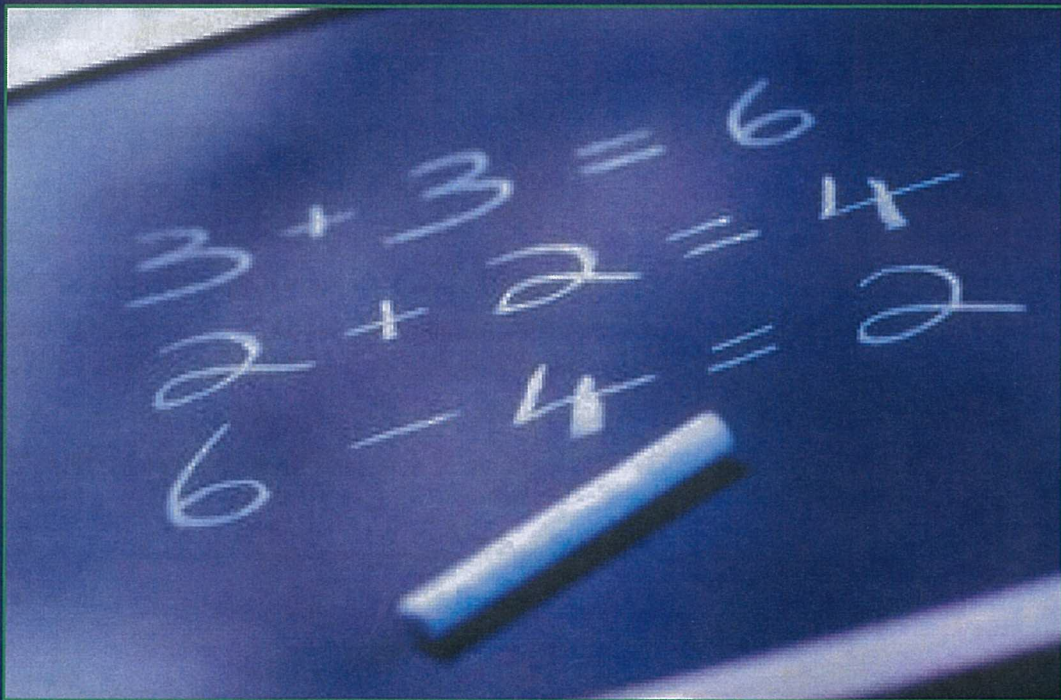


EFFICIENT

ADDITION & SUBTRACTION



Creative Numeracy
Cattai School of Aart
The 3Rs The Professional Way

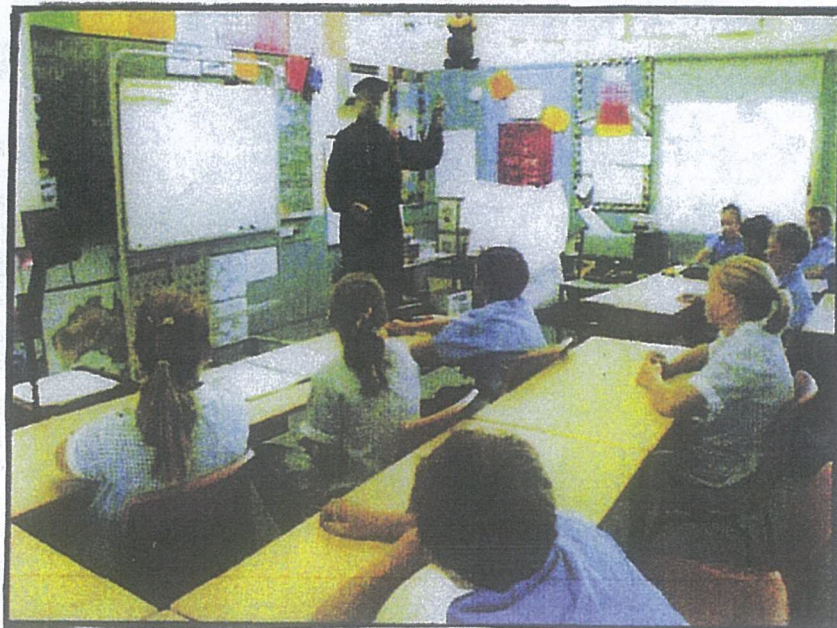
Efficient Addition & Subtraction

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From: Numbers in a Nutshell

Author's Background

Born in 1928

1. **Dutch Diplomas:** HSC, Naval College, 2nd Officer Dutch Merchant Navy, Commercial correspondence Spanish, French and English.
2. **Languages:** Dutch, English, German, French, Spanish, Portuguese and Italian.
3. **High School Teacher:** Holland (2 Years), Australia (12 Years).
4. **Subjects:** English, French, Latin, Spanish, Creative Writing, Art, Music, Technical Drawing & Mathematics.
5. **Private Tutor** since 1976.
6. **Author** of Text Books.
7. **Musician.**



Numbers In A Nutshell : Cattai Public School 2003

The Decimal System

- Learning to confidently add any set of numbers in record time without calculator may be achieved by applying **12 general rules and recipes** (*). It heralds the end of Rote Learning, saying or copying the traditional tables over and over again, often without the hoped-for outcome.
 - The success of this highly efficient course is the result of **training eyes to look and see** instead of relying on variable intelligence! The guided awareness of specific features combined with the use of Verbal Rehearsal, number cards and routine procedures satisfies the 5 requirements in Professional Memory training:
 1. Interest (created by the teacher)
 2. Attention
 3. Concentration (attention to detail)
 4. Visualisation
 5. Repetition
 - My method completely bypasses the Failure Mechanism that is often activated by too many explanations, a modern phenomenon! That's why Subtraction is learnt by using its own rules and recipes. The relationship between Addition and Subtraction is not mentioned. However, since the transition from Addition and Subtraction to the concept of positive and negative numbers in year 7 always creates problems for many students, that topic has been summarily dealt with.
 - As far as Numeracy is concerned, young children should be intelligently programmed like a calculator for their own benefit, especially since it takes at least ten years for the human brain to reach maturity (Uma História da Linguagem).
