**MATHEMATICS STAGE 3**

**TEACHING AND LEARNING OVERVIEW**

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| TERM: | WEEK: **1** | STRAND:Number | **SUB-STRAND:**  **Whole Number** | **WORKING MATHEMATICALLY:**  **MA3-1WM MA3-2WM MA3**-**3WM**  MA3-4NA |
| OUTCOMES: ACMNA 124 | | Investigate everyday situations that use integers, locate and represent these numbers on a numberline. | | |
| **CONTENT:** | | * Use the term “integers” to describe positive and negative whole numbers and zero * Interpret integers in everyday contexts, eg temperature | | |
| ASSESSMENT FOR LEARNING (PRE-ASSESSMENT) | | Ask students to draw a numberline from -10 to 10 and mark on the given integers -8, -2, 4 | | |
| WARM UP / DRILL | | Counting forward from any number, to any number, by any number eg. Count by 3 from 125 to 155  Include counting backwards eg. From 38 to 2 by 3’s. | | |
| TENS ACTIVITYNEWMAN’S PROBLEMINVESTIGATION | | A man works on the 12th floor of a building and needs to get to his car on the 2nd level below ground. How many floors will he go down? Ans. 12 + 2 = 14 levels | | |
| 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 | | <http://www.dr-aart.nl/Arithmetic-negative-numbers-greater-than-and-less-than.html> Different colours on thermometers  <http://www.broadoak.n-somerset.sch.uk/gdaviesmaths/NegativeNumbers.html> Thermometers and other games  <http://www.mathmix.com/content/Subjects/Numbers/Negative_Numbers/What_are_negative_numbers> Sea level  <http://www.slideshare.net/bigpassy/integers-in-the-real-world> Reasonable slide show with many practical ideas | | |

**TEACHING AND LEARNING EXPERIENCES**

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| WHOLE CLASS INSTRUCTION MODELLED ACTIVITIES | GUIDED & INDEPENDENT ACTIVITIES | |
| Discuss situations in every day life where negative numbers occur. Temp – show thermometers of minus temperatures in snow conditions as well as temperatures above freezing.  Level in a building – floors above the ground and levels below ground.  Sea level – metres above and below sea level  Money – having money versus owing money  Golf – under and over parr  Speed – above and below speed limit  View Websites to aid discussions  Model the construction of numberlines. Demonstrate how to plot given points, using correct terminology. | LEARNING SEQUENCERemediationS2 | **Lesson 2:** Give more structured ideas eg. Instruct student to draw a building 12 floors tall with 2 levels of underground parking. Assist with labelling.  **Lesson 3:** Assist individuals as necessary. |
| LEARNING SEQUENCES3 | **Lesson 1:** Discuss with whole class, whilst viewing websites.  **Lesson 2:** Review ideas discussed in lesson 1. Draw own version of every day situation involving both positive and negative integers. Ensure correct terminology is used by students.  **Lesson 3:** Demonstrate concept of linear numberlines. Emphasise even increments or spaces between notches on numberline. Plot given points eg -2, 0, 2. Give numberlines to students and have them plot given points. Eg. Odd numbers between -7 and 7.  <http://dmmb.asia/math-worksheets-number-line> Ready made numberlines  **Investigation:** |
| LEARNING SEQUENCEExtensionS4 | **Lesson 3:** Extend concept of numberline to + and – 100. Plot given numbers. |
| **EVALUATION & REFLECTION** | Use pictures drawn in lesson 2 as an evaluation. Have the students understood the concept that the numbers become smaller, the further from 0 they are?  Observation of student participation in lesson 3 and number of correct answers when constructing own numberlines. Do the students require further support? Or practise? |

