

Intensive English Language / New Arrivals Program

Mathematics and Numeracy: Teaching Learning Sequence

Strand	Number and algebra
Sub-strand	Number and place value: counting
Levels	A B Reception, Year 1
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Year developed	2016

Use this units with your own student cohort

Teachers are invited to trial and modify this teaching learning sequences. Content may need to be modified to meet the particular learning needs of a student cohort. Designers started with the same template, and while there was broad agreement on the use of the template – there may be some variations between this Teaching Learning Sequence and other Teaching Learning Sequences that were developed by DECD educators.

- differentiated activities may be found in either the activities column or the evidence and differentiation column
- generally, language elements were not repeated once they were recorded in an earlier activity
- cross curriculum priorities are included in some unites but not in others.

A feedback form is available at tiny.cc/IELP-NAP-TLS. Please forward feedback to [Erika Vonaspern](#)



Intensive English Language / New Arrivals Program

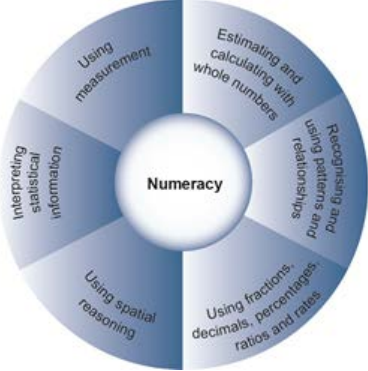
Mathematics and Numeracy Teaching Learning Sequence

WHAT DO WE WANT STUDENTS TO LEARN?

Strand: Number and Algebra Substrand: Number and Place Value: Counting (Prerequisite understanding of our number system)		Learning Goals		
		Achievement Standards	Content Descriptions	Proficiencies
Mathematics Levels: A B (Years Rec - 1)	Timeline: 3 weeks	A Recognises the numerals - to 10 - to 20 - beyond 20 <u>Matches number name (oral), numeral (symbol) and collections/quantity:</u> – <u>0 to 10</u> – <u>0 to 20</u> – 0 to beyond 20 Students count to and from 20	A Understands that our counting system uses a repeating pattern and: - identifies the pattern - EXT: describes the pattern A Students use the language and processes of counting including: understands that digits are used to create a numeral which represents the quantity or number: - uses the term digit, numeral, number accurately as a part of everyday conversations - recognises the digits 0 – 9 A Understands that in our counting system, the position of the digit indicates its value (place value) A Understands and applies the two place value systems ('naming' protocols) in our counting system: - each group (period) of three digits has a different name (eg: hundreds, thousands, millions, billions) - each group (period) of three digits uses the hundreds, tens, units structure. A Understands and applies the two roles of zero: - to mean nothing - as a place/position holder in a numeral	The student demonstrates the following proficiencies. Understanding Connects names, numerals and quantities and represents amounts with numerals. Identifies commonalities and differences between counting systems. Fluency Readily counts numbers in sequences. Recognises the patterns in our number system. Problem-solving Uses materials to model authentic problems. Reasoning Makes sense of and describes the patterns in our number system.

			<p>A Understands that not all digits and symbols are about quantity, some are about labelling</p> <p>A Understands that different symbols are used to represent quantity/how many, for different contexts and purposes.</p> <p>A Understand that in our counting system, numerals are read and written from left to right.</p>	Explains choices for sorting numerals. Records reflections in maths journal.
<p>Overarching Ideas</p> <p>Why do we want to quantify in our lives?</p> <p>Where do the systems of quantifying come from and who invented them?</p> <p>Why do we have numbers? What is their point and purpose?</p>	<p>B</p>	<p>Recognises the numerals to 100</p> <p>Matches number name, numeral and collections/quantity:</p> <ul style="list-style-type: none"> - to 100 - beyond 100 	<p>B</p> <p>Recognises, reads, writes, numerals:</p> <ul style="list-style-type: none"> - 0 - 10 - to 20 - to 100 - beyond 100 	

WHAT DO WE WANT STUDENTS TO LEARN?

Numeracy General Capability	Other General Capabilities	Cross Curriculum Priorities
<p>Estimating and calculating with whole numbers</p> <p>Level 1a Understand and use numbers in context</p> <p>demonstrate concepts of counting using every day experiences</p>  <p>Level 1b Understand and use numbers in context</p> <p>connect and order number names, numerals and groups of objects using numbers up to two digits</p>	<p><input type="checkbox"/> Literacy</p> <p>The literacy capability of <i>Composing Texts</i> is guided by and reported in the sequence of the IELP Progress Report. In addition, the following aspects of the <i>Comprehending Texts</i> continuum are taught and assessed.</p> <p><i>Comprehending texts</i> Level 1e</p> <ul style="list-style-type: none"> - Navigate, read and view learning area texts with familiar vocabulary and supportive illustrations - Listen and respond to learning area texts (brief questions, one and two step instructions and listen for information in simple spoken texts and respond to audio texts and texts read aloud) - Interpret simple texts using comprehension strategies <p><input type="checkbox"/> Intercultural Understanding</p> <ul style="list-style-type: none"> - <i>Recognising culture and developing respect</i> <p>Level 1 Explore and compare cultural knowledge, beliefs and practices</p> <hr/> <ul style="list-style-type: none"> • identify, explore and compare culturally diverse activities and objects. <p>Investigate culture and cultural identity</p> <ul style="list-style-type: none"> • identify and describe the various groups to which they belong and the ways people act and communicate within them Level 1) 	<p><input type="checkbox"/> Aboriginal and Torres Strait Islander histories and cultures</p> <p>The Aboriginal and Torres Strait Islander Histories and Cultures priority provides opportunities for all students to deepen their knowledge of Australia by engaging with the world's oldest continuous living cultures. When students are learning about number systems from different cultures, include number systems from early aboriginal and Torres Strait Islander cultures. Below is a link that indicates that there was a lack of need for number naming</p> <p>http://blogs.slq.qld.gov.au/ilq/2014/09/09/indigenous-number-systems/</p> <p><input type="checkbox"/> Asia and Australia's engagement with Asia</p> <p>The peoples and countries of Asia have contributed and continue to contribute to world history and human endeavour with relation to mathematics.</p>

□ **ICT Capability**

- *Applying social and ethical protocols and practices when using ICT*

- Level 1

Recognise intellectual property

- recognise ownership over their own digital work

- Apply digital information security practices

- follow class rules about using digital information

HOW WILL WE KNOW IF THEY'VE LEARNT IT?

