Booragul Public School NSW Syllabus for the Australian Curriculum – Number and Algebra

Stage 2 - Whole Numbers 2

Outcome	Teaching and Learning Activities	Notes/ Future Directions/Evaluation	Date

Stage 2 A student: › uses appropriate terminology to describe, and symbols to represent, mathematical ideas MA2-1WM › checks the accuracy of a statement and explains the reasoning used MA2-3WM › applies place value to order, read and represent numbers of up to five digits MA2-4NA	Language Students should be able to communicate using the following language: largest number, smallest number, ascending order, descending order, digit, ones, tens, hundreds, thousands, **tens of thousands**, place value, **expanded notation**, round to. Refer also to language in Whole Numbers 1.

Ignition Activities **Maths Tipping**. Students stand around the room. Make a set of three, four or five digit number cards. Ask questions such as: how many tens altogether in 500? What number is 100 more than 602? What is the number 100 before 1469? The student who answers correctly may take one step towards another student. If that student is tipped they sit down. *Variation: can ask students to state the number before and after.*		
Counting Races Students are divided into two groups. The teacher nominates a starting number eg 231. One group counts by tens, while the other counts by hundreds from the starting number. Both groups start counting and are asked to stop at the same time. Before commencing the activity, students discuss: ▮ will both groups start/finish on the same number? Why? ▮ which group will stop on the highest number? Why? ▮ will both groups count number 281? Why?/Why not? ▮ what are some of the numbers both groups will count? ▮ what is a number only your group will count? *Variation:* Students play 'Buzz' counting by tens on and off the decade. They 'buzz' on the hundreds. Changing to 4 and 5 digit numbers. Count backwards as well as forwards.		
Higher or Lower Students play in groups of three (2 players and 1 adjudicator) 'Higher or Lower'. The adjudicator records a 'secret' three-digit number on a card and states the boundaries for the number eg 'The number is between 4000 and 5000.' Students draw their own number line, marking the boundaries for the number. The first player chooses a number in the range and the adjudicator responds by stating whether the number is higher or lower than the one chosen. The players record the response on their number line. The second player then states a number and the adjudicator responds with 'higher' or 'lower'. The game continues		

until a player gives the correct number. Students discuss the strategies they used to determine the secret number. In small groups, throw three dice. Use that number to count on/back by 10s, 100s or 1000s. In small groups, use calculators to add/subtract by 10s and 100s. One student types number on calculator, next student then adds/subtract by 10s or 100s and checks answer. *Variation:* Modify to 4 and 5 digits.		
Nasty Game Purpose:To help students order numbers with 3, 4 or 5 digits. Rules 1. This game must be played with four players and four games must be played. One player records the rolls and the scores. 2. The rules are similar to "Highest Number" except that players are allowed to place the numbers they roll in their opponents' squares. For example, a player may place a "1" in an opponent's hundreds column. Note: Players must explain to the scorer where they want to place the number they have rolled "*Put the 2 in Susan's hundreds column*." 3. The winner of each game scores 4; 2nd = 3; 3rd = 2; 4th = 1. Therefore, after the first game players should use various strategies to ensure that the winner of the first game does not win again. Players who really understand this game should base their strategies on the progressive scores after each round. Note: Each player must have a turn at going first. Variation Use 1–6 or 0–9 dice		
Highest Number Purpose:To help students order numbers with 3-digits, 4-digits or 5-digits. 1. The teacher and a student (or two students) demonstrate the game on the chalkboard. 2. Students play in pairs, sharing one score sheet. Players take turns to roll a die to try to make the highest number they can. Once a number has been placed in a column its position cannot be changed. The student who makes the higher number wins that game. 3. Students play several games to determine an overall winner. 4. The teacher ties the lesson together by asking, *What is the largest possible number you can score*? (9999 if you are using 0–9 dice and playing a 4-digit game.) *Who scored closest to this*? *What was your highest number*? *What was your lowest number*? 5. Some of the results may be written on cards and pinned onto a "clothesline" to help students order 3-digit and 4-digit numbers. Variations 1. Use 1–6 dice or 0–9 dice. 2. Total numbers after several games. Look at teachers' cars and find the smallest and the largest numbers on the number plates.		
Play "Buzz" using skip counting by 10s or 100s, on and off the decade.		
Make 100 Purpose:To help students to group tens and ones and add tens and ones. 1. The aim is to score 100 or as close as possible without 'busting' (passing 100). 2. The teacher rolls the die and announces the number. Students may choose to multiply that number by 10 or score it at face value, e.g. 2 may be scored as 2 or 20. Once a decision has been made it cannot be changed. 3. The die is rolled again. If the number is (say) 4, students decide to score this as 4 or 40 and record it, completing the		

