**Multiplicative Thinking**

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**What is it?**

**Why is it important?**

**How important?**

“The capacity to think multiplicatively is crucial to success in further school mathematics. … [it] is the single most important reason for the eight-year range in mathematics achievement in Years 5 to 9.”

(Siemon, 2013, p. 41)
M/T is fundamental to the development of key concepts

73% of curriculum content descriptors (CCDs) in the Number and Algebra strand of the Australian Curriculum: Mathematics are highly supportive of at least one aspect of multiplicative thinking and/or strongly underpins it.

Multiplicative Thinking is MORE THAN repeated addition, multiplication facts, and being able to ‘do’ multiplication algorithms.
So what is Multiplicative Thinking?

- Work flexibly with a wide range of numbers including very large and small whole numbers, decimals, fractions, ratio and percentage

- Work conceptually with the relative magnitude of whole and decimal numbers in a range of representations, demonstrating an understanding of the notion of ‘times as many’
So what is Multiplicative Thinking?

- Demonstrate a conceptual understanding of the multiplicative situation, the relationship between multiplication and division, numbers of equal groups, factors and multiples, and the various properties of multiplication.

- Articulate a conceptual understanding of a range of multiplicative ideas in a connected way with explicit language and terminology.

Multiplicative Thinking

We worked with over 2 000 students and 80 teachers in 21 schools in WA, England, New Zealand and Victoria.

The data showed remarkable consistency in the way students responded, and is in line with data collected in the 2003-2006 SNMY project (3 500 students).
Take a few minutes to consider…

Tommy and Jamie were asked to represent $3 \times 4$ with tiles. They responded in the following ways.

What does each work sample tell you about each student’s understanding of the mathematics involved?

Which answer shows a greater level of Multiplicative Thinking?

Take a few minutes to consider…

Tommy and Jamie were asked to represent $3 \times 4$ with tiles. They responded in the following ways.

What teaching strategies could you employ to help each student?

How confident were you in answering these three questions?
Year Six children were asked to multiply 17 by 6.

Clearly, there are some issues here!

What teaching strategies could you employ to help each student?
What Irene knows ...

29 × 37
She was able to do 17 × 6 and 34 × 4 but used a vertical algorithm both times. However, when she did the 29 × 37 example, she said (after doing the 29 × 7 part), “Cross out the 7 and do 3 × 9 is 27, put the 2 there. Then 3 × 2 is 6, add 2 makes 8”.

What teaching strategies could you employ to help Irene?
The issue here is...

Most of the children whose work is in the samples, appear to be working with a procedure without understanding why it works!

So . . .

Given that children’s level of understanding of multiplicative structures is limited and/or incomplete, what can you do about it?
Firstly we need to assess exactly what knowledge and understandings of multiplicative structures are held by children. Good news! We have developed diagnostic assessment tools to do exactly that.
Once we have applied our diagnostic tools...

What activities and targeted tasks will be beneficial in developing Multiplicative Thinking?

We have developed an extensive range of activities and targeted tasks which are linked to the Australian Curriculum, and have advice for teachers on how to deeply engage with the required mathematics at a conceptual level.
Multiplicative Thinking is really important and needs a structured, consistent and manageable approach across a school to maximise its development.

Is there a resource that can help me achieve this?

Yes!!!
Making Connections
Explicit

Developing
Multiplicative Thinking

Are you interested?