

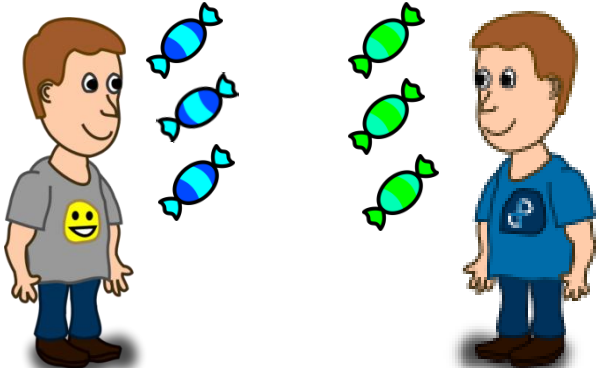
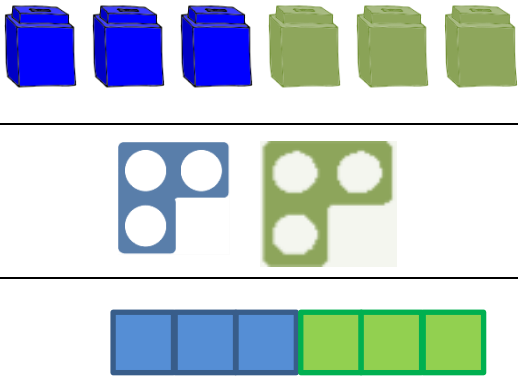
Progression in Calculation – Multiplication

Methods should be introduced with the support of resources that enable pictorial representation and so develop conceptual understanding.

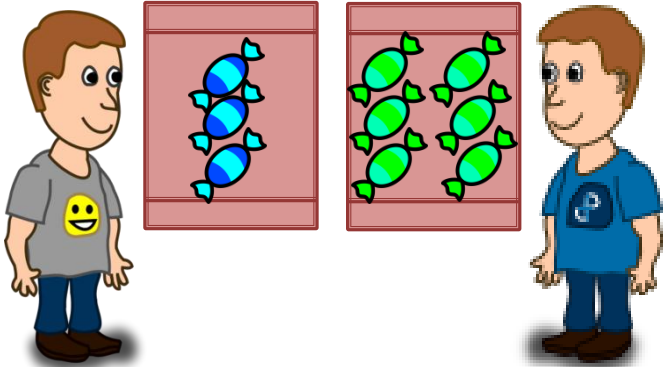
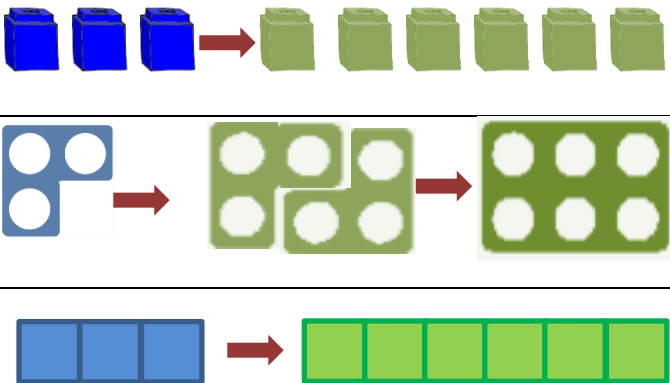
Before recording, it is essential that pupils have experience of multiplying (repeated addition & scaling) using practical apparatus. This practical apparatus is also essential when developing mental calculation methods.

This can then be represented pictorially.

eg 1. **Tom and James each have 3 sweets. How many do they have altogether?**

<p>Repeated addition</p> 	
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eg 2. **Tom has 3 sweets in his packet. James has a packet that has twice as many. How many sweets does James have?**

