86 and count backwards by 10s and I’ll tell you when to stop? Stop at 6.  Can you start from 5 and count forwards by 5s and I’ll tell you when to stop? Stop at 100.  Can you start from 95 and count backwards by 5s and I’ll tell you when to stop? Stop at 5. | **Level 3**  Can you start from 357 and count forwards by 10s each time and I’ll tell you when to stop? Stop at 397  Can you start from 286 and count backwards by 10s each time and I’ll tell you when to stop? Stop at 246  Can you start from 24 and count forwards by 100 each time and I’ll tell you when to stop? Stop at 924  Can you start from 932 and count backwards by 100 each time and I’ll tell you when to stop? Stop at 532 |

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| **Aspect 2 - Counting as a problem solving process - Early Arithmetic Strategies (EAS)** | | | | | |
| **Where are they now?** | **Emergent – 0**  **MAe-4NA**  Cannot count visible items. Does not know the number words or cannot co-ordinate the number words to count items. | **Perceptual - 1**  **MAe-5NA**  Counts visible items and builds and subtracts numbers by using materials or fingers to represent each number to find the total count. | **Figurative - 2**  **MA1-4NA MA1-5NA**  Counts concealed items and visualises the items that cannot be seen but always starts counting from ‘one’ to determine the total. May use fingers. | **Counting-on-and-Back- 3**  **MA1-4NA**  **MA1-5NA**  Counts on or back to solve problems. A number takes the place of a completed count. | **Facile - 4**  **MA1-4NA**  **MA1-5NA**  **MA2-5NA**  Uses known facts and non-count-by-one strategies to solve problems. |
| **Student names** |  |  |  |  |  |
| **Where to next?** | Counts visible items and builds and subtracts numbers by using materials to represent each number to find the total count. | Counts concealed items and visualises the items that cannot be seen.  Counts from one. | Counts on or back to solve problems.  A number takes the place of a completed count. | Uses known facts and other non-count-by-one strategies (e.g. compensation) to solve problems. | Uses known facts and other non-count-by-one strategies (e.g. doubles, partitioning) to solve problems. |
| **Teaching resources and activities** | Sample Units of Work, pp. 16-19  DENS Stage 1, pp. 17-72  Posting blocks, DENS Stage 1, pp. 32-33  Take a numeral, DENS Stage 1, pp. 32-33 BLM p. 57  Mothers and babies, DENS Stage 1, p. 34 BLM pp. 62-63  Beehive, DENS Stage 1,  p. 34 BLM pp. 64-65  **Learning object**  Penguin count | Sample Units of Work , pp. 16-19, pp. 42-46  DENS Stage 1, pp. 113-121  Rabbits ears, DENS Stage 1, pp.104-107  Ten frames, DENS Stage 1, pp.112-113 BLM p. 55  Blocks on a bowl, DENS Stage 1, pp.158-159  **Learning objects**  Egg carton Penguin count Penguin pins  **SMART notebooks** Blocks on a bowl Ten frames Dominoes | Sample Units of Work, pp. 16-19, pp. 42-46  DENS Stage 1, pp. 161-187  Add two dice, DENS Stage 1, pp.162-165  Posting counters,  DENS Stage 1, pp.170-171  Friends of ten, DENS Stage 1, pp.174-175  Race to the pool, DENS Stage 1, pp. 250-251  **Learning objects**  Penguin count Penguin pins  **SMART notebooks** Add two dice Bucket Count On  How many eggs | Sample Units of Work,  pp. 42-46  DENS Stage 1, pp. 232-267  Race to the pool,  DENS Stage 1, pp. 250-251  Doubles bingo,  DENS Stage 1, pp. 262-263  Orange tree,  DENS Stage 1, pp. 266-267 BLM pp. 286-287  **Learning objects**  Penguin count Penguin pins  **SMART notebook** Addition wheel | Sample Units of Work,  pp. 42-46, 87-90  DENS Stage 2, pp. 20-39  Spin, double and flip, DENS Stage 2, pp. 24-25  Addition star,  DENS Stage 2, pp. 26-27 BLM p. 137  Singles or doubles,  DENS Stage 2, pp. 32-33  Hands up, DENS Stage 2, pp. 66-67  **Learning objects**  Penguin count Addition wheel  **Web link** Virtual dice |

How to find out where they are up to on Aspect 2: Counting as a problem solving process? – Early Arithmetical Strategies or EAS

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| **Emergent - 0**  **MAe-4NA**  Cannot count visible items. Does not know the number words or cannot co-ordinate the number words to count items. | **Perceptual - 1**  **MAe-5NA**  Counts visible items and builds and subtracts numbers by using materials or fingers to represent each number to find the total count. | **Figurative - 2**  **MA1-4NA**  **MA1-5NA**  Counts concealed items and visualises the items that cannot be seen but always starts counting from ‘one’ to determine the total. May use fingers. | **Counting-on-and-Back- 3**  **MA1-4NA**  **MA1-5NA**  Counts on or back to solve problems. A number takes the place of a completed count. | **Facile - 4**  **MA1-4NA**  **MA1-5NA**  **MA2-5 NA**  Uses known facts and non-count-by-one strategies to solve problems. |