 - Practising Arithmetic should be considered a practical as well as a therapeutic activity. With the advent of the Internet, Google, Facebook, IPHones and the like, memorising has almost become extinct causing braincells to die off (National Geographic); the price we have to pay for technology and progress. Many children now have a T.V. brain, one that is only suitable to watch the screen (Endangered Minds, Healey). **It's not the apes we come from, it's where we are going!**
- (*) A general rule generates an infinite number of answers. The word recipe is used here to find the answers to a limited group of additions or subtractions.

Program

- General rules and Recipes for Addition (pages 1&2). The use of Choral Reading.
- Exercises 1&2 on page 4.
- Exercise 3: The 36 additions are mixed, black numbers up. Students give oral answers and immediately check the ones on the back. Errors should be recorded on page 4 in the appropriate sections. The exercise should be repeated if necessary until the final score is 100%.
- Exercises 4&5.
- Mentals.
- Addition as a therapy.
- General rules and Recipes for Subtraction (pages 7&8).
- Exercise 6: Guided revision.
- Algorithms Type one.
- Exercise 7: Guided revision.
- Algorithms Type two.

General Rules & Recipes for Addition.

Including the 12 Basic Ones.

If you add 1 to a number, you get the next number.

1.	1+12	1+23	1+34	1+45	1+56	1+67	1+78	1+89
----	------	------	------	------	------	------	------	------

SEE & SAY

If you add 2 to an **odd** number, you get the **next** odd number.

2.	2+3	2+17	2+25	2+39	2+43	2+51	2+69	2+77
----	-----	------	------	------	------	------	------	------

SEE & SAY

If you add 2 to an **even** number, you get the **next** even number.

3.	2+12	2+26	2+34	2+48	2+60	2+76	2+84	2+98
----	------	------	------	------	------	------	------	------

THE 9 - PARTNERS

4.	1 - 8	2 - 7	3 - 6	5 - 4				
	11+8	23+6	32+7	44+5	58+1	67+2	76+3	85+4

SEE & SAY

The first 9 - recipe: Think 1 less and teen.

5.	7+9	9+9	5+9	8+9	6+9	4+9	3+9	2+9
----	-----	-----	-----	-----	-----	-----	-----	-----

SEE & SAY

The second 9 - recipe: Think 1 more, 1 less.