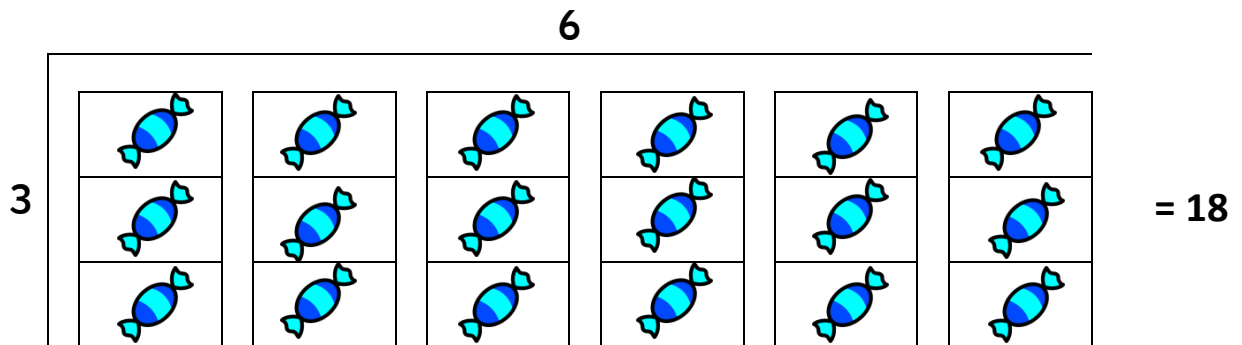
<p>Scaling – increasing a quantity proportionally</p> 	
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Once this conceptual understanding is in place, pupils can start developing meaningful mental methods. These should then be supported by written methods. Concrete resources should be used until the pupil no longer feels the need for them. Every new step must be supported by concrete resources, then pictorial representations before becoming abstract calculations.

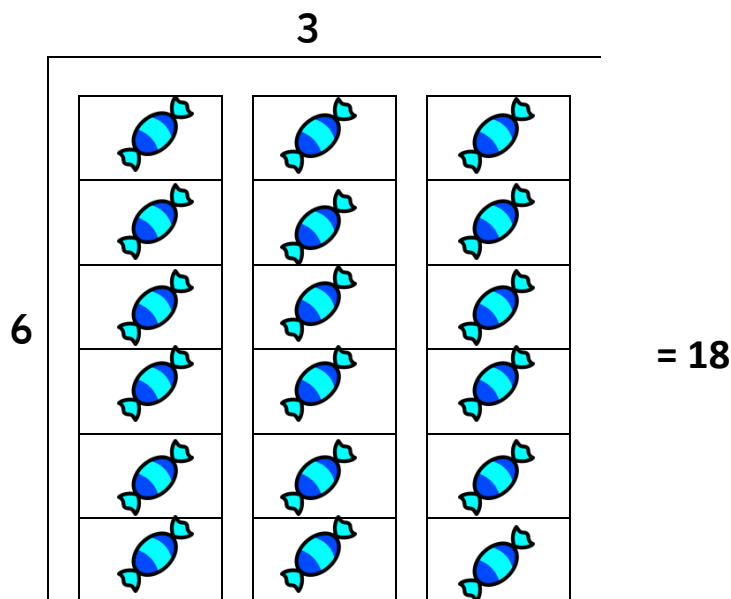
1. Introduction of arrays

Arrays are important elements to conceptual understanding of multiplication and the commutative nature of this operation.

There are 3 sweets in a packet. Tom has 6 packets. How many sweets does he have?



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2. Introduction of a numberline

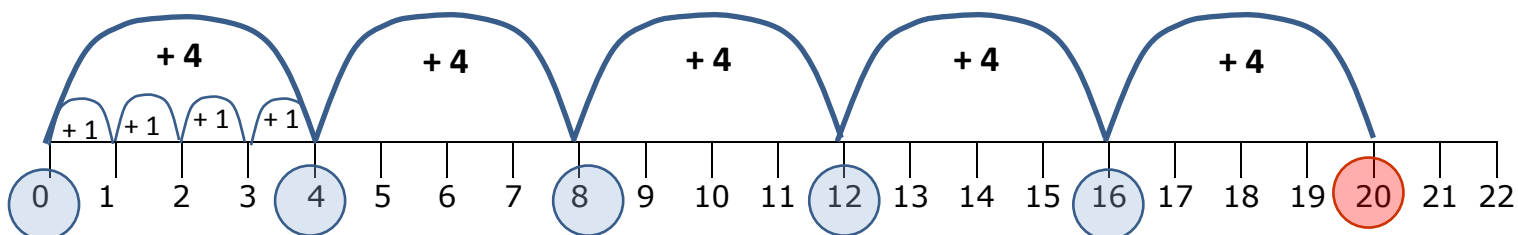
There are 4 balloons in a bunch. There are 5 bunches.