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| *Perceptual*  Put out 5 blue counters. *How many blue counters are there*?  Put out a pile of red counters. *Get me 8 red counters*.  Put out 8 red counters and 5 blue counters in two groups.  *How many counters altogether*?  \* Place the group of five blue counters in a random group (i.e. not in line or in the dice pattern of five).  • Don’t count the counters when placing them on the work space.  \*These questions have taken from the SENA 1, SENA 2 and TENS assessment. | *Figurative*   1. **4 + 3** *Here are four counters*. (Briefly display, then screen.)   *Here are three more counters*. (Briefly display, then screen.)  *How many counters are there altogether*?   1. *I have seven apples and I get another two apples.*   *How many apples do I have altogether?*   1. **9 + 4** *Here are nine counters*. (Briefly display, then screen.)   *Here are four counters*. (Briefly display and then screen.)  *How many counters are there altogether*?  *4. I have 7 bananas and I eat 2. How many bananas do I have left*?  *\** You are seeking to determine the student’s counting stage and **will need to ask**, “How did you work that out?” if you cannot see what the student did to achieve the answer. \* The child is figurative if he or she solves hidden task by counting from one. |
| *Counting- On-and-Back*  **12 remove 3** *I have 12 counters*. (Briefly display, then screen.)  *I’m taking away 3 counters*. (Remove 3.) *How many are left*?  \*Can the student count back to find the answer?  **11 remove… = 7** *I have 11 counters*. (Briefly display, then screen.)  *I’m taking away some counters and there are 7 left*. (Remove 4 counters.) *How many did I take away*? \*Can the student count on to find the difference?  You are looking for: -Counts on rather than counting from one to solve addition or missing addends tasks. -Uses a count-down-from strategy, e.g. 12-3 as 12, 11, 10 and the answer is 9, or a count on strategy, e.g. 11-?=7 as 8,9,10,11 and the answer is 4. | *Facile*  *I had 8 cards and was given another 7. How many do I have now?(near double)*  *I have 17 grapes. I ate some and now have 11 left. How many did I eat?(compensation)*  Display this card: **43 + 21** *What is the answer to this*?  Display this card: **37 + 19** *What is the answer to this*?  Display this card: **50 – 27** *What is 50 minus 27*? *Can you tell me how you worked it out*?  \*Identify if the student used a split, compensation or jump method to solve the tasks. Or other non-count by one strategies. |

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| **Aspect 3 Pattern and Number Structure** | | | | | | |
| **Where are they now?** | **Emergent - 0**  **MAe-4NA**  Cannot subitise | **Instant - 1**  **MAe-4NA**  Subitises small numbers | **Repeated -2**  **MAe-8NA**  Recognises, describes and continues a repeated pattern. | **Multiple -3**  **MAe-8NA**  Creates the pattern of repeated units of a specified size | **Multiple - 4**  **MAe-5NA MA1-NA**  Uses part–whole knowledge to ten. Knows number combinations to ten and  how many more are needed to make ten. | **Multiple – 5**  **MA1-5NA**  Knows or easily derives number combinations to 20. E.g. 7+8 ,might be instantly recalled or treated as one more or less than a double. Knows or easily derives number combinations to 20.  Partitions numbers to 20 in both standard and non–standard form. |
| **Student names** |  |  |  |  |  |  |
| **Where to next?** | Subitises two. | Recognises, describes and continues a repeated pattern of two. | Creates the pattern of repeated units of a specified size. | Can create a pattern of repeated units and supply the missing elements of a pattern | Knows or easily derives number combinations to 20. |  |
| **Teaching resources and activities** | Sample Units of Work,  P&A pp. 23-26, M&D pp. 20-22  DENS Stage 1, pp. 4749  Talking about Patterns and Algebra, pp. 11-32  Talking about P&A, p.15  DENS Stage 1  **Learning objects** Monster choir: making patterns, missing monsters Penguin count | Sample Units of Work,  P&A pp. 23-26, M&D pp. 20-22  DENS Stage 1, pp. 122-129  Talking about Patterns and Algebra, pp. 11-32  Patterns with objects, shapes and pictures, Talking about P&A, p. 19  DENS Stage 1, pp.122-123  DENS Stage 1, pp.122-123  DENS Stage 1, pp.122  **Learning objects**  Monster choir: making patterns Monster choir: missing monsters Penguin count | Sample Units of Work,  P&A pp. 23-26, M&D pp. 20-22  DENS Stage 1, pp. 122-129  Talking about Patterns and Algebra, pp. 11-32  Drawing patterns, Talking about P&A, p. 21  Rhythmic counting, DENS Stage 1, pp.124-125  Body percussion, DENS Stage 1, pp.124-125  **Learning objects**  Number grid Monster choir: making patterns Monster choir: missing monsters Penguin count  **SMART notebook** Rhythmic counting | Sample Units of Work,  P&A pp. 60-65, M&D pp. 47-51  DENS Stage 1, pp.192-195  pp. 268-273  Talking about Patterns and Algebra, pp. 33-55  Generating number sequences, Talking about P&A, p. 38  Teddy tummies, DENS Stage 1, pp.268-269, BLM p. 289  Triangle teddies, DENS Stage 1, pp.192-193  **Learning objects**  Number grid Monster choir: look and listen Penguin count  **SMART notebook** Creating patterns | Syllabus sample work  Frogs jump pg 61  Counting Monsters p 62  Spot the mistake p64  Talking about Patterns and Algebra p35-65  Race to 10, 20 and 30  Friends to 100 | Race to 10, 20 and 30  Friends to 100 |

How to find out where they are up to on Aspect 3: Pattern and number structure?