progressive total. 4. This continues until 9 rolls have been completed. Note: All rolls must be used. 5. The student who scores 100 or the number closest to (but below) 100 wins. **Variations** (a) Use a 1–6 die or a 0–9 die. Ask students how they will vary their strategies if you change from a 1–6 to a 0–9 die. (b) Set a different target. (i) Target = 200 "How will you vary your strategies from the original game?" (Students should realise that they will need to multiply by 10 more often.) (ii) Target = 1000 and you may multiply by 100 once and once only during the game. (c) Allow addition or subtraction of each number rolled.		
Explicit Mathematical Teaching Developing knowledge of forwards and backwards counting skills will assist students in using mental calculations to solve two-digit addition and subtraction tasks. Students need to be able to count by tens from the middle of the decade to use the "jump" method to solve addition problems. This involves starting from one number and adding on by tens and ones. The "empty number line" could be used to record student's thinking and to demonstrate building-on by tens. Students should be encouraged to develop different counting strategies eg if they are counting a large number of shells they can count out groups of ten and then count the groups.		
Explain that the place value position of a digit determines its value. Show how the same digit in a different position has a different value eg. 431 if we move the 1 to the tens position we have 413 which is a smaller number. Why is this a smaller number? Show how to compare digits from left to right eg. Both have a 4 in the hundreds so they both have 400. The next digit shows that the 413 only has a ten while the 431 has a 30 – no need to compare further! Also include 4 digits and 5 digit numbers.		
Developing knowledge of forwards and backwards counting skills will assist students in using mental calculations to solve two-digit addition and subtraction tasks. Students need to be able to count by tens and hundreds off the decade to be able to use the "jump" method for solving addition and subtraction problems. Demonstrate the pattern that happens when counting forwards by 10 - the number in the units column remains the same; the number in the tens column changes regularly, the number in the hundreds column changes slowly; the number in the thousands column is even slower! Ask students to explain why this pattern happens. (The tens change each skip count but it takes ten skip counts forward to change the hundreds value and one hundred skip counts forward to change the thousands value!) Give particular attention to counting backwards as this is often under-emphasised. Use a flip chart to demonstrate counting forwards and backwards by 10s and 100s.		
Whole Class Teaching Activities-some suggestions **Count -Off** Roll a ten-sided (decahedron) or a twelve-sided (dodecahedron) die. Have the students start counting from the number rolled, adding ten to the count each time up to the 90s. Then count backwards by tens. Display a hundred chart to the students. Have one student select a number from 1–9 on the hundred chart and call out the number. Once the student calls out the selected number, the rest of the class continue counting by adding ten each time. The first student may continue to locate each number after it has been called. *Variation:* Use a 1000 number chart and count by hundreds. **Developing Efficient Numeracy Strategies 2(DENS 2)- Stage 2 pp 62-63**		

