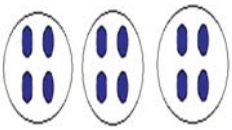
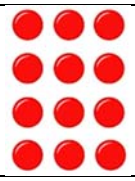
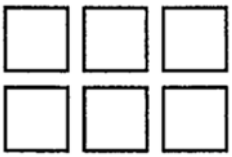
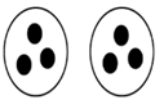
8 February 2017

How we teach maths – Number operations

Provided is an outline of the methods used to teach addition, subtraction, multiplication and division during maths lessons in classrooms K-6. Teaching methods have changed significantly from the 20th century where the focus was on mechanical based knowledge of process (the algorithm) with rote learning of facts. 21st century teaching methods in all subjects focuses on deep understanding and students developing efficient mathematical strategies. We still use the old methods……but not only the old.

We hope that this information can be of assistance to you when helping your child with maths at home.

Multiplication and Division – mental and written strategies

Counting by ones, twos, fives and tens etc, using rhythmic or skip counting	Use body percussion to add interest **Rhythmic** – 1, 2, 3, 4, 5, 6, 7, 8, 9, 10 **Skip** – 3, 6, 9, 12, 15, 18, 21……..
Describing collections of objects as "rows of" **(arrays)** or "groups of" This models that multiplication and division uses **"equal"** groups	 **or** 
Finding the total number of objects using skip counting	5 groups of 2 = 2, 4, 6, 8, 10
Finding the total number of objects using **repeated addition**	5 groups of 4 (5 x 4) = 4 + 4 + 4 + 4 + 4 = 20
Modelling the **commutative property** of multiplication	3 groups of 2 is the same as 2 groups of 3 **OR** 7 x 6 is the same as 6 x 7
Modelling division by **sharing collections** of objects into equal groups or as equal rows in an array.	6 objects shared between 2 friends  **OR** 
Recognising the **symbols** for division, multiplication and equals	**X** for multiplication **÷** or **/** for division **=** for equals
Using a **close known** multiplication fact to solve a challenging fact	8 x 9 = I know 8 x 10 = 80 So 80 – 8 = 72

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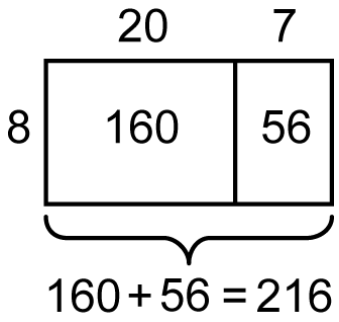
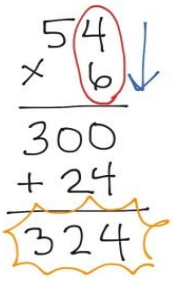
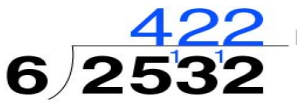
Partitioning multiplication facts to make them easier	6 x 7 is the same as….. 3 x 7 x 2 ……or (3 x 7) + (3 x 7)
Doubling and halving repeatedly to solve 2, 4 & 8 and 3, 6, 12 and 5 & 10 times tables and division questions	6 x 8 = 6 + 6 = 12 12 + 12 = 24 24 + 24 = 48 64 ÷ 4 = ½ of 64 = 32 ½ of 32 = 16
Applying partitioning through the **"area model"** for larger multiplication questions	8 x 27 = 
Using the **formal algorithm** (old school method!) for multiplying and dividing larger numbers	54 x 6 =  2532 ÷ 6 
Using place value to partition and multiply numbers	**673 x 4 = (600 x 4) + (70 x 4) + (3 x 4)** **= 2400 + 280 + 12** **= 2692**

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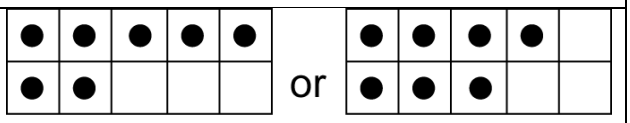
Addition and Subtraction – mental and written strategies