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| **Emergent - 0**  **MAe-4NA**  Cannot subitise | **Instant - 1**  **MAe-4NA**  Subitises small numbers | **Repeated -2**  **MAe-8NA**  Recognises, describes and continues a repeated pattern. | **Multiple -3**  **MAe-8NA**  Creates the pattern of repeated units of a specified size | **Multiple - 4**  **MAe-5NA MA1-5NA**  Uses part–whole knowledge to ten. Knows number combinations to ten and how many more are needed to make ten. | **Multiple – 5**  **MA1-5NA**  Knows or easily derives number combinations to 20. E.g. 7+8 , might be instantly recalled or treated as one more or less than a double.  Knows or easily derives number combinations to 20.  Partitions numbers to 20 in both standard and non–standard form. |

|  |  |  |
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| **Instant- 1**  Subitising- Flash the dot cards from SENA 1. In this order- 4 6 5 3  *How many dots are there?* | **Repeated- 2**  Can you make a pattern with these blocks? Describe your pattern. What would come next? | **Multiple- 3**  Can you make a 2 part pattern with these blocks?  Can you make a 3 part pattern with these blocks? |
| **Multiple- 4**  *Can you tell me two numbers that add up to 10*?  *Tell me two other numbers that add up to 10.*  *Can you tell me another two that add up to 10*?  If I have 4 counters and I want 10, how many more will I need?  If I have 3 counters and I want 10, how many more will I need? | **Multiple- 5**  *Can you tell the answer to 7 + 8? How did you work that out?*  *Can you tell me two numbers that add up to 20*?  *Tell me two other numbers that add up to 20.*  *Can you tell me another two that add up to 20*?  See if the student can produce both standard (10 + 10) and non-standard  (e.g. 11 + 9) partitioning of 20. |  |

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| **Aspect 4: Place Value** | | | | | | |
| **Where are they now?** | **PV level 0**  **MA1-4NA MA1-5NS**  Counts on but uses single units of one or 10 in counting strategies. Knows the sequence of multiples often, 10,20,30,… as sequenced count.  Treats ten as something constructed of ten 1’s but ten 1’s and one 10 do not exist for the student at the same time | **PV level 1**  **MA1-4NA MA1-5NA**  Uses non-count-by-one strategies. Counts by tens and ones on and off the decade.  Adds or subtracts two, two-digit numbers with one number represented by material. | **PV level 2**  **MA2-4NA MA2-5NA**  Selects from a range of mental strategies, including the *jump* and *split* methods, to add or subtract two, two-digit numbers. | **PV Level 3**  **MA2-4NA MA2-5NA** Selects from a range of mental strategies, including the *jump* and *split* methods, to add or subtract two, three-digit numbers. | **PV Level 4**  **MA3-7NA**  Uses tenths and hundredths to represent fractional parts with an understanding of the positional value of decimals. For example 0.8 is larger than 0.75 because of the positional value of the digits. | **PV Level 5**  **MA3-5NA MA3-6NA**  **MA3-7NA**  Recognises that the place value system can be extended indefinitely in two directions- to the left and right of the decimal point. Recognises the relationship between values of adjacent places (units) in a numeral |
| **Students** |  |  |  |  |  |  |
| **Where to next?** | **MA1-4NA MA1-5NS**  Uses non-count-by-one strategies. Counts by tens and ones on and off the decade.  Adds or subtracts two, two-digit numbers with one number represented by material. | **MA1-4NA MA1-5NA**  Selects from a range of mental strategies, including the *jump* and *split* methods, to add or subtract two, two-digit numbers. | **MA2-4NA MA2-5NA**  Selects from a range of mental strategies, including the *jump* and *split* methods, to add or subtract two, three-digit numbers. | **MA2-4NA MA2-5NA** Uses tenths and hundredths to represent fractional parts with an understanding of the positional value of decimals. For example 0.8 is larger than 0.75 because of the positional value of the digits. | **MA3-7NA**  Recognises that the place value system can be extended indefinitely in two directions- to the left and right of the decimal point. Recognises the relationship between values of adjacent places (units) in a numeral. | **MA3-5NA MA3-6NA**  **MA3-7NA** |
| **Teaching resources and activities** | **Sample units of work**  Race to and from 100 p.46  **DENS Stage 2**  Building numbers with ten frames pp.74–75  Cover-up strips pp.84–85  Tracks pp.86–87  Hundred chart challenge  pp.190–191  **CMIT Learning objects**  4 turns to 100  Hundred chart | **Sample units of work**  Mental strategies p.88  Linking 3 p.88  Estimating differences p.88  **DENS Stage 2**  Addition challenge pp.192–193  I have, I want, I need pp.186–187 | **Sample units of work**  Take-away reversals p.89  Number cards p.89  **DENS Stage 2**  Race to 1000 pp.284–285  How many more? pp.286–287  Highway racer pp.290–291 | **Counting On Activities booklet**  Decimal Number Line  Make 1 or 10  Many activities in the booklnet have variations on the activities below. | Mathematics K–6 syllabus,  pp. 62, 63  Mathematics K–6 sample units of work  pp. 98–101  Fractions: pikelets and lamingtons  A long line of Blocks |  |

How to find out where they are up to on Aspect 4: Place Value?

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| **PV level 0**  **MA1-4NA MA1-5NS**  Counts on but uses single units of one or 10 in counting strategies. Knows the sequence of multiples of ten, 10,20,30,… as sequenced count.  Treats ten as something constructed of *ten 1’s,*  but one *ten* and ten *ones* do not exist for the student at the same time. | **PV level 1**  **MA1-4NA MA1-5NA**  Counts by tens and ones from the middle of the decade to find the total or difference of two 2-digit numbers where one of the numbers is represented by materials.  Treats ten as a single unit while still recogising that it contains ten *ones* (abstract composite unit).    Adds or subtracts two, two-digit numbers with one number represented by material. | **PV level 2**  **MA2-4NA MA2-5NA**  2a: *Jump Method*  Treats ten as a unit that can be repeatedly constructed in place of ten individual counts. Tens and ones are flexibly regrouped. Counts forwards and backwards firstly by tens and then by ones.  *2b: Split Method*  Treats ten as a unit as an abstract composite unit. Solves addition and subtraction problems mentally by separating the tens from the ones, then adding or subtracting each separately before combining. Uses non-standard decomposition of two-digit numbers. E.g. 76= 60+16. | **PV Level 3**  **MA2-4NA MA2-5NA**  3a: *Jump Method*  Uses hundreds, tens and ones in standard decomposition, e.g. 326 as three groups of 100, two groups of 10 & six 1s. Increments by hundreds and tens to add mentally. Determines the number of tens in 621 without counting by ten.  3b: *Split Method*  Adds and subtracts mentally combinations of numbers to 1 000. Uses the positional value of numbers to flexibly in regrouping without a need to rely on incrementing by tens or hundreds. Uses a part-whole knowledge of numbers to 1 000. | **PV Level 4**  **MA3-7NA**  Uses tenths and hundredths to represent fractional parts with an understanding of the positional value of decimals. For example 0.8 is larger than 0.75 because of the positional value of the digits.  Interchanges tenths and hundredths, e.g. 0.75 may be thought of as seven tenths and five hundredths. | **PV Level 5**  **MA3-5NA MA3-6NA**  Recognises that the place value system can be extended indefinitely in two directions- to the left and right of the decimal point.  Recognises the relationship between values of adjacent places (units) in a numeral |