How many balloons are there altogether?

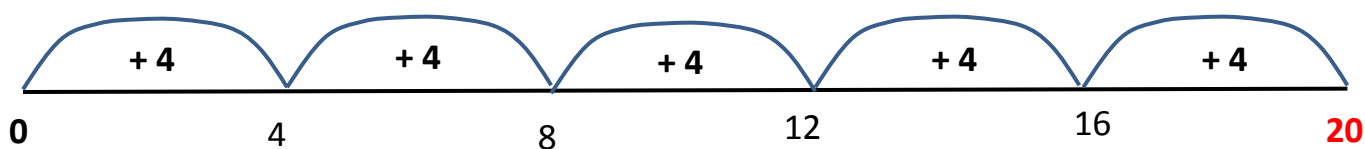
Step 1 – Represent the problem



Step 2 – Use a numberline



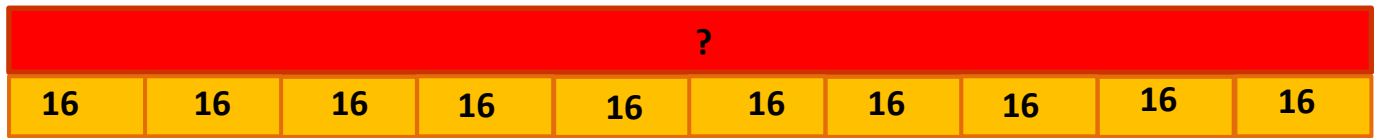
Step 3 – Use a blank numberline



3. Introduction of multiplying by ten

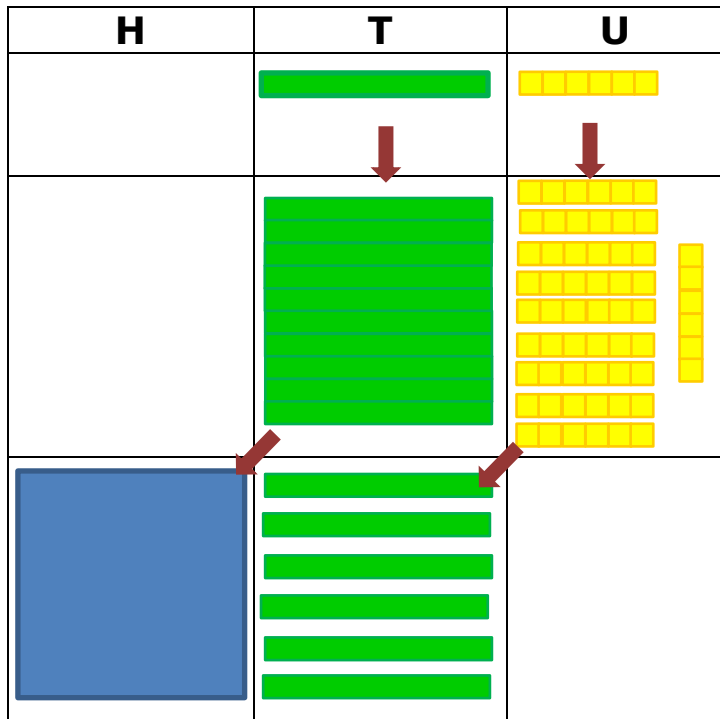
There are 16 sweets in a packet. Tom buys 10 packets. How many sweets does he have?

Step 1 – Represent the problem



Step 2 – Partition

$$16 = 10 + 6$$



X 10

re-group

$$100 + 60 + 0 = \underline{160}$$

Step 3 – Record in columns

H	T	U
	1	6
1	6	0

$$100 + 60 + 0 = \underline{160}$$

4. Introduction of the grid method

There are 24 marbles in a box. Tom has 6 boxes. How many does he have?