Diagnostic Assessment: (What do the students bring?)	Assessment of Learning	Assessment as Learning	Assessment for Learning
<p><u>Dispositions</u> From a young age, students begin to notice the amount of objects around them in their daily lives. They have a natural instinct for the need to quantify.</p> <p>They notice their age and that the number is represented by a symbol and that it quantifies how old they are.</p> <p>Notice symbols that represent amounts and that these symbols differ from letters.</p> <p><u>Knowledge Skills/Understanding</u> They come with various ideas about number systems. They all have different entry points with ideas of number. Some may be able to subitise small collections.</p> <p>Knowledge of digits and their representations in different cultures.</p> <p>Students may have an awareness of different situations that require the use of numerals e.g. at the shop, parents' work, clock, phone numbers, TV channels</p>	<p>Photographs of the student learning over the entire unit to build a portfolio of evidence and growth.</p> <p>Progress Report records the control over language when describing patterns and explaining rules or choices.</p> <p>Evidence taken from work samples.</p>	<p>Observe each child and how they participate and contribute in activities and discussions. Record children's discussions using school recording equipment (e.g. iPads)</p> <p>Use the class checklist to record to check for fluency (tick sheet with notes)</p> <p>Students take photos of their learning around numbers and upload onto a Top 5 summative assessment sheet.</p> <p>Record findings in their math journal using the Reflection Sticks and if children are unable to write, scribe their reasoning for them.</p>	<p>Say, then write the largest number that they know. Have them make the amount, then compare it with their peers.</p> <p>Number Hunt: Search for the numeral of their age. Where do they see it and what does it represent? Explain to a friend what the numbers are used for? Have them take some photos and use the visuals to demonstrate their ideas to their peers.</p> <p>Visual Representation (Concept Web): Demonstrate all the understandings of the quantities that the numeral represents e.g. 5 represents 5 fingers, 5 metres, 5 minutes. How is it represented as a word, symbol and amount?</p>

KEY

Content Descriptions are in plain font

Achievement Standards: Bold font

Numeracy Learning Continuum Description. Underlined font

WHAT DO WE WANT STUDENTS TO LEARN?	WHAT WILL WE DO TO GET THERE?			HOW WILL WE KNOW IF THEY'VE LEARNT IT?	
Mathematical Skills and Concepts	Sequenced learning activities	Language Elements	Resources	Evidence and Differentiation	
<p>Develops fluency to count sequentially forwards and backwards from any numeral.</p>	<p><u>These lessons are designed to be ongoing mental maths routines to be conducted at the beginning of each maths lesson.</u></p> <p><u>M.1 I Am Thinking of a Numeral</u> Start with the mental maths routine "I am thinking of a numeral." Give each child a number line to 20. At first give the students clues to help them to develop the language e.g. more than, less than. As the unit continues include the mathematical technical language that is being used over the term. Differentiate the routines as the unit progresses.</p>	<p>Technical Language: <i>numeral, more, less, backwards, forwards, direction, decade, number name, pattern</i></p> <p>Participants with pointers, numerative and other describers: <i>the number name, the fifth decade, a collection, a number less than ____. a number more than ____.</i></p> <p>Processes: Action <i>say, clap, change (direction), sit, point</i> Relational <i>is, are, has, have,</i></p>	<p>number lines</p>	<p>Needs Support Use a number line to 10 as a visual prompt. Have the students use jumps along a number line from any given numeral to show 'counting back' and 'counting forwards'. Explicitly show that when you count back (name numbers in descending order), numerals decrease in value, and when you 'count forwards' the numerals increase in value.</p>	<p>Needs Extension Use a number line to 100 as a visual prompt. Have the students use jumps along a number line from any given numeral to show 'counting backwards' and 'counting forwards'.</p>
	<p><u>M.2 Naming Numbers in Sequence Back and Forth From Any Given Numeral</u> Students say number names in sequence around in a circle, backwards and forwards from any given numeral. Use UNO cards/ numeral cards to randomly pull out a numeral then say the numbers forwards or backwards from this numeral. Explain to the children that 'forward' and 'backwards' are direction words. You could also clap to change directions.</p>	<p>Circumstances: <i>around, back, forward</i></p> <p>Speech Functions:, questions: <i>"What is the third decade?"</i> statements: <i>"I am thinking of a numeral</i></p> <p>Visual Literacy: number line, number cards</p>	<p>UNO/ Numeral cards,</p>		<p>Needs Extension Students name numbers backwards and forwards using skip counting, to make counting back and forth a faster process.</p>



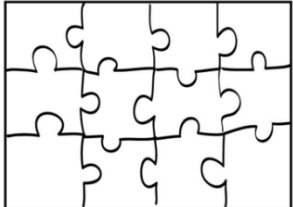

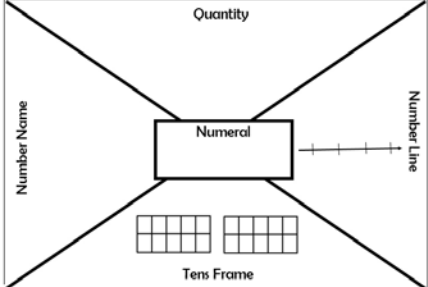
M.3 Number Name Tennis


After teaching concepts from lesson 1.1 introduce the number name tennis game. As a whole group, students sit in a circle. Ask a student to choose a decade to start from. A student, for example, may choose the fifth decade and then point to another student. The next student will then say the next number name (51) using the number naming pattern (1,2,3,4,5,6,7,8,9, decade). That student then points to another student to say the next number name. The game continues in this way until they reach the next decade.

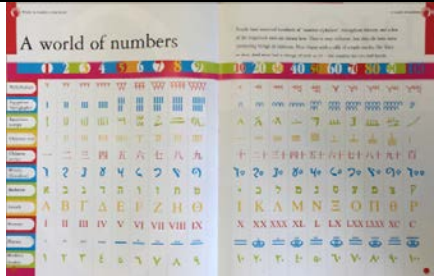
After lesson 5.3, include 'illion' number names into the game e.g. "One million and one, one million and two, one million and three..."