Students need to be at least at the Counting-on-and-back stage to be placed on the Place Value aspect.

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| **PV level 0 MA1-4NA MA1-5NS**  See EAS Counts-on-and-back.   1. See Counting by 10s and 100s, Aspect 1D Level 1     Uncover the first 4 dots. *How many dots are there*?  Slide the covers to the right so that the first 4 dots and the next 10 dots are visible.  *Each time you see one of these long strips, you know it has 10 dots*. *How many dots are there altogether*?  Stop if the student counts on by ones. (The student would be determined to be at level 0). | • **PV level 1 MA1-4NA MA1-5NA**    Cover the card with two cardboard sheets.  Slide the cover across so that the next 20 dots are also visible.  *How many dots are there altogether*?  Slide one cover to the left to cover these 34 dots. Slide the second cover to the right to reveal the next 14 dots.  *How many dots are there altogether now*?  Slide the second cover to the left to reveal the last 25 dots.  *How many dots are there altogether now*?  Students are determined to be at Level 1 (Ten as a unit) if they successfully manipulate tens and ones in this task.  • Ask the student to explain the strategy used.  • Success with these tasks may indicate Level 2 (Tens & ones).  • Identify if the student used a split or jump method to solve the tasks. | **PV level 2 MA2-4NA MA2-5NA**  Cover all dots.  *How many more dots would I need to make 100*?  If students successfully answer the final question above, they would be at Level 2 because all the dots are covered.  SEE EAS Facile  Display this card: **43 + 21** *What is the answer to this*?  Display this card: **37 + 19** *What is the answer to this*?  Display this card: **50 – 27** *What is 50 minus 27*?  *Can you tell me how you worked it out*?  Ask the student to explain the strategy used.  • Identify if the student used a split or jump method to solve the tasks. |
| **PV Level 3**  **MA2-4NA MA2-5NA**  3a: *Jump Method*  Uses hundreds, tens and ones in standard decomposition, e.g. 326 as three groups of 100, two groups of 10 & six 1s.  Increments by hundreds and tens to add mentally.  Determines the number of tens in 621 without counting by ten.  3b: *Split Method*  Adds and subtracts mentally combinations of numbers to 1 000.  Uses the positional value of numbers to flexibly in regrouping without a need to rely on incrementing by tens or hundreds.  Uses a part-whole knowledge of numbers to 1 000. Display this card: **121+117***What is the answer to this*?  Display this card: **437+348** *What is the answer to this*?  Display this card: **332-116** *What is 332 minus 116*?  *Can you tell me how you worked it out*?  Ask the student to explain the strategy used.  • Identify if the student used a split or jump method to solve the tasks mentally. | **PV Level 4**  **MA3-7NA**  Uses tenths and hundredths to represent fractional parts with an understanding of the positional value of decimals. For example 0.8 is larger than 0.75 because of the positional value of the digits.  Interchanges tenths and hundredths, e.g. 0.75 may be thought of as seven tenths and five hundredths. | **PV Level 5**  **MA3-5NA MA3-6NA**  Recognises that the place value system can be extended indefinitely in two directions- to the left and right of the decimal point.  Recognises the relationship between values of adjacent places (units) in a numeral |

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| **Aspect 5: Developing Multiplication and division concepts** | | | | | |
| **Where are they now?** | **Level 1: Forming equal groups**  **MAe-6NA MAe-8NA**  Uses perceptual counting and sharing to form equal groups | **Level 2: Perceptual multiples**  **MA1-6NA MA1-8NA**  Uses groups or multiples in perceptual counting (skip, rhythmic) Cannot deal with concealed items | **Level 3: Figurative units**  **MA1-6NA MA1-8NA**  **MA2-6NA MA2-8NA**  Uses equal grouping without individual items visible, relies on perceptual markers to represent each group | **Level 4: Repeated abstract composite units**  **MA1-6NA MA1-8NA**  **MA2-6NA MA2-8NA**  Use repeated addition & subtraction a specified number of times. Count in multiples. | **Level 5: Multiplication & division as operations**  **MA2-6NA , MA2-8NA**  Recall a wide range of M&D facts. Use M&D as inverse operations flexibly in problem solving |
| **Students** | **Level 0- Learning to make equal groups**  **Level 1- Forming = groups** |  |  |  |  |
| **Where to next?** | **MAe-6NA MAe-8NA**  Use items to form or share equal groups. Find the total of the groups through rhythmic, skip or double counting when the items are visible. | **MA1-6NA MA1-8NA**  Use perceptual markers to represent each group, prior to counting. Counts forwards or backwards using multiples (or a combination of multiples and rhythmic counting). | **MA1-6NA MA1-8NA**  **MA2-6NA MA2-8NA**  Use repeated addition & subtraction a specified number of times. Count in multiples. May use fingers to keep track of the number of groups. | **MA1-6NA MA1-8NA MA2-6NA MA2-8NA**  Recall a wide range of M&D facts. Use M&D as inverse operations flexibly in problem solving. Explain the unit structure in a range of contexts (eg area multiplication tasks).  Solve remainder problems. | **MA2-6NA , MA2-8NA** Multiply 3-digit numbers by a 1-digit number mentally. Divide 3-digit numbers by a 1-digit number mentally. Use mental strategies to multiply or divide a number by 100 or a multiple of 10. Explore prime and composite numbers. |
| **Teaching resources and activities** | **Sample units of work**  p.25 Staircases  pp.47 –49, p.61  p.50 Popsticks in cups  p.51 Leftovers  **DENS Stage 1**  pp.124–133, pp.188–203,  pp.269–277  **DENS Stage 2**  pp.94–107 | **Sample units of work**  p.50 Handful of money, Hidden groups  p.92 Part A  **DENS Stage 1**  pp.122–123 Mail sort  **DENS Stage 2**  pp.204–205, pp.208–209,  **CMIT Learning object**  Arrays | **Sample units of work**  p.92 Table races  **DENS Stage 2**  pp.198–203, pp.206–207 | **Sample units of work**  p.91Part B, Multiplication grid  pp.93–97  **DENS Stage 2**  pp.252–283  **CMIT Learning object**  Remainders count | **Sample units of work**  pp.122–125 |