Number Line Counting Display a 0 –100 number line to the students. Ask a student to nominate a single-digit number from which to begin counting. Encourage the students to count along the line for ten counts from the nominated number. Attach a peg, or paperclip, to the last number of the count. Continue by counting on ten more each time and marking the last number counted. Chant the sequence of "marked" numbers. Repeat the process, starting from a different single-digit. After a few turns, discuss other sequences without having to mark each number first. **Developing Efficient Numeracy Strategies 2(DENS 2)- Stage 2 pp 64-65**		
Hands Up Ask a student to come to the front of the class and hold up ten fingers. Then ask the student to demonstrate a number such as "43" using fingers. If the student is hesitant, suggest that friends may help in the demonstration by raising their fingers as well. Ask the class to check the number of fingers by counting groups of tens and then adding the ones. Then ask the class to check the number again, this time by counting from the "ones" first and then counting on by "tens". In the example of "make 43" the counting sequence would be 10, 20, 30, 40, 41, 42, 43 and then 3, 13, 23, 33, 43. Repeat with various other numbers. When the class is confident in representing numbers in this way, expand the activity to representing two numbers and adding them together. **Variation** Have one student represent a two-digit number using as many students' hands as needed, without stating what the number is. Each member of the class then determines and records the number. **Developing Efficient Numeracy Strategies 2(DENS 2)- Stage 2 pp 66-67**		
Which Is Biggest? Draw up or give out photocopies of the following grid. ☐ ☐ ☐ + ☐ ☐ ☐ + ☐ ☐ ☐ ☐ + ☐ + ☐ ☐ + ☐ + ☐ + ☐ Write four digits on the board. Ask the children to make the largest total for each of the digit arrangements. Repeat for a different set of digit cards, and share and discuss findings with the class. **Questions** Which is the most important digit? Why? What strategies are you using? How did you decide where to put the numbers? How do you know that your total for an arrangement is the largest? How would you make the smallest total each time? Is there more than one way to get the largest total in each case? Why? **Variations/Extensions** Use 5 digit cards and investigate how many different grid arrangements you could make. Think Maths pg 46		
Trigits Tell the story of the 'trigits', a race of tiny people who only knew the digits 1,2,3 and who cycled everywhere. Unfortunately, their bikes kept being stolen, but because no one had a record of the bikes it was hard to trace them. The trigit police came up		

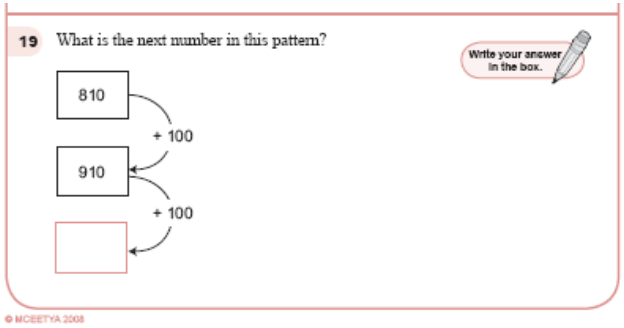
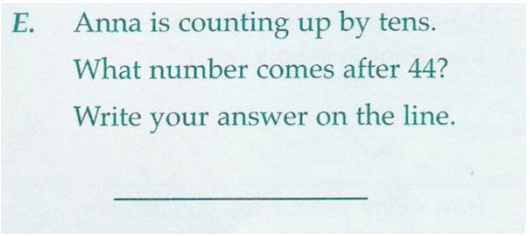
with an idea, whereby each bike could have a registration number. Ask the children to work out what two digit numbers they could make where the digits weren't repeated, and order them. Then ask what numbers they would make if digits could be repeated. Ask them to keep a record of all their numbers. As children find others they can write them on the board. **Questions** What 2 digit numbers can you make? Which numbers have 3 tens? 3 units? Which is the largest/smallest? How do you know if you've found them all? Can you read your numbers out in order? Have you found a pattern? Can you work out a system? What if the numbers were 4,5 and 6? **Variations/Extensions** This can be extended into being an independent activity. Repeat for three numbers. Can they predict how many numbers they could make if they used four digits, five digits? What if they could repeat them? Link to real life contexts such as telephone numbers, car registration plates, 'PIN' numbers etc. Think Maths pg 54		
Air' Numbers Ask children to close their eyes and imagine the number five hundred and sixty two, drawn in the air in front of them. Ask them which digit is on the left and which is on the right, and tell them to swap these two numbers. Share with a partner what the number says now. Imagine rearranging the digits to make the largest and smallest numbers. **Questions** What number did you get when you swapped the hundreds and units? Where is the hundreds digit/ Where is the tens? What digit is on the right? What is it? What's the largest/smallest number you can make? How do you know? **Variations/Extensions** Use larger numbers Think Maths pg 42		
Ordering Numbers to 1000 on washing line (string) Hand out several number cards to each child from a shuffled pack of 1-1000 cards. First ask the children, in pairs, to order their cards. Then name a starting number and an end number and ask children to come out and place their cards in order on the string(washing line).Repeat for different sections of the number line. For example, start: number 350 and end number 500.Other children are asked to place their numbers in between 350 and 500 in turn. **Questions** How are you ordering your cards? Which is the smallest/largest number? Show me. How do you know?		

