2X7=14

6X3=18

3X3=9

Mental Computation

Multiplication and Division facts

8X7=56

7X5=35

4X5=20

When should students know their multiplication facts?

The Victorian curriculum states…

At the end of level 4, students should be able to recall multiplication facts up to 10x10 and related division facts.

‘Times Tables’

- An issue which is often of great concern to parents.
- Approximately 40% of students leave Primary School without a confident knowledge of these facts.
- Non-negotiable on leaving Primary School (ask any secondary school maths teacher)
- A team effort is required - student/teachers/parents

Multiplication facts in Prep?

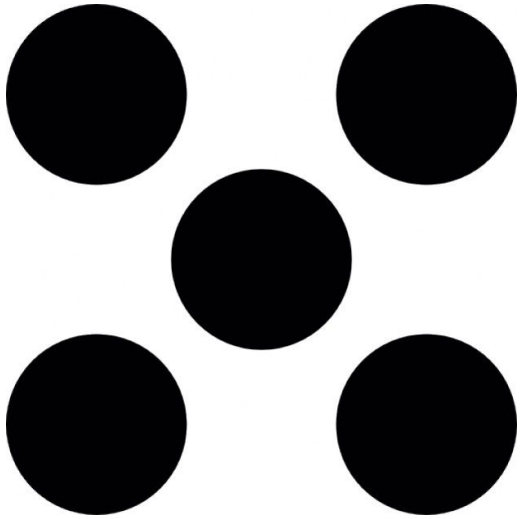
We could wrongly assume that students only start learning these facts at Year 4.

Nothing could be further from the truth!

Trusting the count...

5 five

1,2,3,4,5

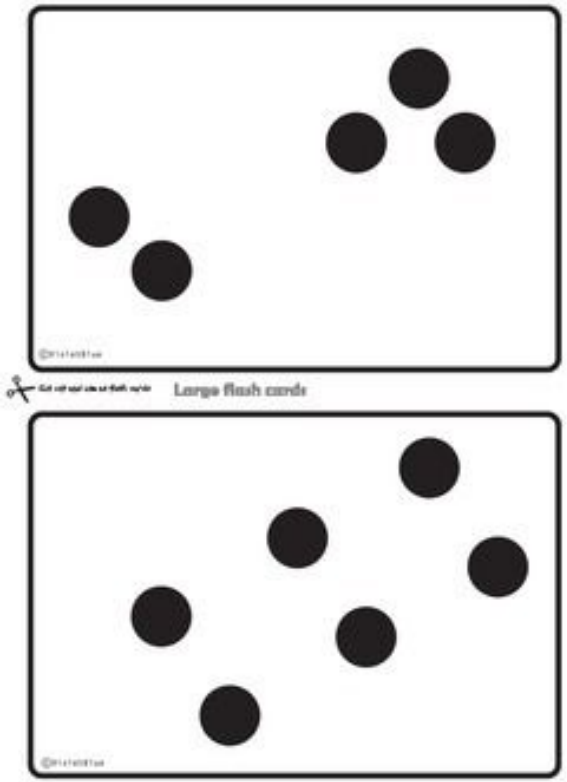


2 and 3 is 5

4 and 1 is 5

Subitising

Recognising collections without counting



Place Value

Understanding that the 6 in 635 means 600

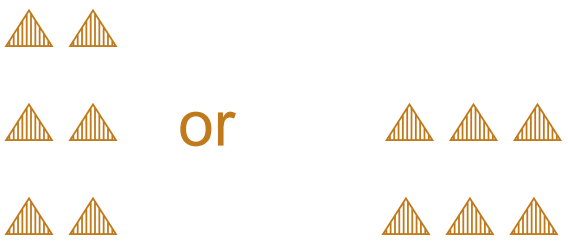
If our students have all of this in place they will have the necessary level of number sense to learn and understand the multiplication facts.

Composite units

Essentially a composite unit is a unit made up of other units.

For example 24 cans of soft drink can be 1 ‘twenty four’ unit as well as 4 ‘six’ units.

Additive and multiplicative thinking...

Additive	Multiplicative
To solve multiplication 3 groups of 2 would be solved as 2+2+2 	Visualising multiplication in 2 dimensions - 3 rows of 2 or 2 rows of 3 

Remembering the facts...

The ultimate goal is to have the multiplication facts committed to memory so they can be recalled quickly and accurately, without too much conscious processing.