How to find out where they are up to on Aspect 5: Multiplication and division?

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| **Level 0: Learning to make equal groups** | **Level 1: Forming equal groups**  **MA1-6NA MA1-8NA**  Uses perceptual counting and sharing to form equal groups | **Level 2: Perceptual multiples**  **MA1-6NA MA1-8NA**  Uses groups or multiples in perceptual counting (skip, rhythmic) Cannot deal with concealed items |
| **Level 3: Figurative units MA1-6NA MA1-8NA**  **MA2-6NA MA2-8NA**  Uses equal grouping without individual items visible, relies on perceptual markers to represent each group | **Level 4: Repeated abstract composite units MA1-6NA MA1-8NA MA2-6NA MA2-8NA**  Use repeated addition & subtraction a specified number of times. Count in multiples. | **Level 5: Multiplication & division as operations MA2-6NA , MA2-8NA** Recall a wide range of M&D facts. Use M&D as inverse operations flexibly in problem solving |

These assessment questions were taken from the SENA 1 and 2 and TENS

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| **Level 0: Learning to make equal groups** | **Level 1: Perceptual counting to form equal groups.**  Present a pile of counters, more than 12, to the student. (Randomly spaced, not in a line. Do not count them out.) *Using these counters, make three groups with four in each group.*  If the student cannot do this they are level 0.  Note how the student forms the groups. Does he or she drag the counters one at a time or many at a time to form a group?  **Perceptual Sharing** Present a pile of 8 counters. *I have 8 counters to be shared with 4 children. How many counters will each child get?* | **Level 2: Perceptual multiples**  *How many counters are there altogether*?  This important question is intended to show the counting strategy which the student uses to find the total(individual items present). A more advanced strategy would be to  Uses skip counting or repeated addition. |
| **Level 3: Figurative units & Level 4: Repeated abstract composite units**  Without the student seeing, put down one A4 card with six cardboard circles on it, each with 3 dots face down and cover them with another A4 card that has the same size 6 circles face down and then cover with dark coloured A4 card face down.  *I have 6 circles each with 3 dots under this cover. How many dots altogether?*  Remove the top cover if the student is unsuccessful to show the circles only. If necessary, remove the circles to show the card with both circles and dots.  1.Now does this help... if not ... 2. Now can you tell me how many there is altogether?  If the student is able to recreate the groups and keep track of the count, he or she is typically demonstrating Level 4.  • Note the strategy used. Does the student multiply, use repeated addition, use a double count or need to recreate the individual units using finger strategies?  If the student is unsuccessful with the circles screened, remove the screen to make the markers for the units visible. This reduces the question to Level 3.  If necessary, reduce to a lower level by turning the circles over for a Level 2 or Level 1 response.  *There are twelve biscuits and the children are given two biscuits each. How many children are there*?  This task is designed to indicate:  • Level 4 strategy (solving a quotitive division where the number of groups are not apparent)  • a more advanced strategy (6 x 2 or 12 2). | | **Level 5: Multiplication & division as operations** |

To use most of these assessment ideas you will need to use the SENA 1 & SENA 2.

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| **Aspect 6: Fraction Units** | | | | | |
| **Where are they now?** | **Level 0: Emergent partitioning/**  Attempts to halve by splitting without attention to equality of the parts Level 0- Learning to make halves | **Level 1:Halving**  **MAe-7NA**  **MA1-7NA**  Forms halves and quarters by repeating halving  Can use distributive dealing to share | **Level 2: Equal Partitions**  **MA2-7NA**  Verifies continuous and discrete linear arrangements have been partitioned into thirds or fifths by iterating one part to form the whole or checking the equality and number of parts forming the whole. | **Level 3: Reforms the whole**  **MA3-7NA**  When iterating a fraction part such as one-third beyond the whole, re-forms the whole | **Level 4: Multiplicative partitioning**  **MA4-5NA**  Coordinates composition of partitioning (i.e. can find one-third of one-half to create one-sixth). Creates equivalent fractions using equivalent equal wholes. Coordinates units at three levels to move between equivalent fraction forms.  **Level 5:**  **Fractions as numbers**  **MA4-5NA**  Identifies the need to have equal wholes to compare fractional parts. Uses fractions as numbers,  i.e 1/3>1/4 including improper fractions | |
| **Students** |  |  |  |  |  |
| **Where to next?** | Forms equal halves and quarters | Verifies continuous and discrete linear arrangements have been partitioned into thirds or fifths by iterating one part to form the whole or checking the equality and number of parts forming the whole. | When iterating a fraction part such as one-third beyond the whole, re-forms the whole | Coordinates composition of partitioning (i.e. can find one-third of one-half to create one-sixth). Creates equivalent fractions using equivalent equal wholes. Coordinates units at three levels to move between equivalent fraction forms. | Identifies the need to have equal wholes to compare fractional parts. Uses fractions as numbers,  i.e 1/3>1/4 including improper fractions |
| **Teaching resources and activities** | **Sample units of work**  **DENS Stage 1**  **DENS Stage 2**  Fractions, Pikelets and Lamingtons DEC support material  Smart Teaching ideas | **Sample units of work**  **DENS Stage 1**  **DENS Stage 2**  **CMIT Learning object**  Fractions, Pikelets and Lamingtons DEC support material  Smart Teaching ideas | **Sample units of work**  **DENS Stage 2**  Fractions, Pikelets and Lamingtons DEC support material  Smart Teaching ideas | **Sample units of work**  **DENS Stage 2**  **CMIT Learning object**  Fractions, Pikelets and Lamingtons DEC support material  Smart Teaching ideas |  |

