Year 6 Maths Knowledge Organiser - Spring 2

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Key Vocabulary

- algebra
- formulae
- express
- equation
- function
- statistics
- perimeter
- area
- volume
- cubic units
- cuboid
- frequency table
- continuous data
- discrete data
- interpret

Find a rule

Function machines perform operations on an input to produce an output. We can use function machines with one step:

input → × 7 → output

We can use function machines with more than one step:

input → × 7 → + 5 → output

If we know the input to this two-step function machine, we can calculate the output.

"If the input is 6, then the output is 47 because 6 × 7 = 42 and 42 + 5 = 47"

If we know the output, we can calculate the input by using inverse operations.

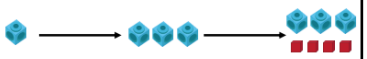
"If the output is 26, then the input is 3 because 26 – 5 = 21 and 21 ÷ 7 = 3"

Form Expressions

In addition to numerical inputs in function machines, we can use simple algebraic inputs.

Instead of a given number, we can use a letter to represent the input, e.g. 'y'. If we need to multiply the input, we put the number we are multiplying by in front of the letter.

input → × 3 → + 4 → output



The expression to match the two-step function machine would be: **3y + 4**

Substitution

If we are given the value of the letters in an expression, we can substitute them to work out the value of the expression.

a = 6 b = 10 c = ½

2a + b = 12 + 10 = 22

4a - 8c = 24 - 4 = 20

If we change the value of the letters, we need to substitute them again to work out the new value.

Formulae

A formula is a way to represent calculations. It is a factor or rule that uses mathematical symbols.

It usually has an equals sign and two or more algebraic values.

Some formulae is used for different areas of mathematics. For example...

perimeter of rectangle = (2 × length) + (2 × width)

P = 2l + 2w

We can also use formulae to work out values in everyday contexts.

"My older sister has a part time job. She gets paid £5 per hour and works 4 hours over the weekend."

P = pay
h = number of hours

P = £5 × h
£20 = £5 × 4

One-Step Equations

We can build on our knowledge of forming expressions to form one-step equations.

It is important to recognise and understand the difference between **expressions** such as y + 4 (which can take different values depending on the value of y) and **equations** such as y + 4 = 11 (where y has a specific value).

"I think of a number. I add 6. My answer is 13."

y + 6 = 13

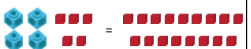
Now that we understand how equations are formed, we can solve one-step equations. We can use a balancing method with inverse operations.

"y equals 7 because 13 - 6 = 7"

Two-Step Equations

We can apply the same balancing method with inverse operation to solve two-step equations

4y + 5 = 17



17 - 5 = 12 and 12 ÷ 4 = 3, so **y = 3**

Find Pairs of Values

Our knowledge of substitution can be used to find the possible values of pairs of values. It is best to find one of the possible values first then work out what the other value would be.

A trial and improvement approach can be used but working systematically is much more efficient.

a - b = 3

Here are three possible solutions:

a	b
10	7
9	6
8	5

Now, we can explore equations with multiples of one or more unknown values. There may also be rules for the values which restrict the possibilities.

2c + 8 = d

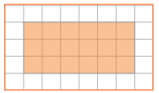
c is an odd number; d is a multiple of 10

Here are three possible solutions:

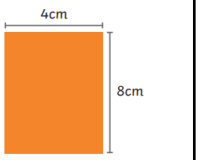
c	d
1	10
11	30
21	50

Area of Rectangles

length × width = area of a rectangle



Counting squares:
area = 18cm²
Use formula:
6cm × 3cm
area = 18cm²

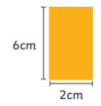


8cm × 4cm area = 32cm²

Perimeter of Rectangles

perimeter = length + width + length + width or (length + width) × 2

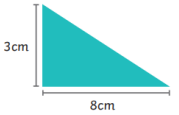
5cm + 4cm + 5cm + 4cm
area = 18cm²



(6 + 2) × 2
area = 16cm²

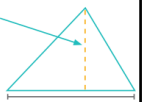
Area of a Triangles

base × perpendicular height ÷ 2 = area of a triangle

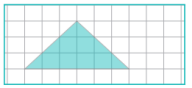


8cm × 3cm ÷ 2
area = 12cm²

perpendicular height = 5cm



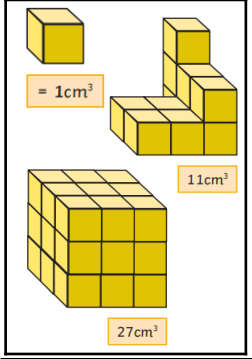
6cm × 5cm ÷ 2
area = 15cm²



Counting squares:
6 whole squares = 6cm²
6 half squares = 3cm²
6cm² + 3cm² = 9cm²
area = 9cm²

Using formula:
6cm × 3cm
÷ 2 = 9cm²

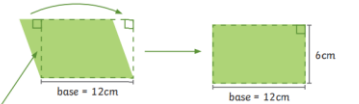
Volume – Counting Cubes



Area of Parallelograms

base × perpendicular height = area of a parallelogram

A parallelogram can be transformed into a rectangle.



perpendicular height = 6cm

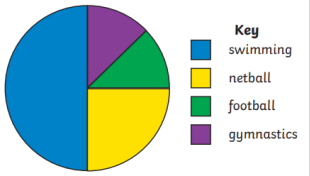
12cm × 6cm = 72cm²

Pie Charts

Pie charts represent discrete data.

A circle is divided into segments, where each segment represents a data category. The size of each segment matches its proportion of the total amount.

A pie chart to show children's favourite sports



24 children were asked in total.