* 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 STAGE 3**

**TEACHING AND LEARNING OVERVIEW**

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| TERM: | WEEK:2 | STRAND: **Number** | **SUB-STRAND:**  **Whole Number** | **WORKING MATHEMATICALLY:**  **MA3-1WM MA3-2WM MA3**-**3WM** |
| OUTCOMES: ACMNA 124 | | Investigate everyday situations that use integers, locate and represent these numbers on a numberline. | | |
| **CONTENT:** | | Recognise the location of negative whole numbers in relation to zero and place them on a numberline. | | |
| ASSESSMENT FOR LEARNING (PRE-ASSESSMENT) | | Observation of student participation in lesson 3 of Week 1 and number of correct answers when constructing own numberlines. This will indicate those students who need extra support and those students who could be extended. | | |
| WARM UP / DRILL | | Counting backwards from any number, to any number, by any number eg. Count by 3 from 17 to -13 | | |
| TENS ACTIVITYNEWMAN’S PROBLEMINVESTIGATION | | Which is smaller? -10 or -15? Explain your answer. Sam was in a submarine at a depth of 150 metres below sea level. He took to submarine down a further 100 metres. What is his current depth? | | |
| 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 | | **Lesson 4:** Numberlines from -10 to 10  **Lesson 5: Game Mission 2110 Roboidz** <http://www.bbc.co.uk/bitesize/ks2/maths/number/negative_numbers/play/>  **Lesson 6: Rules for Tug of War game**  <http://www.scribd.com/doc/48187508/Tug-of-War> , pack of cards, a strip of paper to be used as a numberline that is marked off from -10 to 10. A counter placed on zero to begin the game. Later in lesson, a Pack of cards, numberline and counter per pair. | | |

**TEACHING AND LEARNING EXPERIENCES**

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| WHOLE CLASS INSTRUCTION MODELLED ACTIVITIES | GUIDED & INDEPENDENT ACTIVITIES | |
| Demonstrate the construction of a numberline from -10 to 10, giving particular emphasis to the spacing of the increments. Demonstrate the plotting of points eg. Even numbers. Demonstrate, by playing a class game, “Mission 2110 Roboidz”. This game plots 4 numbers in sequence on a numberline, but uses a greater range of numbers.  Divide the class into 2 teams. Use the rules provided to demonstrate the game “Tug of War”. | LEARNING SEQUENCERemediationS2 | **Lesson 4:** Assist individual students as required. Have several numberlines already ruled up for those in need.  **Lesson 5:**  Work with students experiencing difficulties in a small group game.  **Lesson 6:**  Continue to play the game in a small group with those experiencing difficulties. |
| LEARNING SEQUENCES3 | **Lesson 4:** Revise the construction of a numberline from 10 to -10. Students construct own numberlines and plot given points. Pay particular note to spacing of increments and sequencing of negative numbers. Have students construct own number lines and plot given points eg. From 10 to -10, numbers in counting by 4 pattern.  **Lesson 5:** Demonstrate the game “Mission 2110 Roboidz” to the class by playing it together in teams. Students can then play the game in pairs (or small groups for those students who require support). Access to computers is required for this lesson.  **Lesson 6:** In class teams, play the game of Tug of War. Students can play in pairs once familiar with rules. A pack of cards is required for this game. Later, a pack of cards is needed per pair.  Investigation: |
| LEARNING SEQUENCES4 | **Lesson 4:**  Widen the range of numbers to plot eg. Numberline from -100 to 20. Plot 17, 7, -7, -17, -27, -37, -47 etc.  Numberline from -1000 to 100. Plot 50, -50, -150, -250, -350, etc  **Lessons 5 and 6:**  Have students play game in pairs earlier than class. In Lesson 6, the rules of the game could be modified further so that students continually add the scores eg. If cards red 5, black 9, red 8, black 2 are drawn as players alternate in taking turns, then the score becomes -5, +9 = -4, -8 = -4, +2 =-2. After 10 rounds, who wins? |
| **EVALUATION & REFLECTION** | In Lesson 4, did students get 7 or more correct out of 10?. If not, why? Do they require further lessons?  Observation of students playing the games in lessons 5 and 6. |