How to find out where they are up to on Aspect 6: Fraction Units?

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| **Level 0:**  **: Emergent partitioning**  **Developing a quantative** Attempts to halve by splitting without attention to equality of the parts | **Level 1: Halving MAe-7NA MA1-7NA**  Forms halves and quarters by repeating halving  Can use distributive dealing to share | **Level 2: Equal Partitions MA2-7NA**  Verifies continuous and discrete linear arrangements have been partitioned into thirds or fifths by iterating one part to form the whole or checking the equality and number of parts forming the whole. |
| **Level 3:**   **Reforms the whole MA3-7NA**  When iterating a fraction part such as one-third beyond the whole, re-forms the whole | **Level 4: Multiplicative partitioning MA4-5NA**  Coordinates composition of partitioning (i.e. can find one-third of one-half to create one-sixth). Creates equivalent fractions using equivalent equal wholes. Coordinates units at three levels to move between equivalent fraction forms. | **Level 5: Fractions as numbers MA4-5NA**  Identifies the need to have equal wholes to compare fractional parts. Uses fractions as numbers,  i.e 1/3>1/4 including improper fractions |

Narrative: Lamington, pikelets or chocolate

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| *Using the strip of paper ask:*   * *Imagine this strip is lamington, can you show me by folding, how much of this lamington I would get if you gave me half?*   **Level 0 :** Emergent partitioning involves breaking things into parts and allocating the pieces. *No attention is given to the specific size of the pieces. At this level, when a student uses the term half it generally means a piece, which may or may not be one of two equal pieces.*  *Using the strip of paper ask:*   * *Imagine this strip is lamington, can you show me by folding, how much of this lamington I would get if you gave me half?* * *Fold this paper streamer to show me one quarter of the lamington.* * *Can you show me three-quarters of the lamington?*   **Level 1:** Halving to form two *equal* pieces is an early fractioning process. The term equal is emphasised here to draw attention to the need to be aware of the basis of determining equality. At Level 1, *finding half way is typically used to halve. That is, the basis of determining half of a rectangular piece of paper relies on length rather than area. In a similar way, repeated halving with respect to length can form quarters or eighths.* | **Level 2**: *Constructing thirds and fifths by partitioning a continuous quantity is difficult.* Although fifths are introduced in some syllabus documents before thirds, partitioning to create thirds is clearly easier than partitioning to create fifths. *The emphasis at Level 2 is not on the student being able to partition into fifths and thirds but rather being able to verify that particular partitions represent fifths and thirds. Students can be provided with strips of paper partitioned as follows and asked to determine the indicated partitions as fractions of the whole.*   * *Can you show me by folding, how much of this lamington I would get if you gave me one third?* * *Can you show me by folding, how much of the lamington I would get if you gave me one fifth?*   When iterating a fraction part such as one-third beyond the whole, the student re-forms the equal whole. Some students consistently regard an improper fraction produced via iteration of a unit fraction as a new whole (Tzur, 1999). That is, they think of 1/4 iterated five times as 5/5 and each part is considered as being transformed into 1/5. This belief could be attributed to students failing to reform the iterated four-fourths into the equivalent unit whole.  aspect 6_15 *Five-quarters recast as five-fifths*\  Even when successfully creating seven-fifths of a drawing of a lamington, pikelet or chocolate bar, some students view the resulting pieces as not being fifths but rather sevenths — “they turned into seven pieces instead of five pieces” (Hackenberg, 2007, p. 33). *This reorganisation of iterated fraction units, recognising when the whole has been formed, is necessary* to make the transition from an additive iteration of units to a multiplicative association between parts of an equal-whole.  Or you can do the following activity:  Using a triangle and pentagon template and ask the following:   1. *If an ant crawls along the outside of the triangle. If an ant starts in this corner (point to a corner) show me where it would be if it is one-half of the way around?* 2. *If an ant crawls along the outside of the triangle. If an ant starts in this corner (point to a corner) show me where it would be if it is one-third of the way around?*   *Use the same questions as above but using a pentagon for one-fifth.* ***If the student can do the above activity they are at level 2.*** | **Level 3:** *When iterating a fraction part such as one-third or one-fifth beyond the whole, the student re-forms the equal whole.* See example below. Some students consistently regard an improper fraction produced via iteration of a unit fraction as a new whole (Tzur, 1999). That is, they think of 1/4 iterated five times as 5/5 and each part is considered as being transformed into 1/5. This belief could be attributed to students failing to reform the iterated four-fourths into the equivalent unit whole.    *The lamington and chocolate bar example above demonstrates reforming the whole....sixth-fifths*  *Using strips or circular disc, paper ask students:*   * *If we wanted to share 3 pikelets/ lamington between 2 people, how could we do it?* * *What would we do if we had 5 pikelets/ lamingtons to share between 2 people? Can you draw your answer* * *How could you share 7 pikelets among 4 people? Can you draw your answer*   Even when successfully creating seven-fifths of a drawing of a lamington, pikelet or chocolate bar, these students view the resulting pieces as fifths not sevenths and create 1whole and 2/5— *This reorganisation of iterated fraction units, recognises when the whole has been formed,* this is necessary to make the transition from an additive iteration of units to a multiplicative association between **parts of an equal-whole.** |
| **Level 4:** The student can coordinate composition of partitioning. For example, given one-half and asked to create one-sixth of a whole, the student finds one-third of one-half. This requires coordinating units at three levels to move between equivalent fraction forms.  aspect 6_16  *Coordinating units at three levels with proper fractions*  Moving between equivalent fraction forms can also include improper fractions (Hackenberg, 2007). For example, conceiving of 4/3 as an improper fraction means conceiving of it as a unit of 4 units, any of which can be iterated 3 times to produce another unit (the whole), a three-levels-of-units structure. One level is 4/3 as a unit, another level is the whole and the final level of units is one-third. Dealing with equivalent proper fractions also requires operating across three levels of units.  Stage 4 | **Level 5:** At this level, the student identifies the need to have equal wholes to compare fractional parts. They can also use fractions as numbers (unit-less quantities), i.e. 1/3 > 1/4. For example, in determining the relative size of fractions such as 1/3 and 1/6, care is taken in representing the two fractions with equal wholes (unlike the following response).  aspect 6_19  Comparing the size of 1/3 and 1/6 without referencing equal wholes.  In this student’s response, no attempt has been made to use equal wholes when comparing 1/3 and 1/6. It is also clear that for this student the fraction notation does not link to regional models of fractions. At this level the student is aware of the need for the fixed unit whole to compare quantity fractions. Coordinating units linked with the idea of a universal equal whole, is also important in addressing the distinct problem of fractions having multiple representations of the one quantity (1/3 = 2/6 = 3/9) within the same representational system.  As Lamon (1999, p. 22) has suggested, the hardest part for some students is understanding that “what looks like the same amount might actually be represented by different numbers.” The notational equivalence of fractions is implicitly dependent on the existence of a universal one, a whole that is always the same size. |  |

