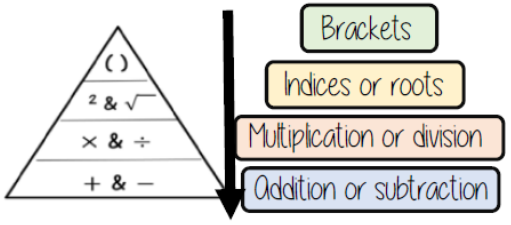
Knowledge Organiser: Year 7 Maths; Order of Operations & Algebraic Expressions (Part 1)

Order of operations



If you have multiple operations from the same tier work from left to right

e.g. 10 − 3 + 5 → 10 − 3 → 7 + 5

6 x 4 + 8 x 2

24 + 16 = 40

Brackets has the **highest priority** so must be completed first, followed by indices then multiplication/division and finally addition/subtraction.

Equal priority means they can be completed in any order.

Like and unlike terms

Like terms are those whose variables are he same

♥ and 3♥ are like terms

the variable is the same

★ 3♥ are unlike terms

the variables are NOT the same

Examples and non-examples

Like terms	Un-like terms
y, 7y	y, 7x
ab, 10ba	ab, 10a
5, -2	5, -2t

Note here ab and ba are commutative operations, so are still like terms

Equivalence

Check equivalence by substitution

e.g. m= 10

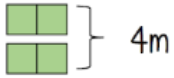
5m	2 x 2m	7m − 3m
5 x 10	2 x (2x 10)	(7x 10) − (3x 10)
= 50	= 2 x 20	= 70 − 30
	= 40	= 40

Equivalent expressions

Repeat this with various values for m to check

5m

2 x 2m



7m − 3m

Collecting like terms ≡ symbol

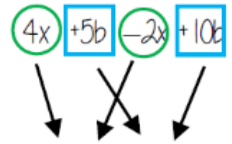
The ≡ symbol means equivalent to

It is used to identify equivalent expressions

Collecting like terms

Only like terms can be combined

4x +5b −2x + 10b



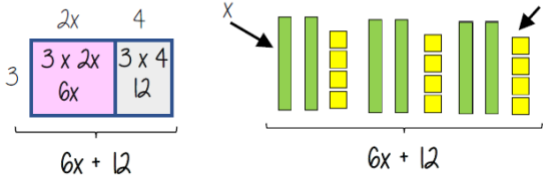
2x + 15b

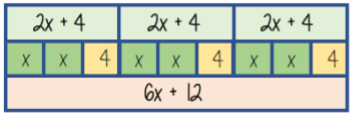
Common misconceptions

$2x + 3x^2 + 4x \equiv 6x + 3x^2$

Although they both have the x variable x2 and x terms are un-like terms so can not be collected

Multiply single brackets 3 (2x + 4)





Different representations of 3(2x+4) = 6x + 12

Keywords

Equality: two expressions that have the same value

Equals: represented by '=' symbol – means the same

Inverse: the operation that undoes what was done by the previous operation (The opposite operation)
Term: a single number or variable
Like: variables that are the same are 'like'
Coefficient: a multiplicative factor in front of a variable e.g. 5x (5 is the coefficient, x is the variable)
Expression: a maths sentence with a minimum of two numbers and at least one math operation (no equals sign)

Knowledge Organiser: Year 7 Maths; Order of Operations & Algebraic Expressions (Part 2)

Equality

$2 + 14 = 5 + 5 + 6$

16 16

"Is equal to"

The sum on the left has the same result as the sum on the right

Saying it out loud sometimes helps you to understand equality

Substitution into expressions

$4y$ ← 4 lots of 'y'

If y = 7 this means the expression is asking for 4 'lots of' 7

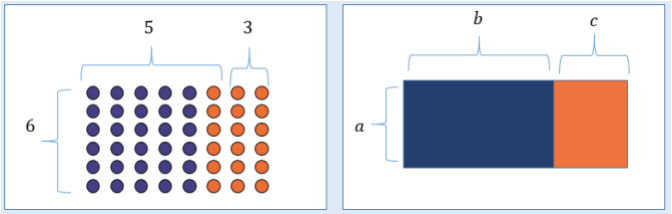
4 x 7 OR 7 + 7 + 7 +7 OR 7 x 4 = 28

eg: $y - 2$
$= 7 - 2 = 5$

The distributive law of multiplication

$$6 \times (5 + 3) = (6 \times 5) + (6 \times 3)$$

$$a \times (b + c) = a \times b + a \times c$$



Algebraic constructs

Expression
A sentence with a minimum of two numbers and one maths operation

Equation
A statement that two things are equal

Term
A single number or variable

Identity
An equation where both sides have variables that cause the same answer includes ≡

Formula
A rule written with all mathematical symbols
e.g. area of a rectangle A = b x h

Using letters to represent numbers

5 + 5 + 5	y + y + y + y	20 ÷ h
3 x 5	y x 4	$\frac{20}{h}$
5 x 3	4 x y	
	4y	
Addition and multiplication can be done in any order Commutative calculations	↑ 4 multiplied by 'y'	↑ 20 shared into 'h' number of groups

Conjectures and counterexamples

Conjecture

1, 2, 4....
The numbers in the sequence are doubling each time.

A pattern that is noticed for many cases

Counterexamples

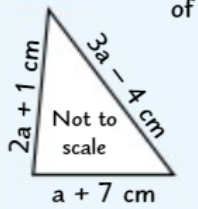
This sequence isn't doubling it is adding 2 each time

Only one counterexample is needed to disprove a conjecture

Use Shape Properties to Find Formulas and Equations

In some questions, you'll need to use what you know about shapes (e.g. side lengths or areas) to come up with a formula or an equation to solve.

EXAMPLE:



a) Write a formula for P, the perimeter of the triangle below, in terms of a.

Form an expression for the perimeter:

P = (a + 7) + (2a + 1) + (3a − 4)

P = 6a + 4 cm

b) If the triangle has a perimeter of 58 cm, find the value of a.

P = 58, so set your formula equal to 58 and solve to find a:

6a + 4 = 58

6a = 54

a = 9

How do we use Knowledge Organisers in Mathematics?

How can you use knowledge organisers at home to help us?

- **Retrieval Practice:** Read over a section of the knowledge organiser, cover it up and then write down everything you can remember. Repeat until you remember everything.
- **Flash Cards:** Using the Knowledge Organisers to help on one side of a piece of paper write a question, on the other side write an answer. Ask someone to test you by asking a question and seeing if you know the answer.
- **Mind Maps:** Turn the information from the knowledge organiser into a mind map. Then reread the mind map and on a piece of paper half the size try and recreate the key phrases of the mind map from memory.
- **Sketch it:** Draw an image to represent each fact; this can be done in isolation or as part of the mind map/flash card.
- **Teach it:** Teach someone the information on your knowledge organiser, let them ask you questions and see if you know the answers.

How will we use knowledge organisers in Mathematics?

Knowledge organisers will be used before I complete a Learning Check or Common Assessment. I will spend part of the lesson looking over each of the key topics of the half term before completing the Learning Check or Common Assessment.

I will also use these at home to complete my own independent learning and revision of these key topics.

GLUE HERE