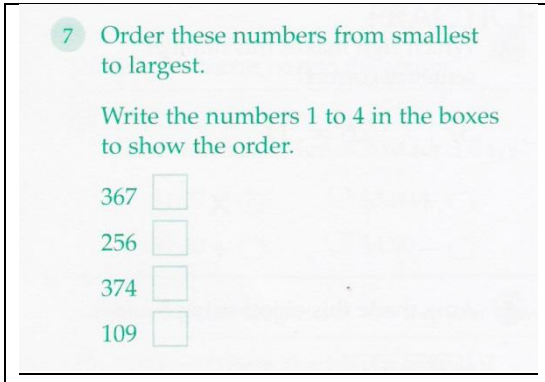
Who's got a number with 5 hundreds in it? 3 tens? Show me a number between 830 and 970 Show me a number less than 490 but greater than 190 Which numbers could go between 250 and 440? How many numbers are there between 190 and 310? Hpow could you check What number would come next after 1000? After 2000? How could we order the cards differently? What comes before zero? How did you decide where to lay your card? Does anyone think it should be moved? Why? **Variations/Extensions** Order the cards according to different criteria, eg those children with a 3 in the units column, come and place their cards in order. Look at the tens pattern. Use sets of cards higher than 1000. Think Maths pg 43		
Largest Number Wins Organise the students into small groups and provide them with an "operation die" (A cube marked with "+1", "-1", "+10", "-10", "+100", "-100".) Each player starts with a score of 500. The die is rolled and each player adds or subtracts the number rolled to his or her score. In turns, players then have four rolls of the "operation die". After each roll the player calculates and records his or her tally. The winner is the player with the largest number. Variation: die can be changed to include +1000 and -1000 and the first to reach 5000. **Developing Efficient Numeracy Strategies 2 (DENS 2)pg 68-69**		
Start With Four Organise the students into pairs or groups of three and provide them with a set of numeral cards 1–9 (make at least three of each number), a set of instruction cards "+1" "+10" "+100" "-1" "-10" "-100" (at least three of each) and a recording sheet each. Alternatively, use the operation die from *Largest number wins.* Ask the students to shuffle the numeral cards and deal out four cards to form a four-digit number. This will be the starting number for the first round. Each student records the starting number on his or her worksheet. The students then take turns to draw an instruction card and add it to, or subtract it from, the starting number and record the new tally on the worksheet. Play continues until all players have had four turns at drawing an "instruction card". The player with the largest number after four draws is the winner. **Variation** Variation: die can be changed to include +1000 and -1000 and the first to reach 5000. **Developing Efficient Numeracy Strategies 2 (DENS 2) pg 180-181**		
Bucket Count On Drop a small collection of large disks or blocks (all of one colour) into a bucket or container one at a time. Tell the students that the colour of the discs, say red, represents a unit of ten. Ask the students to count aloud by tens as each disc is added. Choose a different coloured disc and tell the students that this colour, say blue, represents units of 100. Drop the discs into the bucket one at a time. Ask the students to continue counting by adding on 100 to the total as each disc is dropped. After adding in this fashion, return to adding discs representing "tens" to the total. Discs of another colour could be used to represent units of "one" and if		

appropriate, use discs to represent units of “1000”. **Developing Efficient Numeracy Strategies 2 (DENS 2) pg 182-183**		
Patterns in counting Students design their own digits to replace the digits 0-9 eg. 0 = @, 1 = &, 2 = $, 3 = * etc. Write a four digit number on the board. Students write the number using their own 'digits' 1120 &&$@ Ask 'what will your number look like if you add 10? &&*@ then add 100?' &$*@ Ask students to start at a given number and skip count backwards by ten, then by 100, then forwards by 10 three times, then back by 100. What number did they end up at?		
Expanded Notation Give each student a sheet of paper or large note card with a numeral between 0 - 10. Call two students up to the front of the class. Any two students will work as long as they are not both holding a 0 card. Have them show their numerals to the class. For example, one student is holding a 1 and the other is holding a 7. Ask the class, “What number do they make when they stand next to each other?” Depending on where they are standing, the new number is 17 or 71. Have students tell you what the numbers mean. For example, with 17, the "7" means 7 ones, and the "1" is really 10. Move on to three digit numbers by inviting three students to come to the front of the class. Let’s say that their number is 429. As in the above examples, ask the following questions: ○ What does the 9 mean? ○ What does the 2 mean? ○ What does the 4 mean? As students answer these questions, write the numbers down: 9 + 20 + 400 = 429. Tell them that this is called “expanded notation” or "expanded form". The term “expanded” should make sense to many students because we are taking a number and expanding it into its parts. After doing a few examples at the front of the class, have the students begin writing the expanded notation down as you invite students up to the board. With enough examples on their paper, when it comes to more complex problems, they will be able to use their notes as a reference. Continue adding students to the front of the class until you are working on four-digit numbers, then five-digit, then six. Please note the convention for writing numbers of more than 4 digits requires that numerals have a space (and not a comma) to the left of each group of 3 digits when counting from the units column eg 16 234. No space is used in a 4 digit number eg 6234.		
Guided and Independent Activities-some suggestions **Please look at Developing Efficient Numeracy Strategies 1 and 2(DENS 1 and 2) and Sample Units of Work Books for more ideas on catering to the different needs and levels of the children in your maths groups.**		