Ideas taken from Fraction, Lamingtons and Pikelets.

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| **Aspect 7 Measurement** | | | | | | | | |
| **Where are they now?** | **Emergent structures**  **Level 0**  Attempts direct comparison without attending to alignment.  May attempt to measure indirectly without attending to gaps or overlaps. | **Direct alignment**  **Level 1**  **Mae-9MG, Mae-10MG, Mae-11MG**  Direct comparison of the size of two objects (alignment). | **Transitive comparison**  **Level 2**  **Mae-9MG, Ma1-10MG, Mae-11MG, MA1-11MG**  Direct comparison of the size of three or more objects (transitivity).  Indirect comparison by copying the size of one of the objects | **Multiple Units**  **Level 3**  **MA1-9MG, MA1-10MG, MA1-11MG**  Uses multiple units of the same size to measure an object (without gaps or overlaps).  Chooses and uses a selection of the same size and type of units to measure an object (without gaps and overlap) | **Indirect Comparison**  **Level 4**  **MA1-9MG, MA1-10MG, MA1-11MG**  States the qualitative relationship between the size and number of units (i.e. with bigger units you need less of them)  Chooses and uses a selection of the same size and type of units to measure by indirect comparison | **Iterates the Unit**  **Level 5**  **MA1-9MG, MA2-9MG**  Uses a single unit repeatedly (iterating) to measure or construct length. Can make a multi-unit ruler by iterating a single unit and quantifying accumulated distance.  Identifies the quantitative relationship between length and number of units ( i.e. If you halve the size of the units you will have twice as many units in the measure) | **Composite Area**  **Level 6**  **MA2-10MG**  Creates the row- column structure of the iterated composite unit of area.  Uses the row-column structure to find the number of units to measure area. | **Repeated layers**  **Level 7**  **MA2-11MG, MA3-11MG**  Creates the row-column- layer structure of the iterated layers when measuring volume.  Uses the row-column-layer structure to find the number of units to measure volume. |
| **Student**  **names** |  |  |  |  |  |  |  |  |
| **Where to next?** | Direct comparison of the size of two objects (alignment). | Direct comparison of the size of three or more objects (transitivity).  Indirect comparison by copying the size of one of the objects | Uses multiple units of the same size to measure an object (without gaps or overlaps).  Chooses and uses a selection of the same size and type of units to measure an object (without gaps and overlap) | States the qualitative relationship between the size and number of units (i.e. with bigger units you need less of them)  Chooses and uses a selection of the same size and type of units to measure by indirect comparison | Uses a single unit repeatedly (iterating) to measure or construct length. Can make a multi-unit ruler by iterating a single unit and quantifying accumulated distance.  Identifies the quantitative relationship between length and number of units ( i.e. If you halve the size of the units you will have twice as many units in the measure) | Creates the row- column structure of the iterated composite unit of area.  Uses the row-column structure to find the number of units to measure area. | Creates the row-column- layer structure of the iterated layers when measuring volume.  Uses the row-column-layer structure to find the number of units to measure volume. |  |
| **Teaching resources and activities** | **Sample units of work**  **DENS Stage 1**  **DENS Stage 2**  Teaching Measurement Stage Early Stage One and Stage One DEC support material  Smart Teaching ideas | **Sample units of work**  **DENS Stage 1**  **DENS Stage 2**  Teaching Measurement Stage Early Stage One and Stage One DEC support material  Smart Teaching ideas | **Sample units of work**  **DENS Stage 1**  **DENS Stage 2**  Teaching Measurement Stage Early Stage One and Stage One DEC support material  Smart Teaching ideas | **Sample units of work**  **DENS Stage 1**  **DENS Stage 2**  Teaching Measurement Stage Early Stage One and Stage One DEC support material  Smart Teaching ideas | **Sample units of work**  **DENS Stage 1**  **DENS Stage 2**  Teaching Measurement Stage One, Stage Two and Three DEC support material  Smart Teaching ideas | **Sample units of work**  **DENS Stage 1**  **DENS Stage 2**  Teaching Measurement Stage One, Stage Two and Three DEC support material  Smart Teaching ideas | **Sample units of work**  **DENS Stage 1**  **DENS Stage 2**  Teaching Measurement Stage One, Stage Two and Three DEC support material  Smart Teaching ideas |  |

How to find out where they are up to on Aspect 7: Measurement?