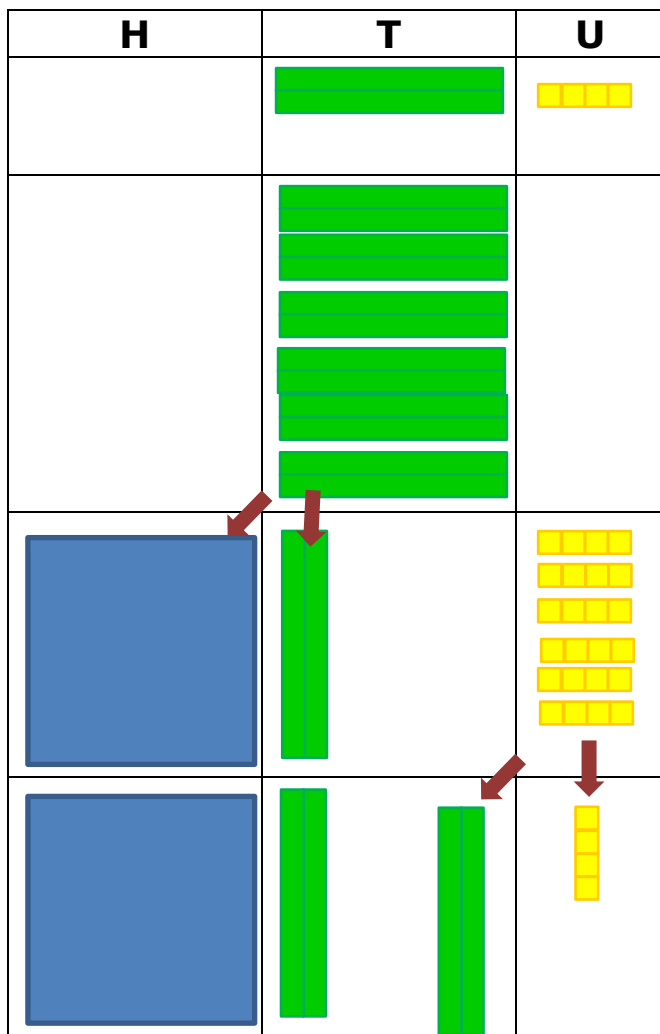
Step 1 – Represent the problem



Step 2 – Use Base 10 equipment or counters to partition the number.

Multiply the tens number and record in the grid.

Multiply the units number and record in the grid.



x6

x6

re-group

	T	U
X	20	4
6	120	24

$$120 + 24 = \underline{144}$$

$$100 + 40 + 4 = \underline{144}$$

5. Introduction of a compact written method

There are 14 marbles in a box. Tom has 12 boxes. How many does he have?

Step 1 – Represent the problem



Step 2 – Use Place value discs to represent the number of tens, units etc.

Multiply units first

H	T	U
	10	1 1 1 1
	10 10	1 1 1 1 1 1 1 1
100	10 10 10 10	
1	6	8

H	T	U
	1	4
	1	2
	2	8
1	4	0
1	6	8

6. Recording the compact written method

a) without exchange

*There are 123 pieces in a lego model. Tom has made 3 lego models.
How many pieces has he used?*

	H	T	U
	1	2	3
x			3
	3	6	9

= 369 pieces of lego

b) with exchange

*There are 127 pieces in a lego model. Tom has made 3 lego models.
How many pieces has he used?*

	Th	H	T	U
		1	2	7
x				3
		3	8	1
			2	

= 381 pieces of lego

c) with further exchange

*There are 267 pieces in a lego model. Tom has made 8 lego models.
How many pieces has he used?*

	Th	H	T	U
		2	6	7
x				8
	2	1	3	6
	2	5	5	

= 2136 pieces of lego

c) with larger numbers

*There are 127 pieces in a lego model. Tom has made 23 lego models.
How many pieces has he used?*

	Th	H	T	U
		1	2	7
x			2	3
		3	8	1
			2	
	2	5	4	0
		1		
	2	9	2	1
		1		

= 2921 pieces of lego