Bingo Students make up a bingo card (3 x 3) and fill it with three-digit numbers e.g. using the digits 6, 3, 2, 5 and 0. The teacher reads a clue, e.g. the number 100 more than 256. If the student has that number, they cross it out. First to three in a row, column or diagonal is the winner. *Variation:* modify to include 4 and 5 digit numbers.		
Estimating Counters The teacher puts out a pile of about 20 counters and asks students to 'look and think about' how many there are. The teacher counts 10 counters and puts them aside. Students look again and think about how many counters there are. Students are allowed to change their estimates at any time. Students explain their strategies for working out their estimates. *Variation:* The teacher puts out a large number of counters and again asks students to estimate how many there are. The teacher begins to count them into groups of 10 counters and asks students to rethink their estimates as the counting proceeds. The teacher models the rounding of numbers to the nearest 10 eg the teacher puts out a pile of about 100 counters and the student says 'I think there are 73.' The teacher responds with 'So you think there are about 70?' Numbers could also be rounded to the nearest 5. Possible questions include: ▮ who thinks there are about 70? 80? 90? ▮ why did you revise your estimate? *Arrow codes – on/back by 10s and 100s*		
Problem Solving and Problem Posing Students solve a variety of problems using a large number of strategies. The teacher should encourage students to pose their own problems involving numbers of up to four digits. Use Previous BST/NAPLAN Questions for this as well.		
How Many Ten Dollar Notes? Learning Outcome:We are learning how many tens there are in numbers less than 1 000. Problem: "Mrs Jones takes her class to the circus. She has $237 to pay for the students to get in. Admission is $10 per person. She has 25 students in her class. Does she have enough money?" The students solve the problem in groups with play money. Record 237 on the board or modelling book and discuss the meaning of the digit 2. "How many tens is this worth?" Then ask how many tens are needed altogether. Then answer the question "Is there enough money?" "No." Examples: Word stories and recording for: $167 for 13 students $203 for 41 students $203 for 21 students $199 for 18 students $167 for 17 students ... Problem: "Mrs Wineta collects $10 from each student in her class to take them to the circus. She collects from 17 students. How much money has she got?" Examples: Word stories and recording for: 15 ten-dollar notes 26 ten-dollar notes 13 ten-dollar notes 21 ten-dollar notes ... **Using Imaging** *Shielding* and *Imaging Only:* Examples: Word stories and recording for: 12 ten-dollar notes 29 ten-dollar notes 19 ten-dollar notes 31 ten-dollar notes 34 ten-dollar notes 45 ten-dollar notes ...		

