Students use numbers and operations and the relationships between them efficiently and flexibly.

Student Focus for Learning

- numbers represented in a variety of ways and representations including fractions, percentages, decimal fractions, positive integer powers and ratios
- place value and understandings necessary for ordering and distinguishing relative magnitudes of whole and decimal numbers with very small and very large numbers
- the concepts of negative and irrational numbers, numbers that form a continuum, and that between any two real numbers there is another real number
- simplifying fractions and ratios and converting fractions to decimals and decimals to fractions
- the four operations including division and operations with positive and negative rational numbers
- the commutative, associative and distributive properties of operations to explore patterns and generalisations
- order of operations and the use of brackets
- fractions and decimal numbers for addition, subtraction, multiplication and division calculations
- mental computation, estimation and paper and pencil techniques
- the conventions and uses of calculators
- number operations in a wide range of problem situations, examining and selecting the operation and checking the reasonableness of results
Background

Traditional Aboriginal society in Western Australia did not use the decimal (base 10) ‘two hand’ number system. In place of this they used a base five or ‘one hand’ number system. When items were distributed evenly they might be broken into groups, for example of one hand and two more. Most groups had words for one, two, three, four and a handful. In a number of cases they did not require a concept for zero and amounts less than one.

Ideas for teaching units in Number from an Aboriginal perspective

- Students find the words used for each of the numbers one, two, three, four and a handful in the local Aboriginal language.

- Students investigate and develop the base five number system using place and face value.

- Students find the rules for the four operations of addition, subtraction, multiplication and division of numbers in the base five systems.

- In class a great deal of time is given over to the concept of equal sharing, especially in the teaching of fractions. Have the students discuss instances in their own family where an object, such as food, is not divided into equal amounts. Students to compare and contrast the concept of equal and unequal sharing.
Example Lesson Plans

Topic: Base 5 number system

Background
A numeral system (or system of numeration) is a framework where a set of numbers are represented by numerals in a consistent manner. It can be seen as the context that allows the numeral "11" to be interpreted as the binary numeral for three, the decimal numeral for eleven, or six for base five, etc.

Many counting systems employed by Aboriginal Australians use 5 as a primary base, almost surely coming from the number of fingers on a person's hand. Most of these languages had words for the numbers from one to five. In some languages the word for 5 is the same as "hand." The concepts of zero, parts of a whole or negative numbers tend to be irrelevant.

Most sharing in Aboriginal communities tended to be based on a person's position and there was little use for collecting resources for the sole purpose of hoarding. The number system that was developed was generally for sharing communal food. A family could receive one handful and two or two handfuls and three.

Class activity

• Students review the base ten number system. Consider how numbers are developed and written given their place value and face value.
• Students investigate other number systems.
• Explain the idea that a system of numbers based on one hand rather than both will produce a base five number system rather than base ten.
• Using only the digits 0, 1, 2, 3, and 4, students write the numbers from one to fifty.
<table>
<thead>
<tr>
<th>$n$</th>
<th>Image</th>
<th>Number of Fingers</th>
<th>Symbols</th>
<th>Number of Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>![Image](1 finger.png)</td>
<td>one finger</td>
<td>X</td>
<td>one unit</td>
</tr>
<tr>
<td>2</td>
<td>![Image](2 fingers.png)</td>
<td>two fingers</td>
<td>XX</td>
<td>two units</td>
</tr>
<tr>
<td>3</td>
<td>![Image](3 fingers.png)</td>
<td>three fingers</td>
<td>XXX</td>
<td>three units</td>
</tr>
<tr>
<td>4</td>
<td>![Image](4 fingers.png)</td>
<td>four fingers</td>
<td>XXXX</td>
<td>four units</td>
</tr>
<tr>
<td>10</td>
<td>![Image](1 hand.png)</td>
<td>one hand no fingers</td>
<td>XXXXX</td>
<td>one group of five</td>
</tr>
<tr>
<td>11</td>
<td>![Image](1 hand 1 finger.png)</td>
<td>one hand one finger</td>
<td>(XXXXX) X</td>
<td>one group one unit</td>
</tr>
<tr>
<td>12</td>
<td>![Image](1 hand 2 fingers.png)</td>
<td>one hand two fingers</td>
<td>(XXXXX) XX</td>
<td>one group two units</td>
</tr>
<tr>
<td>13</td>
<td>![Image](1 hand 3 fingers.png)</td>
<td>one hand three fingers</td>
<td>(XXXXX) XXX</td>
<td>one group three units</td>
</tr>
<tr>
<td>14</td>
<td>![Image](1 hand 4 fingers.png)</td>
<td>one hand four fingers</td>
<td>(XXXXX) XXXX</td>
<td>one group four units</td>
</tr>
<tr>
<td>20</td>
<td>![Image](2 hands.png)</td>
<td>two hands</td>
<td>(XXXXX) (XXXXX)</td>
<td>two groups of five</td>
</tr>
<tr>
<td>21</td>
<td>![Image](2 hands 1 finger.png)</td>
<td>two hands one finger</td>
<td>(XXXXX) (XXXXX) X</td>
<td>two groups one unit</td>
</tr>
</tbody>
</table>
Resources

• Australian Aboriginal counting systems
  http://en.wikipedia.org/wiki/Australian_AboriginalEnumeration

• The Sumerian number system. Absolute and place-value number systems.

• Incan counting system