<p>A Understands that our counting system uses a repeating pattern and:</p> <ul style="list-style-type: none"> - identifies the pattern - (EXT)describes the pattern 	<p>1.1 Patterns in Number Name (Orally)</p> <p>Explicitly explain the pattern for naming numbers (1,2,3,4,5,6,7,8,9, decade). Look at hundred chart and point to the numerals and say them. Instead of saying "10" use the term "first decade." Continue naming the numerals and replace "20, 30 and 40" with "second decade, third decade and fourth decade." The students will notice that a pattern is forming and the decades are in the tens column and each decade has a zero digit. Inform the students that it is a recurring pattern. Give the children an example by naming numbers from the second decade, "21,22,23,24,25,26,27,28,29, third decade,31,32..."</p> <p>Get the students to use the pattern of naming numbers orally starting from any decade. Introduce the mental routine M.3 Number Name Tennis</p>	<p>Technical Language: <i>backwards, forwards, amount numerals, number names, decade, pattern, horizontal, horizontally, vertical, vertically, direction, skip, collection, counters, repeat</i></p> <p>Participants with pointers, numerative and other describers: the number name, the numeral, <i>the fifth decade, a collection, a number line, a number less than _____. a number greater than _____.</i></p> <p>Processes Action <i>- count, move along, name match, say (the number names), follow, start, begin, finish, explain, identify, choose, recall, repeat, continue,</i> Relational <i>-is, are, has, have</i></p> <p>Circumstances: <i>In sequences of two, from any number, until the number twenty, in different ways, forwards from three, on from three, backwards from three, from the fourth decade, within the numbers to one hundred, horizontally, vertically</i></p>	<p>counters, hundred chart</p>	<p>Needs Support Use a hundred chart as a visual prompt and have the students use clear counters to make patterns and then say the numbers under the clear counters.</p>	
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<p>A. Understand that in our counting system, numerals are read and written from left to right.</p>	<p><u>1.2 Patterns in Written Numerals</u> Revise the pattern for naming numbers (1,2,3,4,5,6,7,8,9, decade). Show the children a hundred chart on the interactive whiteboard. Focus on each horizontal row at a time starting at the top of the hundred chart. Ask the children if they can see the pattern in the numerals. Use starboard and smartboard software to highlight the pattern throughout the hundred chart. Ask the students if they can see the pattern elsewhere. They may notice that the pattern also occurs vertically.</p> <p style="text-align: center;">Hundred Chart</p> <table border="1" style="margin: auto;"> <tr><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td><td>8</td><td>9</td><td>10</td></tr> <tr><td>11</td><td>12</td><td>13</td><td>14</td><td>15</td><td>16</td><td>17</td><td>18</td><td>19</td><td>20</td></tr> <tr><td>21</td><td>22</td><td>23</td><td>24</td><td>25</td><td>26</td><td>27</td><td>28</td><td>29</td><td>30</td></tr> <tr><td>31</td><td>32</td><td>33</td><td>34</td><td>35</td><td>36</td><td>37</td><td>38</td><td>39</td><td>40</td></tr> <tr><td>41</td><td>42</td><td>43</td><td>44</td><td>45</td><td>46</td><td>47</td><td>48</td><td>49</td><td>50</td></tr> <tr><td>51</td><td>52</td><td>53</td><td>54</td><td>55</td><td>56</td><td>57</td><td>58</td><td>59</td><td>60</td></tr> <tr><td>61</td><td>62</td><td>63</td><td>64</td><td>65</td><td>66</td><td>67</td><td>68</td><td>69</td><td>70</td></tr> <tr><td>71</td><td>72</td><td>73</td><td>74</td><td>75</td><td>76</td><td>77</td><td>78</td><td>79</td><td>80</td></tr> <tr><td>81</td><td>82</td><td>83</td><td>84</td><td>85</td><td>86</td><td>87</td><td>88</td><td>89</td><td>90</td></tr> <tr><td>91</td><td>92</td><td>93</td><td>94</td><td>95</td><td>96</td><td>97</td><td>98</td><td>99</td><td>100</td></tr> </table> <p>Write the pattern several times horizontally on a piece of butcher's paper while the children orally repeat the pattern as you write. Students should notice that there are patterns in the way numerals are written in the hundreds chart, both horizontally and vertically. As a task, give students a blank hundred chart template. Students to write numerals using the pattern. Use work sample as an assessment of and for their learning.</p>	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100	<p>Conjunctions: <i>and, but, because</i></p> <p>Print Conventions: reading numerals from left to right (forwards), spaces between periods</p> <p>Reference Items: <i>this, that, these, his, her, she, he, you, me, my, I</i></p> <p>Speech Functions:., questions: <i>What pattern can you see?</i> statements: <i>"The first digit only changes after the second digit has changed 9 times.</i></p> <p>Visual Literacy: numerals, patterns, symbols, images of collections, hundreds chart, number line</p>	<p>Interactive whiteboard, butcher's paper, coloured markers, hundred chart, blank hundred chart</p>	<p>Needs Support Provide students with copy of hundred chart. Students to colour/highlight patterns in numerals, e.g. Colour in all the numerals that have a '3'.</p>	<p>Needs Extension Students to continue pattern on another blank hundred chart. Keep extending.</p>
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<p>A B Represents amounts (connect/match number name, numeral and collections/quantity)</p>	<p><u>1.3 Matching Numerals, Number Names and Amounts to 20 or 100</u> Explicitly explain that there are different ways of representing amounts; as numerals, with number names (oral) and as amounts. Play a game of memory or snap with the students. Use cards with images that show the amounts, numerals and number words to 10.</p>		<p>memory game cards, counters, UNO cards/ numeral flash cards</p>		<p>Needs Extension Students match the numerals and collections up to 100. They could look at groups of ten to easily identify amounts.</p>																																																																																																				

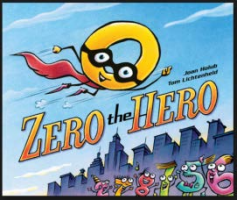
	<p>e.g.</p> <p>seven 7 </p> <p>eight 8 </p> <p>As a whole class, give each child a handful of counters. Use numeral flash cards to hold up so students can say the number name and make the amounts shown on the cards.</p>				
<p><u>Matches number name, numeral and collections/quantity:</u></p> <ul style="list-style-type: none"> - <u>to 100</u> - <u>beyond 100</u> 	<p>1.4 Matching Numerals, Number Names and Amounts puzzle</p> <p>Have the students make their own puzzle where they match numerals, numbers names and amounts. Take photographs of the products to document if they can demonstrate the achievement standard.</p> 	<p>Simple Sentences (oral)</p> <p><i>The numeral is 6. The number name is six. The amount looks like this.</i> </p>	<p>blank puzzle template</p>	<p>Needs Support</p> <p>Provide students with a partially completed puzzle and visual prompts for form symbols.</p>	
<p>A. Recognises, orders, sequences, reads, writes, numerals:</p> <ul style="list-style-type: none"> - to 20 	<p>1.5 Think Board</p> <p>Students use a Thinkboard to demonstrate their understanding of numeral, number name and amount. Students show where their number fits in a sequence by writing the numbers that come before and after.</p> 		<p>Think board template</p>	<p>Needs Support</p> <p>Students recognise, order, read and write numerals to 10.</p>	<p>Needs Extension</p> <p>Students recognise, order, read and write numerals to 100, beyond 100</p>