Using Number Properties Problem: "Boxes of chocolates cost $10 each. How many boxes can Charlotte buy if she has $589 to spend?" Discuss the solution. Examples: Word stories and recording for: $867 $701 $327 $991 $563 ...		
How Many Tens and Hundreds? Learning Outcome: We are learning how many hundreds there are in numbers over 1 000. Problem: "The Bank of Mathematics has run out of $1,000 notes. Alison wants to withdraw $2,315 in $1, $10, and $100 notes. How many one-hundred-dollar notes does she get?" Discuss the answer and record it on the board or modelling book. Examples: Word stories and recording for: $2,601 $3,190 $1,555 $1,209 $2,001 $1,222 $2,081 ... **Using Imaging** Problem: "Tickets to a concert cost $100 each. How many tickets can you buy if you have $3,215?" Record $3,215 on the board or modelling book. Shield three one thousands, two one hundreds, one 10, and five ones. Ask the students what they can see. Discuss how many one-hundred-dollar notes they could get by exchanging the thousands. Discuss which notes are irrelevant (the 10 and the ones). Record the answer on the board or modelling book. *Shielding* and *Imaging Only:* Examples: Find and record the number of hundreds in: $1,608 $2,897 $2,782 $3,519 $3,091 $4,000 ... **Using Number Properties** Examples: Find and record the number of hundreds in: 3 459, 8 012 , 9 090 6 088, 3 280, 5 823, 7 721, 2 083 ... Challenging examples: Find and record the number of hundreds in: 13 409, 28 002, 78 370, 12 088, 45 290, 82 356, 21 344 ... Find the number of tens in: 3 709, 8 002, 8 579, 5 208, 4 829 82 333, 12 897, 30 897, 89 000, 50 890 *Variation: How many thousands in a five digit number*		
Calculators Students are given a calculator to type in a three digit number. Without speaking, students order themselves based on their calculator number. If they are incorrect they sit out. Increase the number of digits and repeat. Can students order five and six digit numbers? Use a variety of pages from an old phone book (not in consecutive order). Ask students to put the pages in order from lowest to highest. (or highest to lowest). Can they identify a page that is missing – how do they know where the page goes?		
Count Off Roll a ten-sided (decahedron) or a twelve-sided (dodecahedron) die. Have the students start counting from the number rolled, adding ten to the count each time up to the 90s. Then count backwards by tens. Display a hundred chart to the students. Have one student select a number from 1–9 on the hundred chart and call out the number. Once the student calls out the selected number, the rest of the class continue counting by adding ten each time. The first student may continue to locate each number after it has been called. **Developing Efficient Numeracy Strategies 2 (DENS 2)pg 184-185**		
Rounding Card Game Differentiated for three ability groups, this game helps pupils practice rounding numbers up/down to the nearest 10, 100 or		

1000. Give each group of players a set of number cards and a set of instruction cards ('Round to the nearest...'). Cards are placed face down in two piles on the table. Players take it in turns to take a card from each pile and follow the instruction to round the number up/down. Answer checked by peers. Could be done against the clock, or player wins a counter for each correct answer; most counters wins the game. Game available http://www.tesaustralia.com/Source/taxonomySearchResults.aspx?area=resources&keywords=rounding+numbers&parametrics=300002&page=2		
Snakes and Ladders Students to make their own Snakes and Ladders board that goes up by 10s from a four digit number. They play backwards, rolling a 'tens' dice (10, 20, 30, 40 etc). They play the game by rolling the dice and going backwards from the top. First to get to the bottom left square wins. Students can think of their own rules and starting/finishing points and skip counts. **NAPLAN 2008 Question-Yr 3**  BST 2000 Question-Yr 3  BST 2006 Question-Yr 3		


7 Order these numbers from smallest to largest.

Write the numbers 1 to 4 in the boxes to show the order.

367 ☐

256 ☐

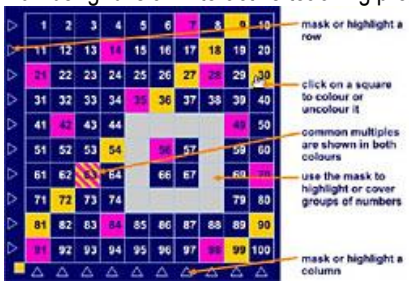
374 ☐

109 ☐

Computer Learning Objects

Hopper-Whole Numbers Years 3-4
Reference Number:L1084
Students select a jump size between 1 and 10 and the starting point is generated randomly on a grid of whole numbers between 0 and 999

Number Grid
Number grid is an interactive teaching program (ITP) on the Standards Site in the UK which generates a 100 square.



Teaching and Learning Exchange (TaLe)
www.tale.edu.au

Arrow Card Game-Stage 2 Students drag the appropriate numbers onto the arrow card holder to make the target number.  **Using Learning Objects To Teach Mathematics'** CD ROM Click on Whole Numbers (yellow button) Scroll down and click on Number Grid		