11+9	23+9	49+9	76+9	87+9	95+9	104+9	232+9
19+2	29+4	59+3	79+7	99+2	119+3	129+5	89+9

General Rules & Recipes for Addition.

Including the 12 Basic Ones.

THE 10 - PARTNERS

6.	1-9	2-8	3-7	4-6	5-5
	one - nine	two - eight	three - seven	next even	2 hands

SEE & SAY

Think 1 more and zero.

14+6	21+9	35+5	42+8	57+3
196+4	283+7	379+1	735+5	642+8

SEE & SAY

The number and teen

7.	9+10	6+10	8+10	5+10	3+10
-----------	------	------	------	------	------

SEE & SAY

1 more and keep.

14+10	51+10	99+10	188+10	515+10
-------	-------	-------	--------	--------

DOUBLES

8.	3+3	4+4	6+6	7+7	8+8
-----------	-----	-----	-----	-----	-----

$\frac{1}{2}$

DOUBLES PLUS ONE

9.	3+4	5+6	6+7	7+8	8+7
Even down 8 + 6 ----- 4 teen	$\frac{3}{9}$ say aloud 3-5-8 5-8-13	4711 If 4+7=11 5+7=12	FOUR - SEVEN ELEVEN If 4+7=11 4+8=12	4711 If 4+7=11 3+8=11	

10.

11.

12.

2 + ODD

1 2 3

2 + EVEN

1 2 3 4

The 10 - Partners

The 9 - Partners

D
O
U
B
L
E
S
+
1

The First 9 - Recipe:

Think 1 Less & Teen

The Second 9 - Recipe:

Think 1 More, 1 less

Doubles in Action



The
Four - Seven - Eleven
Group

8
6
↓
4 Teen

3-5-8

5-8-13

1.

NOTE: The Biggest Combination is $9+9=18$
 So 20 can only
 Become 30

$$24 + 8$$

$$\text{See } 20 + 12$$

Say Thirty - Two

2.

$$67 + 6$$

$$\text{See } 60 + 13$$

Say Seventy - Three

3.

$$21 + 35$$

$$\text{See } 50 + 6$$

Say Fifty - Six

4.

$$34 + 49$$

$$\text{See } 70 + 13$$

Say Eighty - Three

A Single Column

1.

EYES

3
5 8
6 14
7 21
8 29
9 38
2 40

1. Say Aloud
2. Think

2 Columns

2.

Without crutch figures;
it disturbs fluency.

In a relay race, the baton is passed on, not thrown on the ground!

10	83		← Start
17	75	8	Say or Think
23	66	14	
28	57	21	
+ 2	38	29	Put down the 9,
Pen ↓	319	↓	carry the 2'n 8's 10
			L ← R

3.

Check

379	1
523	1
+ 417	3
1319	5 ✓

Checking with the 9-remainder method (Trachtenberg): Reduce each number to one single digit by adding its digits. Mentally cancel nines or combinations totalling nine.
Note: The 9-Remainder is the sum of the digits.

Eg: $21 = (2 \times 9) + 3$

4.

Finding Palindromic Numbers

- Start with any number
- Add its reverse
- Repeat this procedure
- Eventually, you'll find one

	379	
	+ 973	

	1352	
	+ 2531	

	3883	

It reads the same both ways

General Rules & Recipes for Subtraction

If you take 1 from a number, you get the number before.

1	20-1	11-1	18-1	39-1	47-1	54-1	66-1	74-1
---	------	------	------	------	------	------	------	------

The *difference* between two *consecutive* numbers is 1

2	17-16	15-14	20-19	31-30	49-48	56-55	64-63	100-99
---	-------	-------	-------	-------	-------	-------	-------	--------

The *difference* between two *consecutive odd* numbers is 2

3	19-17	5-3	27-25	33-31	41-39	3-1	51-49	61-59
---	-------	-----	-------	-------	-------	-----	-------	-------

The *difference* between two *consecutive even* numbers is 2

4	2-0	14-12	26-24	38-36	50-48	62-60	70-68	100-98
---	-----	-------	-------	-------	-------	-------	-------	--------

If you take 2 from an *odd* number, you get the *odd* number before.