Swimming = ½ so ½ of 24 = 12 children

Netball = ¼ so ¼ of 24 = 6 children

Football = ⅛ so ⅛ of 24 = 3 children

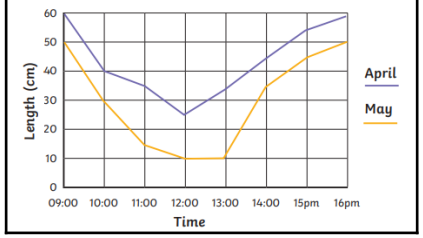
Gymnastics = ⅛ so ⅛ of 24 = 3 children

Volume – Counting Cubes

Line graphs are used to show changes to a measurement over time.

Data shown in a line graph is continuous.

A line graph to show the length of shadows over time



Volume of a Cuboid

length x width x height

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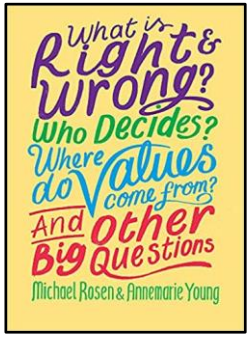
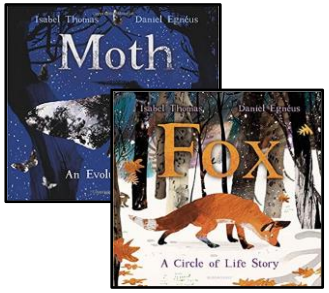
Core Texts



What is Right and Wrong? Who Decides? Where Do Values Come From? And Other Big Questions
Michael Rosen & Annemarie Young



Moth: An Evolution Story/ Fox: A Circle of Life Story
Isabel Thomas

Features of Text Type: Discussion

Discussion texts are designed to examine both sides of an argument impartially, carefully presenting information on different points of view.

In order to remain neutral and discuss the argument objectively, a **third person, impersonal voice** and a **formal tone** is used.

The **present tense** is usually used in discussion texts to reflect the fact that the subject is current and topical.

Conjunctions and **relative pronouns** are used to make logical connections and to provide evidence and justification.

Specific 'discussion language' is included, such as the use of **rhetorical questions** to engage the reader in the text; the use of **modal verbs** and **adverbs** to express degrees of possibility; and the use of specific phrases to introduce new points.

Features of Text Type: Narrative Non-Fiction *(About the texts)*

Both '*Moth: An Evolution Story*' and '*Fox: A Circle of Life Story*' are narrative non-fiction picture books, written by award-winning science author, Isabel Thomas, and illustrated by Daniel Egnéus.

They each cleverly incorporate complex themes, scientific facts and technical vocabulary into a simple, memorable narrative, making them accessible, on different levels, to children of all ages.

The sparse, lyrical text engages the reader in the facts of the 'story', whilst the beautiful, muted illustrations and use of layout devices, add meaning, exemplifying the words in the text and providing additional detail.

DEVICE	PURPOSE	EXAMPLE
Rhetorical questions	to engage the audience	*'how would you feel if…?'*
Emotive language	to 'tug on the heartstrings'	*'poor, innocent creatures'*
Repetition	to emphasise a point	*'over and over again'*
Rule of three	to emphasise a point	*'reduce, reuse, recycle'*
Statistics	to back up claims	*'75% agree'*

Features of Text Type: Narrative Non-Fiction

In line with the book's primary purpose of informing, the narrative contains facts and technical vocabulary.

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Sentence structures are simple, and vocabulary is precise and concise. Questions and interjections using imperative verbs, are used in lieu of dialogue to activate the reader's own thoughts and actively engage them in the text.

A wide range of literary devices *(such as rhyme, repetition, simile, metaphor and onomatopoeia)* are used to engage the reader in the text.

Hyphens are used to avoid ambiguity.

Year 6 Science Knowledge Organiser - Spring 2

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Key Vocabulary

annelids	annelids are animals that do not have a backbone
arachnids	arachnids are animals that do not have a backbone
arthropods	a group of animals that include insects, spiders, crustaceans and myriapods.
bacteria	micro-organisms that consists of just one cell. Some are harmful to our bodies, and some are not.
classification	sorting or grouping things according to their characteristics
exoskeleton	a skeleton that is on the outside of the body
dichotomous key	a set of questions that helps identify a living thing or which group it belongs to by answering questions about it.
endoskeleton	a skeleton that is on the inside of the body
exoskeleton	a skeleton that is on the outside of the body
flowering plants	plants that produce flowers that contain the sexual organs of the plant
non-flowering plants	plants that do not produce flowers. These include ferns, mosses and conifers
fungi	a type of organism – including mushrooms – that varies in shape and size, some are classed as micro-organisms
virus	a type of microorganism

Invertebrates

Group	Features
Molluscs	Internal or external shell and a muscular foot
Echinoderms	Five-part symmetry often have a hard spiny covering
Sponges	No organs, very simple animals
Cnidaria	Distinct body shape (medusa or polyp) have nematocysts (stinging cells)
Annelid	Segmented body and movable bristles
Platyhelminthes	Flat bodies
Arthropods	Segmented bodies and exoskeletons There are four main types: Insects, arachnids, crustaceans and myriapods

Fungi

Fungi are different to plants and animals. They cannot make their own food (like animals) but cannot move (like plants) Some **fungi** are microorganisms (yeast), but not all are (mushrooms).

Micro-organisms

Micro-organisms are organisms that are so small that we cannot see them with our eyes alone. Bacteria and viruses are examples of microorganisms.

Some bacteria can cause disease. Others are helpful, like those that help break down food in our digestive system or the bacteria we use to make yoghurt and cheese.