Rote Learning	Memorisation
Once memorised, mental computation facts are filed in procedural memory.	Once memorised, mental computation facts are filed in procedural memory.
This frees up our working memory to focus on other learning and processing tasks.	This frees up our working memory to focus on other learning and processing tasks.
Not necessarily accompanied by number sense.	Accompanied by Number Sense. It assumes understanding! People with number sense are those who can use numbers flexibly.
If facts are forgotten, no strategies for working out the answer.	Committing to memory the relationships and number facts which if forgotten they could efficiently re-create using learnt strategies.

Number sense

Being able to manipulate numbers.

When asked to solve 7 x 8, someone with number sense may have memorized 56, but they would also be able to work out that

- 7 x 7 is 49 and then add 7 to make 56,
- ten 7's and subtract two 7's (70-14).

Teaching Multiplication at St Fidelis

First……Understanding

Second….Strategies

Third…..Memorisation

Reducing the memory load

- Teaching strategies reduces how much children have to commit to memory.

- There are 100 Facts to be learned. Through using strategies we reduce the amount learnt to 21-six of which are square numbers (6X6)

Strategies

- The purpose is to introduce to children at least one efficient strategy for **each basic fact**, but we must ensure we say it is not the only way

- Eg: 6X7
- Can be 5X7+7 or double 3X7

Sequence for teaching the strategies

- 10s, 2's
- 5s (from 10s)
- 1s, 0's
- 4s and 8s (from 2s)
- 3s (from 2s)
- 6s (from 5s)
- 9s (from 10s)
- 7s (spin arounds, memorise 7x7)

Doubling
2's

Doubling and halving are important preparations for multiplication

This is children's first introduction to multiplication and they appear to gain control of this long before they can perform other multiplications.

Eg:2X8 is double 8

X	1	2	3	4	5	6	7	8	9
1	1	2	3	4	5	6	7	8	9
2	2	4	6	8	10	12	14	16	18
3	3	6	9	12	15	18	21	24	27
4	4	8	12	16	20	24	28	32	36
5	5	10	15	20	25	30	35	40	45
6	6	12	18	24	30	36	42	48	54
7	7	14	21	28	35	42	49	56	63
8	8	16	24	32	40	48	56	64	72
9	9	18	27	36	45	54	63	72	81

Think of ten
5's and 9's

5 sevens

THINK: half of 10 sevens, 35

9 eights

THINK:
1 less than 10 eights,
1 eight less than 80,
72

X	1	2	3	4	5	6	7	8	9
1	1	2	3	4	5	6	7	8	9
2	2	4	6	8	10	12	14	16	18
3	3	6	9	12	15	18	21	24	27
4	4	8	12	16	20	24	28	32	36
5	5	10	15	20	25	30	35	40	45
6	6	12	18	24	30	36	42	48	54
7	7	14	21	28	35	42	49	56	63
8	8	16	24	32	40	48	56	64	72
9	9	18	27	36	45	54	63	72	81

Multiplication of 1

Anything multiplied by one is itself

This reduces the number of facts to be learnt by 17 leaving 64

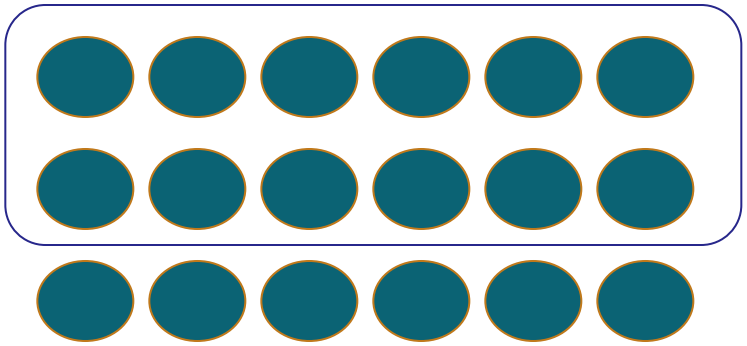
X	1	2	3	4	5	6	7	8	9
1	1	2	3	4	5	6	7	8	9
2	2	4	6	8	10	12	14	16	18
3	3	6	9	12	15	18	21	24	27
4	4	8	12	16	20	24	28	32	36
5	5	10	15	20	25	30	35	40	45
6	6	12	18	24	30	36	42	48	54
7	7	14	21	28	35	42	49	56	63
8	8	16	24	32	40	48	56	64	72
9	9	18	27	36	45	54	63	72	81

Multiplication of 0

- Anything multiplied by zero equals zero
- This reduces what needs to be learnt by 19 facts - There are only 81 facts left to learn

Double and one more 3's

- **3X6= double 6 and one more 6.**



- Introduce with small numbers but has excellent applications with mental computation of larger numbers eg: 3X35= (2X35)+35=

Double, Double - 4s
Double, Double, Double - 8's

4x7 = double 7 =14, double 14 = 28

8x7 = double 7 =14, double 14 = 28,
double 28 = 56

3s

Use 2's facts

3x2s is 2x2s and one more group

Or double and one more group

6s

X6 (Think x5 and add 1 more group)

6x4 is 5x4 and one more 4

What about the 11's and 12's?