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**MATHEMATICS STAGE 3**

**TEACHING AND LEARNING OVERVIEW**

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| TERM: | WEEK:3 | STRAND: **Number** | **SUB-STRAND:**  **Whole Number** | **WORKING MATHEMATICALLY:**  **MA3-1WM MA3-2WM MA3**-**3WM** |
| OUTCOMES: ACMNA 124 | | Investigate everyday situations that use integers, locate and represent these numbers on a numberline. | | |
| **CONTENT:** | | Investigate negative whole numbers and the number patterns created when counting backwards on a calculator.  Revision of: Recognise the location of negative whole numbers in relation to zero and place them on a numberline. | | |
| ASSESSMENT FOR LEARNING (PRE-ASSESSMENT) | | Observation of students during lesson 6 in particular. Observation of students during warm-up drills of counting, especially backwards. | | |
| WARM UP / DRILL | | Counting forwards from any number, to any number, by any number eg. Begin at -18 and count forwards by 3.  Counting backwards from any number, to any number, by any number eg. Count by 3 from 17 to -13 | | |
| TENS ACTIVITYNEWMAN’S PROBLEMINVESTIGATION | | What would happen if we subtracted a larger number from a smaller number? Explain why. Charlie was in debt $30 to his parents. Each week he paid them back $5. How many weeks would it take him to pay off his debt at this rate? Show this as a counting pattern. | | |
| QUALITY TEACHING ELEMENTS | | **INTELLECTUAL QUALITY** | **QUALITY LEARNING ENVIRONMENT** | **SIGNIFICANCE** |
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| RESOURCES | | **Lesson 7:** Numberline from -100 to 100  **Lesson 8:** Calculators  **Lesson 9:** =/- dice, pack of cards; sufficient for class to play in pairs. | | |

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| WHOLE CLASS INSTRUCTION MODELLED ACTIVITIES | GUIDED & INDEPENDENT ACTIVITIES | |
| Lesson 7: Model by plotting two numbers on the numberline. Discuss which is larger and why. Demonstrate the appropriate symbol to use in the questions eg. -45 -37 **Lesson 8:** Count with students from 4 to -24 by 5’s Have students use the calculator to verify. Eg 4 -5 = -5 = -5 = etc  Do this several times before allowing students to do the activity on their own.  **Lesson 9:**  Divide the class into two teams and demonstrate the game by playing it with them.  Game rules:  Player 1 draws a card from the deck and rolls the dice. The score is a combination of this eg -4.  Player 2 does the same. Eg. -8  Player 1 repeats the action of drawing a card and rolling the dice. Add the score to previous score. Eg -4 -2 =-6  Player 2 does the same and adds current numbers to previous eg -8 +5 =-3  Continue alternating players until time is up, or until a player reaches a specified number eg. 20. | LEARNING SEQUENCES2 | **Lesson 7:** Assist students as required. Restrict the range on the numberline so that all numbers are written to provide greater support eg. -20 to 0. Have students plot numbers used in worded problems so that it becomes more visual for them.  **Lesson 8:** Allow the students who are experiencing difficulty to use the calculator first, and then record the answers.  **Lesson 9**: Continue to play the game in a small group with those who require extra support. |
| LEARNING SEQUENCES3 | **Lesson 7:** Give numberline from -100 to 100 to students. Students to use or signs to complete number sentences eg. -45 -37. Give questions as worded problems. Eg. Who is at the warmer temperature? -15 C or -8 C? Explain.  **Lesson 8:**  Students to count backwards, given rules. Students to write own answers first, and then use a calculator to verify answers. Eg. Start at 4 and count backwards by 5 stopping and -24.  **Lesson 9:** Demonstrate the playing of the game as a class, and then allow students to play the game in pairs. For those students experiencing difficulties, play the game with them in a small group or match the more abled students with those who require support. Pack of cards and dice marked + and – required.  Investigation: |
| LEARNING SEQUENCES4 | **Lesson 7:** Widen the range of numbers to compare. Eg. Numbers from -1000 to 1000.  Have students complete comparisons without the support of the numberline  **Lesson 8:** Widen the range of numbers as above. Give more complex counting patterns.  **Lesson 9:** Modify the rules of the game for adding and subtracting larger numbers eg. 2 digits numbers. Or introduce the concept of two negatives making a positive eg. 2- -5 =7 |
| **EVALUATION & REFLECTION** | **Lessons 7 and 8:** Observation of student participation in lessons and number of correct answers when comparing numbers and sequencing. Do the students require further support? Or practise?  **Lesson 9:** Observation of students participating in the game. Is one person scoring? Or are both contributing equally? Which students required support and played in a group with the teacher? |

**TEACHING AND LEARNING EXPERIENCES**

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