<p>As a part of their intercultural understanding and recognition of their culture, students make connections with their own numerical system and learn about other systems from their peers.</p> <p>A. Understand that different symbols are used to represent quantity/how many, for different contexts and purposes.</p> <p>A. Extension: Draw upon their own knowledge of the number system/ symbols from their own culture and make comparisons to the Hindu Arabic number system.</p> <p>A. Extension: Understand the purpose and need for different number systems i.e. the need to quantify in our daily lives.</p>	<p><u>2.1 Explore the Numerical System of Their Own Culture</u></p> <p>Ask the students, “How do you count to ten using your body?” Some students may use base 10 with their fingers and others may use base 12 using their fingers with their thumb as a pointer. Get the students to work with a pair and show their partner how to count with their body and if they can, write the numerals.</p>  <p>Ask the students how they number name to ten in the country that they are from. Get the students to write the numerals to ten using numerals from their country. Sort the numerals into cultures that use the same system as Australia (the Hindu Arabic System) and cultures that do not.</p> <p>Students use the reflection stick, ‘Today I discovered...’ to share their understanding and reflect on the lesson .</p>	<p>Technical Language: <i>Base 10, quantify, label, culture, count, numerical systems, counting system, cultural, Hindu Arabic, categories, numerals, number names, symbols, pattern, continue, repeat/ed</i></p> <p>Participants with pointers, numerative and other describers: The numerical system, parts of the body, students’ home language, <i>the same as, different culture, groups, connection</i></p> <p>Processes: Action <i>describe, explain, talk about, , count, give an example, write, observe, sort, match, cut, glue, order, sequence, group, make, connect, observe, notice, present, quantify, label</i> Relational <i>is, are, has, have, can</i> Mental <i>compare, think</i></p> <p>Circumstances: <i>in your culture, at home, before you arrived, previously, since, prior to Australia</i></p> <p>Conjunctions: <i>and, but, because, therefore</i></p>	<p>‘Today I discovered...’ reflection stick</p>	<p>Needs Support If possible. Use a Bilingual School Services Officer to support students with the numerical system of their own culture.</p>	
	<p><u>2.2 Origins of Numeral Systems in Different Cultures</u></p> <p>Use the page ‘A world of numbers’ from ‘Think of a Number’ by Johnny Ball Page: 24.</p>		<p>Book: ‘Think of a Number’ Johnny Ball Page: 24, ‘I made a connection...’ reflection stick,</p>	<p>Needs Support During the numeral sorting activity, support students who are experiencing difficulty by making suggestions of how to sort using colour and symbol patterning cues.</p>	<p>Needs Extension Have a look at the book: ‘Think of a Number’ by Johnny Ball page 24. How do other number systems compare with their own and are there any similarities?</p> <p>Order the numerals from different cultures.</p>

	 <p>Use the photocopier to enlarge the numerals from the different numerical systems from around the world. Cut out the images and get the students to sort the number symbols into collections. Students observe the symbols and compare them as a whole class. Display the original page 24 from 'Think of a Number' by Johnny Ball. Children observe the sorted and ordered symbols and compare their own collections. Display their learning from this lesson in the classroom as well as the original page for reference in later lessons.</p> <p>Use the reflection stick "I made a connection....." so that students record their understanding in their maths journal.</p>	<p>Print Conventions: Culturally specific numerical symbols, directionality of written numerals from different cultures</p> <p>Reference Items: <i>this, that, these, his, her, she, he, you, me, my, I</i></p> <p>Speech Functions: questions and statements: <i>How do you count in your culture? In Germany, we say four and twenty, not twenty four.</i> <i>How is it similar or different?</i> <i>What are numerals used for?</i></p> <p>Visual Literacy: numerals, patterns, symbols, images of collections, different cultural numerical systems</p>			
	<p><u>2.3 'World of Numbers' Open-Ended Task</u> Students work in partners for this task. Give the children a copy Johnny Ball's, "A World of Numbers" page 24. Ask the students to think about which number system is not used anymore and why?</p>		copies of Johnny Ball's, "A World of Numbers" page 24.		
	<p><u>2.4 Origins of Hindu Arabic System Formation of Digits and Their Evolution</u> Revise lesson 2.2 and look at the cultural numeral symbols display from that lesson. Use a set of numeral flashcards (Hindu Arabic) and ask the students which number system is most like the system that we use today. The students should be able to recognise that the Hindu and Arabic systems are most like our own. Introduce the words Hindu Arabic and talk about the countries that our system originated from. Explain how the Hindu Arabic system is now recognised and used over the entire world.</p>		UNO cards/ numeral flashcards,		

<p>A. Understands that not all digits and symbols are about quantity, some are about labelling</p>	<p><u>2.5 Purpose of Numeral Systems</u> With your whole class go on a numeral hunt. This activity requires the use of an iPad or cameras and they will need to work in pairs. This activity does not have to be limited to the classroom (they could walk around the school grounds or as an excursion in their local community). Students take images of the numerals that they find. Print the images of for the next lesson. After the numeral hunt reflect upon how numerals are everywhere and introduce the idea that they are for different purposes.</p>		<p>iPads or other photography equipment,</p>	<p>Needs Support Give the students a numeral card to use as a visual so they can match the symbol with symbols in their environment. Give them the numeral that represents their age to make the search more meaningful.</p>	
	<p><u>2.6 Purpose of Numeral Systems Continued... Quantifying and Labelling</u> Give the students the paper copies of the images that they personally took. Students get into their pairs from the previous lesson. They can revise the last activity by reviewing the photos that they took on their numeral hunt. Ask the students, "What are numerals used for?" Using the 'think, pair, share strategy,' they can think, then explain their ideas to a friend using the knee to knee strategy. Students sit opposite each other with their knees touching so that can have a focused discussion. Get the students to share their partner's ideas with the rest of the class. Explicitly explain that there are two roles of number systems i.e. to quantify and label. As a whole class use two hula hoops with headings 'Quantifying' and 'Labelling.' Or 'Counting' and 'Naming'. Sort the photos that they took into the two categories. Discuss what they notice.</p>		<p>2 hula hoops 'quantifying' and 'labelling' headings on paper cut-outs</p>		<p>Needs Extension Independently categorise the images taken from the numeral hunt to see if they can distinguish between quantifying and labelling.</p>
<p><u>A.</u> Students use the language and processes of counting including: - Understands that digits are used to create a numeral which represents the quantity or number</p>	<p><u>3.1 Quantifying using Mathematical Terminology</u> Ask the students to quantify how many students there are in the class. Explain that the word quantify means to find out how many. Give the students a picture of an item that exists in their classroom and ask them to find the quantity e.g. quantify the chairs, clocks, tables, trays, pencil sharpeners etc. Make sure the items have varying amounts so students can explore the efficiency of recording a range of amounts e.g. lots of pencils vs. a clock.</p>	<p>Technical Language: <i>quantify, symbols, digit, alphabet, numerals, numbers, subitise, counting system, categories, similar</i></p>	<p>pictures of objects from around the classroom on a sheet of paper with space for recording, clipboard</p>	<p>Needs Support Give the students an item with a smaller quantity so that it is easier for them to count how many and allocate a numeral e.g. clocks, teacher desk</p>	<p>Needs Extension Give the students an item with a larger quantity so that they can explore the efficiency of using numerals instead of recording with pictures.</p>