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| **Emergent structures**  **Level 0**  Attempts direct comparison without attending to alignment.  May attempt to measure indirectly without attending to gaps or overlaps. | **Direct alignment**  **Level 1**  **Mae-9MG, Mae-10MG, Mae-11MG**  Direct comparison of the size of two objects (alignment). | **Transitive comparison**  **Level 2**  **Mae-9MG, Ma1-10MG, Mae-11MG, MA1-11MG**  Direct comparison of the size of three or more objects (transitivity).  Indirect comparison by copying the size of one of the objects | **Multiple Units**  **Level 3**  **MA1-9MG, MA1-10MG, MA1-11MG**  Uses multiple units of the same size to measure an object (without gaps or overlaps).  Chooses and uses a selection of the same size and type of units to measure an object (without gaps and overlap) | **Indirect Comparison**  **Level 4**  **MA1-9MG, MA1-10MG, MA1-11MG**  States the qualitative relationship between the size and number of units (i.e. with bigger units you need less of them)  Chooses and uses a selection of the same size and type of units to measure by indirect comparison | **Iterates the Unit**  **Level 5**  **MA1-9MG, MA2-9MG**  Uses a single unit repeatedly (iterating) to measure or construct length. Can make a multi-unit ruler by iterating a single unit and quantifying accumulated distance.  Identifies the quantitative relationship between length and number of units ( i.e. If you halve the size of the units you will have twice as many units in the measure) | **Composite Area**  **Level 6**  **MA2-10MG**  Creates the row- column structure of the iterated composite unit of area.  Uses the row-column structure to find the number of units to measure area. | **Repeated layers**  **Level 7**  **MA2-11MG, MA3-11MG**  Creates the row-column- layer structure of the iterated layers when measuring volume.  Uses the row-column-layer structure to find the number of units to measure volume. |

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| **Level 1-**At this level it involves direct comparison,(2 objects) such as determining the longest string, requires aligning and juxtaposing the length of objects. The student can determine which of the two pencils is longer relies on establishing a common baseline or starting point to make the comparison. See example below. ***Level 1: Using two pencils make a comparison and establish a baseline.*** | **Level 2-** At this level it involves ordering the ***size of three or more objects*** relies on using the transitive property of measuring quantities. That is, the student can say the yellow striped pencil is longer than the red pencil, and the red pencil is longer than the stubby yellow pencil, then the yellow striped pencil is longer than the stubby yellow pencil. At Level 2 students can also make a copy of one object, say with their fingers, and use it to compare to another object.  Direct comparison and ordering of length (transitivity).  *Level 2: Using three pencils of different colours make direct comparison and order the lengths. Student discusses and compares lengths.* | **Level 3-** At this level it involves measuring using multiple units of the same size recreating the length, area or volume. Indirect comparison is achieved by copying the size of one of the objects and using the multi-unit representation as the means of comparison.  **Level 3:** Using a diagram similar to  the one provided students use ones blocks (or any other unit) to work out which line is longest. **Making sure there are no gaps or overlaps with the blocks.** |
| **Level 4-** At this level the student compares sizes by choosing and using a selection of the same size and type of units to measure and make indirect comparisons. Students are able to state the qualitative relationship between the size and number of units (i.e. with bigger units you need fewer of them). *Level 4: Using a variety of units such as rods, match sticks, blocks, pop sticks, centicubes and paper clips to measure the same line and its length. Students discuss what they notice.* | **Level 5-**At this level the student **m**easures length determining the number of unit lengths that fit end to end along an object, with no gaps or overlaps. With only one copy of the unit (paper clip or block) of length to be used, you need to be able to use a single unit repeatedly (iterating) to measure or construct length. Students need to gain an understanding of how a multi-unit ruler works by constructing one by iterating a single unit and quantifying the accumulated distance numerically. Students also need to appreciate the quantitative relationship between length and the number and size of units used to measure length (i.e. if you halve the size of the units you will have twice as many units in the measure).  ***Level 5:*** *Using a line and only one paper clip construct a ruler repeatedly using a paper clip making markings and numbers along the line, must have only one paper clip, no gaps and no overlap.* | **Level 6-**At level 6 the student is able to create the structure of a rectangular array. That is, the student is able to visualise a column and row structure and has moved beyond simple counting of squares along a one-dimensional path. The rows and columns are conceptualised as composite units.  ***Level 6:*** *Show the cardboard unit square and the 7x3 rectangle.*  *Ask: How many squares like this would you need to cover the rectangle completely?*  *Provide the student/ students with a copy of the grid and ask: Can you draw what the squares would look like?* |
| **Level 7-**At level 7 the student is able to create and use the structure of a repeated layer in determining the volume of a rectangular prism.  **Level 7:** *Use centimetre blocks to make a rectangular prism that starts with a base that has twelve blocks. Add two more layers before drawing your rectangular prism and recording the total number of blocks used. What would the volume be if you had a different number of layers?* | | |

Ideas taken from Teaching Measurement and SENA 2.