These strategies are for adding and subtracting one and two digit numbers

Counting on from the largest number to find the total of two numbers	6 + 4 = 10 **7, 8, 9, 10**
Counting back from a number to find the number remaining	12 – 4 = 8 **11, 10, 9, 8**
Counting on or back to find the difference between two numbers	
Create and recognise combinations for numbers to at least 10, eg 'How many more make 10?'	
Double and near doubles	5 + 7 = Double 5 Then add 2 = 12
Combining numbers that add to 10	4 + 8 + 6 = 4 + 6 = 10 Then add 8 = 18
Bridging to 10	17 + 5 = 17 + 3 = 20 Then add 2 = 22
Recording patterns for individual numbers by making all the possible whole-number combinations	**5** 5 + 0 = 5 4 + 1 = 5 3 + 2 = 5 1 + 4 = 5 0 + 5 = 5

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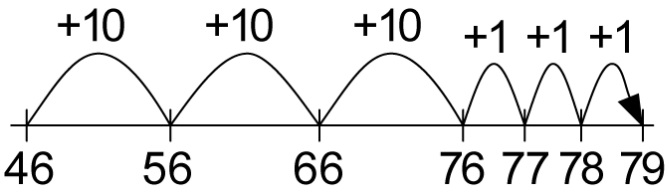
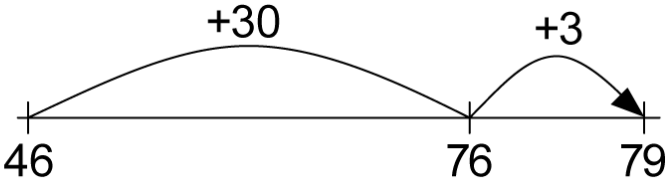
These strategies are for adding and subtracting larger numbers

Jump strategy – ADDITION

46 + 33

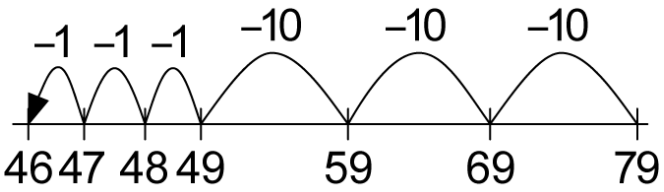
OR

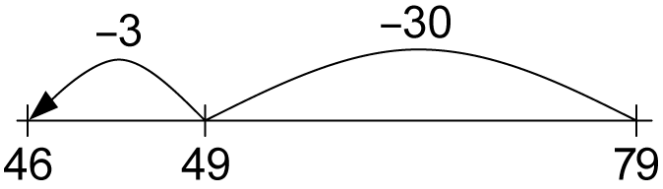




Jump strategy – Subtraction

79 – 33





Split strategy – addition

146 + 333 = 479

100 + 40 + 6 + 300 + 30 + 3
First add the hundreds
100 + 300 = 400
Then add the tens
40 + 30 = 70
Then add the ones
6 + 3 = 9

400 + 70 + 9 = 479

Split strategy – subtraction

479 – 146 = 333

479 – 100 – 40 – 6
First take away the hundreds
479 – 100 = 379
Then take away the tens
379 – 40 = 339
Then take away the ones
339 – 6 = 333

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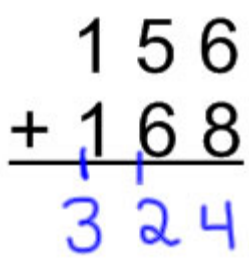
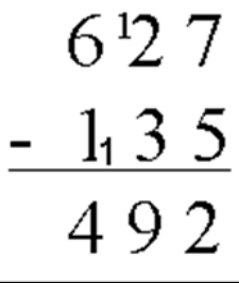
The formal algorithm – addition	**The formal algorithm** – subtraction
	

All of these strategies are hierarchical. Students cannot progress to the more complex strategies for larger numbers without learning the fundamental strategies with small numbers. The key to understanding the four operations is for students to develop a deep understanding of place value and treat our number system flexibly.

All of these strategies are backed by the NSW Board of Studies rationale of *developing students to be creative and flexible users of Mathematics.*

Lee Englefield

Assistant Principal