<p>- Uses the term digit, numeral, number accurately as a part of everyday conversations.</p> <p>- Recognises the digits 0-9</p>	<p>The students go and look for their item with their visual prompt and record the quantity of their item. They may record either with symbols or by drawing pictures. Get the students to return to the whole group and show how they recorded. Observe the use of symbols to show the quantity.</p> <p>Explicitly explain to the students that the symbols they used to show the quantities are called numerals and they are an efficient way to record quantities/ amounts. It is much quicker to write a numeral than draw pictures especially when quantifying larger numbers.</p>	<p>Participants with pointers, numerative and other describers: <i>symbols, digits, numerals, numbers, quantities, quantity, alphabet, names of various objects in the classroom, similar, larger, smaller, the second digit, (ordinal number),</i></p> <p>Processes Action: <i>write, draw, record, observe, show, explain, quantify, sort, order, talk, explore, talk about, present, play, form, compare, connect, give (an example)</i> Relational: <i>is, are, has, have</i> Mental: <i>think, decide, notice</i></p>			<p>They may use tallying, drawn pictures or numerals to record. Compare the recording methods of the students.</p>
<p>A. Order numerals – <u>0 to 10</u> – <u>0 to 20</u> – beyond 20</p>	<p><u>3.2 Digits are the Alphabet of our Number System</u> Explicitly teach the students that digits are used to form numerals using the analogy that digits are similar to the alphabet: letters are used to form words and digits are used to form numerals.</p> <p>Have the numerals to 20 printed in large font. As a whole class sort the numerals into categories of one digit numerals and 2 digit numerals. Which numerals have one digit and which numerals have two digits? Get the students to cut the two digit numerals to show individual digits. As a whole class, order/sort the digits. Explore that all numerals are formed using the digits 0-9. Ask the students to talk to a partner and decide if 10 is a digit. Why or why not?</p>	<p>Circumstances: <i>in our classroom, with (their visual prompt,) with symbols, to the whole group, into categories, on the whiteboard</i></p> <p>Conjunctions <i>and, but, because, therefore</i></p>	<p>numerals to 20 printed in large font</p>	<p>Needs Support Complete activity with mixed ability groups or with adult support.</p> <p>Order the numerals 0 – 10 according to value.</p>	<p>Needs Extension Complete activity with the numerals to one hundred and independently make generalisations. Order the numerals 0 – 100 according to value.</p>
	<p><u>3.3 Digit Formation</u> Play an interactive game on the whiteboard that helps the students to learn and practice the formation of the digits. This can be done throughout the year with any new students.</p>	<p>Print Conventions large numerals, directionality of written numerals, formation of numerals,</p> <p>Reference Items: <i>our, their, them, they</i></p>	<p>See suggested websites in references</p>		

		<p>Speech Functions: Questions: e.g. Why or why not?</p> <p>Visual Literacy: <i>numerals, patterns, symbols, pictures of classroom objects in their environment, numerals on the interactive whiteboard</i></p>			
<p>A. Understands and applies the two roles of the zero: - to mean nothing - as a place/position holder in a numeral</p>	<p>4.1 The Two Roles of Zero Read the story "Zero the Hero" by Joan Holub and Tom Lichtenheld.</p>  <p>Before reading it to the class, decide to read the whole book to the class or just sections of the book that explore the two roles of zero (as a place holder and to mean nothing.) Ask the students if Zero is in fact a hero and is he important or not? Students get into pairs and discuss why or why not. They then share their ideas with the whole class using reflection sticks 'I proved that is true' and 'I proved that is false' students record their understanding in their maths journal.</p>	<p>Technical language: <i>quantities, zero, roles of zero, amount, nothing, true, false, numerals, collection, place holder, quantify, approximate, amount, decade</i></p> <p>Participants with pointers, numerative and other describers: <i>numeral, quantities, amounts, hero, important, true, false, zero, the two roles of zero, small collection, different quantities, amount, decade</i></p> <p>Processes: Action: <i>discuss, share, explain, use, read, explore, record, make,</i> Relational: <i>is, are, has, have</i> Mental: <i>think, give an example, connect, prove, reason, justify, reflect</i></p> <p>Circumstances <i>in your maths book/journal, to the class, with the whole class, in our classroom, in the pattern, in sequence, in order</i></p>	<p>'Zero the Hero' by Joan Holub and Tom Lichtenheld, 'I proved that ... is true' and 'I proved that ... is false' reflection sticks</p>	<p>Needs Support Order numeral cards with collections from 0 – 20 With support, students connect the two roles of zero. There is no amount with zero. Scribe for the students who have difficulty recording.</p>	
<p>A Order numerals to 20</p>	<p>4.2 The Need for Zero When Writing Numerals Show the students the numerals to 20 using flash cards but instead of 10, use a 1 flashcard and instead of 20, use a 2 flash card e.g. 1,2,3,4,5,6,7,8,9,1,11,12,13,14,15,16,17,18,19,2. Get the students to order the numerals to 20. Get the students to observe what happens when zero is missing. The students may connect that without the digit 0, you couldn't use symbols to represent decades.</p>		<p>numeral cards</p>	<p>Needs Support Give students various numeral cards with and without zero. They can sort the numerals and with support talk about what they notice. They may notice that zero is on the right and not at the left of the numeral</p>	<p>Needs Extension Give students two to four numeral cards. They can sort, discuss and make generalisations. Ask students to write three and four digit numerals with zeros. They can identify which place zero is holding.</p>

		<p>Conjunctions <i>and, but, because, therefore</i></p> <p>Print Conventions large numerals, directionality of written numerals, formation of numerals, role of zero in decades</p> <p>Reference Items: <i>our, their, them, they, this, it</i></p> <p>Speech Functions: Questions e.g. Why or why not? Statements <i>I proved that _____ is true.</i> <i>"There are zero _____ in our _____."</i></p> <p>Visual Literacy: 'Zero the Hero' Story, picture cards and blank cards</p>			E.g. 4076 – In four thousand and seventy six, there are no hundreds.
	<p>4.3 The Value of Zero With the whole class, use counters to make a small collection and ask the students to approximate how many. Do this with different quantities e.g. make 4, make 8, make 6 then make 0. Ask the students to quantify each amount and help them to make connections with zero to mean nothing.</p>		counters, numeral cards		
	<p>4.4 Problem Solving Task Students then think about things that have zero as their quantity e.g. There are zero dinosaurs in the world today. There are zero cats and dogs in our classroom. Students complete the sentence in their maths journal: "There are zero _____ in our _____."</p>		pencils, math journals	<p>Needs Support Give children picture cards, some with pictures on and some that are blank. Children say "That has nothing," for the cards that are blank. They write the numeral 0 on the blank cards.</p>	<p>Needs Extension Get the children to think on a larger scale than the classroom and school. Think about what there may be 'zero' of at home or community. Make comparisons from their country of origin to Australia. E.g. 'There are zero cows in the streets.'</p>
<p>A B. Understands and applies the two place value systems ('naming' protocols) in our counting system: - Each group (period) of three digits has a different name (eg: hundreds, thousands, millions, billions) - Each group (period) of three digits uses the hundreds, tens, units structure.</p>	<p>5.1 Exploring Patterns in Numerals Get students to write the largest numeral that they know on a piece of paper, then as a group, decide which is the largest numeral out of everyone's responses. Ask, "Are there any numerals that are larger than this numeral?" With support, get the students to sort the numerals in ascending order. The students may notice that the more digits, the larger the value of the numeral. Discuss the numerals and strategies that the students used to write the numerals. Introduce the concept that numbers and numerals are infinite.</p>	<p>Technical language: <i>Infinite, units, tens, hundreds, thousands, billions, trillions, patterns, numerals, ascending, descending, numerical system, digits, number names, strategy, largest, quantity, flexible number line, periods, alphabet, symbols, bridge through tens, horizontally, place value</i></p>	paper, markers		