5	3-2	11-2	25-2	37-2	49-2	51-2	63-2	75-2
---	-----	------	------	------	------	------	------	------

If you take 2 from an *even* number, you get the *even* number before.

6	2-2	14-2	26-2	38-2	40-2	52-2	64-2	76-2
---	-----	------	------	------	------	------	------	------

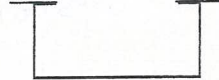
The missing 9-partners

7	9-1	9-2	9-3	9-4	9-5	9-6	9-7	9-8
---	-----	-----	-----	-----	-----	-----	-----	-----

Replace the 9 by the missing partner

	19-1	29-3	39-2	49-4	59-8	69-7	79-6	89-5
--	------	------	------	------	------	------	------	------

General Rules & Recipes for Subtraction

8	The 9 - remainder group		
	The 9-remainder is the sum of the digits: $13 = 9 + 4$ 	∴ (means therefore)	
		$13 - 9 = 4$	$13 - 4 = 9$

15-9	11-9	16-7	16-9
11-2	18-9	14-9	15-6
10-1	19-10	13-4	18-9
13-9	10-9	14-5	12-9
17-8	17-9	19-9	12-3

The second 9 - recipe in reverse: Think 1 less, 1 more.

9	20-9	37-9	41-9	53-9
	68-9	72-9	84-9	106-9

Think missing 10-partners

10	10-2	20-4	30-3	40-5	50-7	60-6	70-8	80-9
-----------	------	------	------	------	------	------	------	------

Think 1 less and keep

11	18-10	75-10	34-10	83-10	92-10	61-10	56-10	47-10
-----------	-------	-------	-------	-------	-------	-------	-------	-------

The left-overs

12	7-3	8-5	7-4	8-3	11-4	14-8	11-7	12-7
-----------	-----	-----	-----	-----	------	------	------	------

ALGORISMS

They must be done as an old fashioned **routine!**
 Explanations only activate the failure mechanism;
 the calculator doesn't provide them either.
 If you explain too much, you explain nothing.

TAKEAWAY is only for Fish & Chips or Hamburgers.
 Type 1 Algorithms

<p style="text-align: center;">Say;</p> $ \begin{array}{r} 98 \text{ Positive } 98 \\ \text{Not shown} \\ - 55 \text{ Negative } 55 \\ \hline 43 \text{ Positive } 43 \end{array} $	1.	$ \begin{array}{r} 76 \\ - 44 \text{ The negative sign is written in front! (As you say it)} \\ \hline 32 \end{array} $	2.
Type 1			

Year 7: $-7 + 5 - 3 + 4 - 2 + 1 = -2$
 Think: There are 12 **Negatives** & 10 **Positives**.
 "The **Negatives** win by 2"

Exercise 6: Guided Revision with cards.

Exercise 7: The 45 Possibilities.
 Check Answers on the back of the cards.
 Type 2 Algorithms

<p>Routine:</p> $ \begin{array}{r} \text{Put 1} \\ \downarrow \\ \text{Take 1} \rightarrow 43 \\ - 8 \\ \hline 35 \end{array} $ <p style="margin-left: 100px;">Do $13 - 8 = 5$</p>	3.	<p>Stage 1: Using 10 - partners</p> $ \begin{array}{r} 13 - 8 = 5 \end{array} $ <p>Think 2+3</p> <p>Stage 2: Exercise 7</p> <p style="text-align: right;">Direct Answers</p>
---	----	--

<p>Routine:</p> $ \begin{array}{r} \text{Put 1} \\ \downarrow \\ \text{Take 1} \rightarrow 50 \\ - 17 \\ \hline 33 \end{array} $ <p style="margin-left: 100px;">Do $10 - 7 = 3$</p>	4.	$ \begin{array}{r} 73 \uparrow 10 \checkmark \\ - 25 + 7 \\ \hline 48 \quad 3 \text{ Check Up!} \end{array} $	5.
--	----	--	----

$ \begin{array}{r} 195 \uparrow 6 \checkmark \\ - 36 + 0 \\ \hline 159 \quad 6 \text{ ignore nines or combinations} \end{array} $	6.	$ \begin{array}{r} 333 \uparrow 9 \checkmark \\ - 178 + 7 \\ \hline 155 \quad 2 \end{array} $	7.
--	----	--	----

Back to Basics

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