

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

NUMBER SKILLS

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**.

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

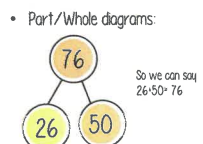
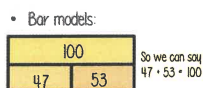
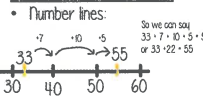
It doesn't matter how you group the numbers.

Formal written method:

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

Remember the place value for each column!

Models to help with addition



Subtraction

Subtraction is **NOT** commutative or associative.

$$12 - 8 \neq 8 - 12$$

When you subtract, the order must stay the same.

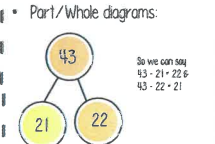
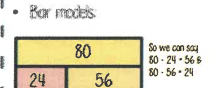
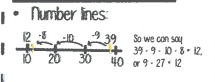
Formal written method:

	H	T	U
	5	2	1
-	2	1	6
	3	1	6

Remember 0 is a place holder!

	2	0	8
-	0	0	4

Models to help with addition



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:

	2	4	7	x
0	6	1	2	3
7	4	1		

REPEATED ADDITION:

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

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!

$$2 + 3 = 5$$

Written Methods for Division

SHORT DIVISION:

	0	4	2
6	2	5	2
	1	0	2
8	8	1	6

SHORT DIVISION with remainders:

	1	2	5	5
2	2	5	1	0

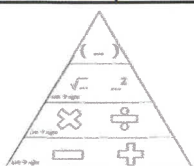
Continue after the decimal point! If you start to get a repeating decimal, stop

LONG DIVISION:

	0	4	2
6	2	5	2
-	2	4	0
	0	1	2
-	0	1	2
			0

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

Order of Operations



Example 1

$$(4 \times 7) + 3$$

So we need to evaluate the brackets first; $4 \times 7 = 28$

$$\text{This is now } 28 + 3 = 31$$

Example 2

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

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

$$\text{This is now } 7^2 \times 4 = 49 \times 4 = 196$$

Example 3

$$4 - 8 \times 2 + 12 \div 4$$

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

$$\text{Now we do the addition/subtraction from left to right; } -12 + 3 = -9$$

Generalisation.

Multiplication

$$2 \times -3$$

'2 lots of -3'

$$= -6$$

$$-2 \times -3$$

Think of this as the negative of 2×-3 .

$$= 6$$

Division

Remember that multiplication and division are inverse operations.

$$\text{Eg } 6 \div -3 = -2$$

$$-6 \div 2 = -3$$

Generalisation

x	+	-
+	+	-
-	-	+

Models to help

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