	<p>5.2 Writing Numerals From Left to Right Revise that digits are like the alphabet for numbers and then discuss that when you write them, you write them from left to write, just like words. In their math journal, get the students to practice writing numerals from left to right and provide the students with numerals to start from so that they can bridge through tens e.g. 18, 19, 20, 21, 22. This way the pattern of bridging through ten will become explicit.</p>	<p>Participants with pointers, numerative and other describers: <i>Largest numeral, ascending, infinite, flexible number lines, patterns, alphabet, numeral, symbol, number names, the three naming protocols, right and wrong, spaces, every three digits, units, tens, hundreds, thousands, tens thousands, hundred thousands, millions, billion, trillions, quadrillions, quintillion, largest possible number</i></p> <p>Processes: Action <i>sort, bridge through tens, order, name, read, discuss, continue, revise</i></p> <p>Circumstances <i>in ascending order, in descending order, forwards and backwards, across, from left to right, more easily, upon</i></p> <p>Conjunctions <i>and, but, because, therefore</i></p>	Math journals, pencils	<p>Needs Support Students practice writing the numbers from left to right bridging through 10.</p>	<p>Needs Extension Students practice writing the numbers from left to right bridging through 100.</p>
<p>A Understands that in our counting system, the position of the digit indicates its value (place value)</p>	<p>5.3 Writing and Reading Large Numerals With Periods Revise the concept of numbers and numerals being infinite. Tell the students that there are patterns in the way we read and write numbers. Write a very simple sentence on the whiteboard without using spaces between words e.g. acatsatonamatintherain. Ask the students to have a go at reading the sentence. Have the students discuss what is wrong with the sentence. The students should tell you that they need spaces to read it more easily. Make it explicit that it is the same with large numerals. Lay 12 random UNO numeral cards horizontally as one large numeral in front of the students. Ask them to read the large numeral. At this stage the students will probably find it difficult. Tell the students that in the same way sentences need spaces, so do numerals. Show the students that between every three digits you need to leave a space.</p> <p>Use place value sheets (attached as a resource) to place the UNO cards upon. Help the students to read the large numeral using the two naming protocols (HTU, then how HTU sits within thousands, millions, billions etc.)</p>	<p>Processes: Action <i>sort, bridge through tens, order, name, read, discuss, continue, revise</i></p> <p>Circumstances <i>in ascending order, in descending order, forwards and backwards, across, from left to right, more easily, upon</i></p> <p>Conjunctions <i>and, but, because, therefore</i></p>	Uno cards, place value sheets	<p>Needs Support Use the HTU place value sheet only and assist the students to say the numerals.</p> <p>Students use UNO cards and the place value sheets only using HTU to use as a visual prompt when reading and writing large numerals (which could be up to 999).</p>	<p>Needs Extension Have the students work independently and see if they can work out the names of the numerals with the support of the place value sheets.</p> <p>Students write their own numerals, using finger spaces between each set of 3 digits and then read the number with some accuracy using the 'illion' pattern. (E.g. three hundred and twenty three bazillion)</p>
	<p>5.4 H/T/U Pattern Continuing on from previous lesson, get the students as a class to revise by noticing that hundreds, thousands, millions, billions are in groups of three. Model how to read the larger numerals.</p>	<p>Print Conventions large numerals, directionality of written numerals, formation of numerals, role of zero in decades</p>	Uno cards, place value sheets, math journal, pencils	<p>Needs Support Use UNO cards and place value sheets to make large numerals, then write in their maths journal.</p>	






	<p>Students practice writing large numerals in their math journal. Ask the students to read the numeral and record/ scribe what they say. Use this as evidence to observe if they understand if there are patterns in the way we read and write numerals.</p>	<p>Reference Items: <i>our, their, them, they, this, it, I</i></p> <p>Speech Functions: Questions <i>Why or why not?</i> Statements <i>"I investigated the problem..."</i></p> <p>Visual Literacy: Uno cards, place value sheets, reflection sticks</p>			
	<p>5.5 Place Value Problem Solving Task In differentiated groups of three or four, ask the students to use a collection of random UNO cards. Use digits on the cards to make the largest possible numeral. They may use strategic placement of digits (e.g. using the digits 9 and 8 to make numerals of larger value.) Use reflection stick 'I investigated the problem...' so that students record their understanding in their maths journal.</p>		<p>'I investigated the problem...' reflection stick</p>	<p>Needs Support Use the HTU place value sheets to resource as a visual prompt. Give the students only 2 or 3 UNO cards to work with.</p>	<p>Needs Extension Use all place value sheets or do not use any place value sheets to see if children can show their understanding of periods. Give the children six or seven numeral cards so that they can demonstrate their understanding of periods. Ask them to give reasons for their placement of the digits.</p>

Overview of language and examples used in the teaching, learning and assessing program

A summary of the language mostly pertaining to this substrand as used in the following teaching, learning and assessing program.

Oral Texts	Visual Texts and Symbols	Text Knowledge	Grammar Knowledge	Word Knowledge
<p>Spoken Texts Participation in oral texts to explore understandings about number systems, roles of zero and numerals, numbers and quantities.</p> <p>Verbal elements Understand the 'illion' pattern to read large numerals, even when using made up numbers e.g. three hundred and twenty-five bazillion.</p> <p>Speech functions Respond to and ask questions.</p> <p>Statements to describe patterns and learning.</p> <p>Social exchanges Ask questions about other student's culture and share knowledge of their own. Collaborate with others.</p>	<p>Visuals in Multimodal texts Number lines to 20 Whole class display to show large numbers in order.</p> <p>Symbolism Symbols to represent numerals</p> <p>Semiotics Intertextual representations of oral and visual patterns <i>eg symbols can represent quantities</i></p>	<p>Written texts: Record reflections in their maths journal. - Anecdotes</p> <p>Text organisers / connectives Foregrounds the repeating unit, <i>eg Every second numeral</i></p> <p>Circumstances of -time: <i>then, next,</i> -place: <i>after, before</i></p> <p>Reference items <i>It, this</i></p>	<p>Simple sentence <i>This numeral is a label</i></p> <p>Compound sentence <i>This is a phone number and it is a label.</i></p> <p>Complex sentence <i>This numeral is a label that doesn't represent a quantity.</i></p> <p>Print Conventions use of comma in numerals, directionality</p> <p>Processes - Relational (<i>is, am, are</i>) - action (<i>count, write, draw, order</i>) - mental (<i>think, reflect,</i>)</p> <p>Tense Simple present and past tense Multi-word verb groups</p> <p>Subject Verb Agreement <i>eg It goes, There are</i></p> <p>Nouns and Noun Groups <i>Largest number, the number after 20</i></p> <p>Modality and graduation <i>It is impossible. This is definitely the largest number.</i></p>	<p>Topic Vocabulary <i>count back, count forward, amount, numerals, base 10, quantify, label, culture, symbols, digit, alphabet, numerals, numbers, formation, quantities, zero, roles, amount, infinite, hundreds, thousands, billions, trillions</i></p>

Top 5

	Learning Goal	Evidence of Learning
	I know the two purposes of number, to quantify and to label.	
	I can name numbers forwards and backwards.	
	I know what a numeral, digit and number is.	
	I can read large numerals.	
	I can recognise the numerals to 20 or 100	
Student Comment:		
Teacher Comment:		

