NUMBER SKILLS

What do I need to be able to do?

You should be able to:

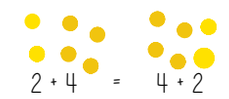
- Understand properties of addition and subtraction
- Understand properties of multiplication and division
- Use formal methods of addition and subtraction for integers
- Use formal methods of multiplication and division for integers
- Add and subtract directed numbers
- Multiply and divide directed numbers
- Understand and use order of operations with positive and negative integers

Key Words

- Commutative: changing the order of operations does not change the result
- Associative: when you add or multiply you can do so regardless of how the numbers are grouped
- Inverse: the operation that undoes what was done by the previous operation
- Subtract: taking away one number from another
- Negative: a value less than zero
- Debit: money that leaves a bank account
- Credit: money that goes into a bank account
- Integer: a whole number
- Product: multiply terms
- Operation: a mathematical process

Addition

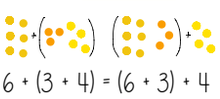
Addition is commutative



2 + 4 = 4 + 2

The order of addition doesn't change the result

Addition is associative



6 + (3 + 4) = (6 + 3) + 4

It doesn't matter how you group the numbers

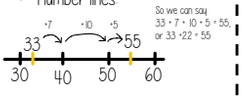
Formal written method:

	H	T	U
	3	4	2
+	1	4	9
	4	9	1
	1		

Remember the place value for each column!

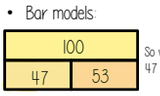
Models to help with addition

- Number lines:



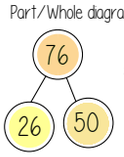
So we can say 33 + 7 + 10 + 5 = 55, or 33 + 22 = 55

- Bar models:



So we can say 47 + 53 = 100

- Part/Whole diagrams:



So we can say 26+50= 76

Subtraction

Subtraction is NOT commutative or associative.

12 - 8 ≠ 8 - 12

When you subtract, the order must stay the same.

Formal written method:

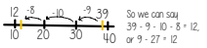
	H	T	U
	5	3	12
−	2	1	6
	3	1	6

Remember 0 is a place holder!

	2	0	8
−	0	0	4

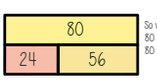
Models to help with addition

- Number lines:



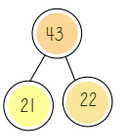
So we can say 39 - 9 - 10 - 8 = 12, or 9 - 27 = 12

- Bar models:



So we can say 80 - 24 = 56 & 80 - 56 = 24

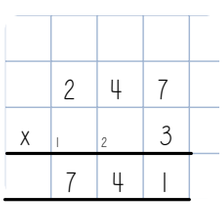
- Part/Whole diagrams:



So we can say 43 - 21 = 22 & 43 - 22 = 21

Written Methods for Multiplication

LONG MULTIPLICATION:



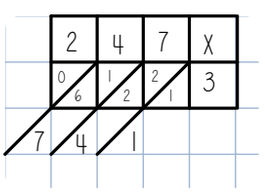
	2	4	7
x	1	2	3
	7	4	1

GRID METHOD:

X	200	40	7
3	600	120	21

600 + 120 + 21 = 741

GELOSIA:



REPEATED ADDITION:

	H	T	U
	2	4	7
	2	4	7
+	2	4	7
	7	4	1
	1	2	

Written Methods for Division

SHORT DIVISION:

		0	4	2
6	2	2 5	1 2	

		1	0	2
8	8	1	1 6	

SHORT DIVISION with remainders:

		1	2	5	5
2	2	5	1 1	1 0	

Continue after the decimal point! If you start to get a repeating decimal, stop

LONG DIVISION:

		0	4	2	
6	2	5	2		
−	2	4	0		6 X 40
	0	1	2		
−	0	1	2		6 X 2
			0		

This method relies on you being comfortable with multiples of your divisor (in this case, 6)!

Calculations with Directed Numbers

Addition

2 + - 3

Remember, if I add a negative, I am adding something that will make it smaller, so it is the same as subtracting that number!

2 - 3 = -1

Subtraction

2 - - 3

Remember, if I subtract a negative, I am taking away the amount that was making it smaller, so it is the same as adding that number!

2 + 3 = 5

Generalisation: + - = - - - = +

Multiplication

2 x - 3

'2 lots of -3'

= -6

-2 x -3

Think of this as the negative of 2 x -3

= 6

Division

Remember that multiplication and division are inverse operations.

Eg 6 ÷ -3 = -2

-6 ÷ 2 = -3

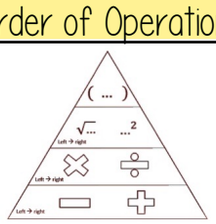
Generalisation

X	+	−
+	+	−
−	−	+

Models to help

It can be helpful to put calculations involving directed numbers into real life contexts. Think about temperate or bank accounts when unsure

Order of Operations



Example 1

(4 x 7) + 3

So we need to evaluate the brackets first; 4x7 =28

This is now 28 + 3 = 31

Example 2

$(6 + 4 - 3)^2 \times 4$

So we need to evaluate the brackets first and we work left to right ; 6 + 4 - 3 =7

This is now $7^2 \times 4 = 49 \times 4$

= 196

Example 3

4 - 8 x 2 + 12 ÷ 4

So first we do the multiplication/division left to right; 4 - 16 + 3.

Now we do the addition/subtraction from left to right: -12 + 3 = -9