- In today's curriculum children are only required to know their tables up to 10X10.
- 11's are an interesting pattern and easy to learn so feel free to explore them with your class
- 12's were required for the imperial measurement system and thus have less application today

9’s

X9 (Think x10 and take away one group)

9x6 is 10x6 take away one group of 6

7s

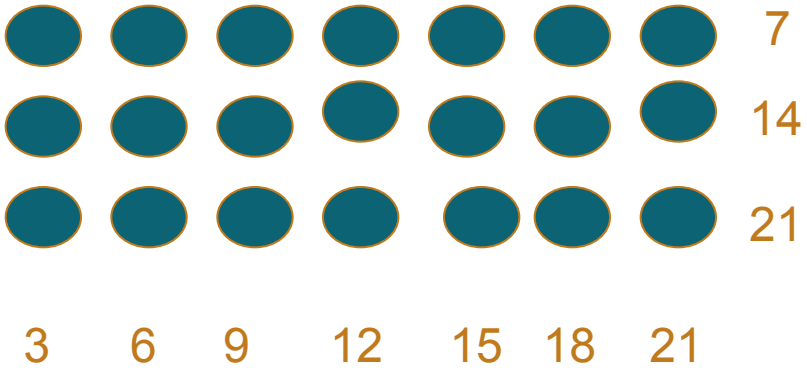
Spin arounds…

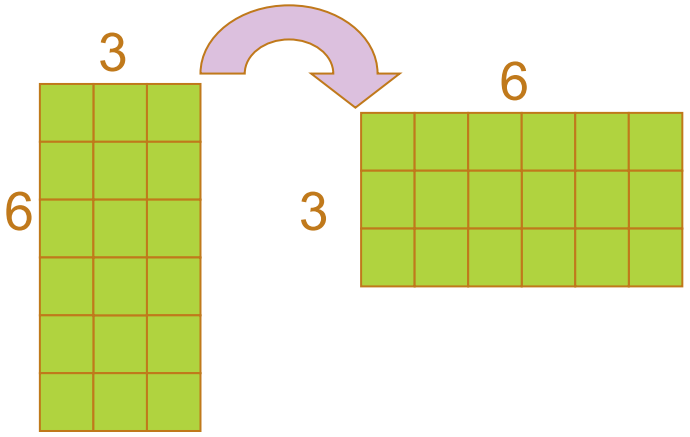
7x3 think 3x7

The only one left to memorise is 7x7=49

Commutativity

- Spin Arounds 7X3= 3X7
- A good way of showing this is in an array





Reduces the 64 facts to be learnt by almost half

How can you help at home?

- Encourage knowledge and practice of skip counting - make the connection!
- Practice using strategies but continually ask children to justify how they worked out the answer- celebrate differences!
- Constantly Reinforce commutativity
- ie: 3X4=4X3
- Continually encourage and discuss connections eg: 3x4=12 and 12/3=4

The great ‘Tables’ debate

- Knowing the basic multiplication facts is integral to further maths knowledge, however knowing the table form is not really necessary.
- Eg: 1x2=2

  2x2=4
- Skip counting is more crucial than ‘three ones are three, three twos are six’

Skip Counting

- **3,6,9,12**

- Students only need remember the answers and can use their fingers to keep track

Language

- 3X4 should be read as
- *'3 lots of 4'*
- '*3 times 4'* meaning 4+4+4

NOT

- 3 '*multiplied by*' 4 is not used as it implies 3+3+3+3
- 3 '*timesed by*' 4 is not a word in the English language

Basic Multiplication and Division facts

- Memorising 5 multiples at one time is a reasonable expectation for most students, whereas ten is a big challenge for many.

- Division facts in general are not committed to memory. The most common strategy is to turn it into multiplication eg: 28/4 becomes 4X?=28

Once the basic facts are learnt move on to larger numbers and encourage students to apply the basic strategies

How would you solve these?

- 2X24
- 3X24
- 4X24
- 5X24
- 6X24
- 7X24
- 8X24
- 9X24

Other ideas..

- **Goodies vs Baddies**

  One piece of useful advice is to use simple flashcards, small scale, with only the facts that are being targeted. Don't take much time on practising facts that are already known, but focus on missing skills.

- Time for individual practice at home is essential. Have children make their own flashcards.
- Online tables games
- Practise skip counting