Student Name	Can name numbers forwards from any given numbers within			Can name numbers backwards from any given numbers within			Can match numbers, numerals, and amounts			Can order the numerals			Can use the terms; numerals, numbers and digits in context	Can distinguish between quantifying and labelling	Can use 'illion' pattern when reading larger numbers
	10	20	100	10	20	100	10	20	100	10	20	100			

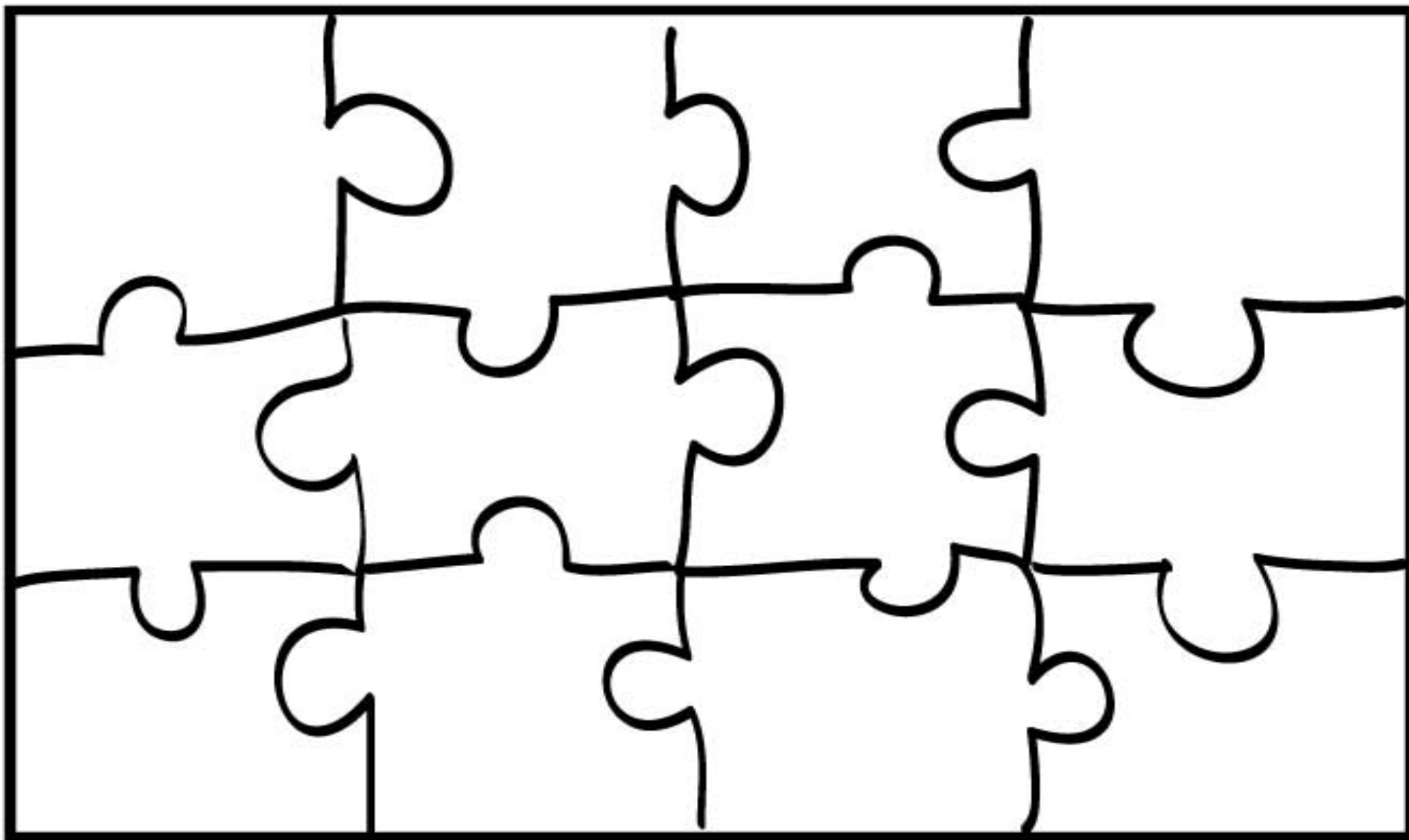
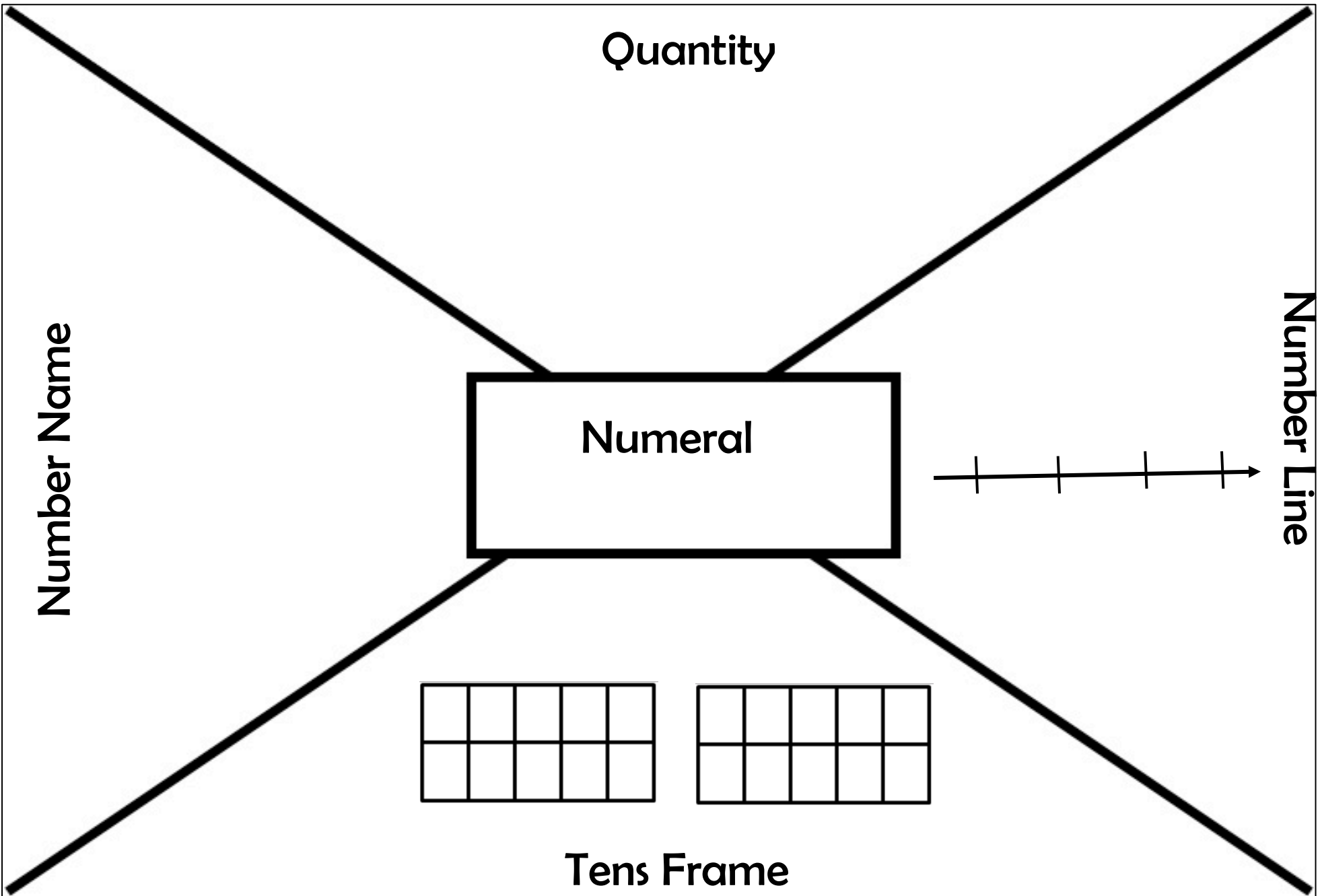


Image from Google images. http://www.datemplate.com/postpic/2013/09/puzzle-piece-template-printable_341368.jpg Date Accessed:17/04/2016



A world of numbers

People have invented hundreds of "number alphabets" throughout history, and a few of the important ones are shown here. They're very different, but they do have some interesting things in common. Most began with a tally of simple marks, like lines or dots. And most had a change of style at 10 – the number for two full hands.

	1	2	3	4	5	6	7	8	9	10	20	30	40	50	60	70	80	90	100	
Babylonian	∩	∩∩	∩∩∩	∩∩∩∩	∩∩∩∩	∩∩∩∩	∩∩∩∩	∩∩∩∩	∩∩∩∩	∩∩∩∩	∩∩∩∩	∩∩∩∩	∩∩∩∩	∩∩∩∩	∩∩∩∩	∩∩∩∩	∩∩∩∩	∩∩∩∩	∩∩∩∩	∩∩∩∩
Egyptian hieroglyphic	∩	∩∩	∩∩∩	∩∩∩∩	∩∩∩∩	∩∩∩∩	∩∩∩∩	∩∩∩∩	∩∩∩∩	∩∩∩∩	∩∩∩∩	∩∩∩∩	∩∩∩∩	∩∩∩∩	∩∩∩∩	∩∩∩∩	∩∩∩∩	∩∩∩∩	∩∩∩∩	∩∩∩∩
Egyptian script	∩	∩∩	∩∩∩	∩∩∩∩	∩∩∩∩	∩∩∩∩	∩∩∩∩	∩∩∩∩	∩∩∩∩	∩∩∩∩	∩∩∩∩	∩∩∩∩	∩∩∩∩	∩∩∩∩	∩∩∩∩	∩∩∩∩	∩∩∩∩	∩∩∩∩	∩∩∩∩	∩∩∩∩
Chinese rod	∩	∩∩	∩∩∩	∩∩∩∩	∩∩∩∩	∩∩∩∩	∩∩∩∩	∩∩∩∩	∩∩∩∩	∩∩∩∩	∩∩∩∩	∩∩∩∩	∩∩∩∩	∩∩∩∩	∩∩∩∩	∩∩∩∩	∩∩∩∩	∩∩∩∩	∩∩∩∩	∩∩∩∩
Chinese script	一	二	三	四	五	六	七	八	九	十	二十	三十	四十	五十	六十	七十	八十	九十	百	
Hindu (Gwalior)	∩	∩∩	∩∩∩	∩∩∩∩	∩∩∩∩	∩∩∩∩	∩∩∩∩	∩∩∩∩	∩∩∩∩	∩∩∩∩	∩∩∩∩	∩∩∩∩	∩∩∩∩	∩∩∩∩	∩∩∩∩	∩∩∩∩	∩∩∩∩	∩∩∩∩	∩∩∩∩	∩∩∩∩
Hebrew	א	ב	ג	ד	ה	ו	ז	ח	ט	י	כ	ל	מ	נ	ס	פ	צ	ק	ר	
Greek	Α	Β	Γ	Δ	Ε	Ζ	Η	Θ	Ι	Κ	Λ	Μ	Ν	Ξ	Ο	Π	Ρ	Σ	Τ	
Roman	I	II	III	IV	V	VI	VII	VIII	IX	X	XX	XXX	XL	L	LX	LXX	LXXX	XC	C	
Mayan	∩	∩∩	∩∩∩	∩∩∩∩	∩∩∩∩	∩∩∩∩	∩∩∩∩	∩∩∩∩	∩∩∩∩	∩∩∩∩	∩∩∩∩	∩∩∩∩	∩∩∩∩	∩∩∩∩	∩∩∩∩	∩∩∩∩	∩∩∩∩	∩∩∩∩	∩∩∩∩	∩∩∩∩
Modern Arabic	١	٢	٣	٤	٥	٦	٧	٨	٩	١٠	٢٠	٣٠	٤٠	٥٠	٦٠	٧٠	٨٠	٩٠	١٠٠	

Johnny Ball "Think of a Number" page 24

Two Place Value Systems

H	T	U
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Units

hundreds	tens	units
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thousands

hundreds

tens

units

millions

hundreds

tens

units

billions

hundreds

tens

units

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trillions

hundreds

tens

units

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quadrillion

hundreds

tens

units

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quintillion

Reflection Sticks

The thinking I did was...

The strategy I used was...

The way I worked this out...

Some ideas I used were...

Today I discovered

I made a connection...

I learned that I

I was surprised that...

I noticed

I discovered

I was pleased that I

I was interested ...

My learning was helped by...

I can explain my thinking...

I recorded my results...

The best way to record...


I proved that... is false

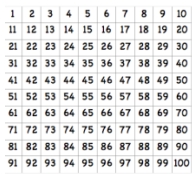

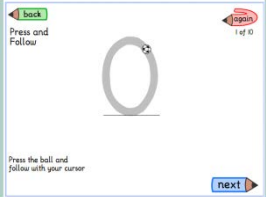
I proved that... is true

References

Place Value Sheets (see attached)	Supplied by Trish Boschetti	25/11/2015
Reflection Sticks (see attached)	Supplied by Trish Boschetti	25/11/2015

References

Resource	Link	Date Accessed																																																							
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<p>Hundred Chart</p> 	<p>http://cdn2.buggyandbuddy.com/wp-content/uploads/2013/06/Screenshot-2013-06-04-at-3.14.50-PM.png</p>	<p>17/04/2016</p>
<p>Number, Numeral, Number Name Matching</p> 	<p>https://www.teacherspayteachers.com/Product/Number-Name-Recognition-Memory-Pairs-Game-1390913</p>	<p>15/04/2016</p>
<p>Digit Formation - suggested online activity</p> 	<p>http://www.turtlediary.com/game/writing-numbers.html</p>	<p>12/11/2015</p>
<p>Digit Formation - suggested online activity</p> 	<p>http://www.doorwayonline.org.uk/literacy/letterformation/</p>	<p>14/04/2016</p>
	<p>http://gistroud.com/a/wp-content/uploads/2016/03/Thinkboard.jpg</p> <p>Resource created by Alissia King and Isabel Venables.</p>	<p>24/10/2016</p>