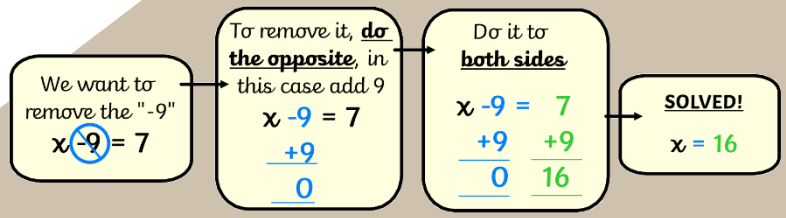
SPRING TERM OVERVIEW YEAR 6 – Maths

Term 2 – Goodnight Mister Tom

Block 3 -Topic: Algebra		Guide Time = 2 Weeks
Assessment:	WRM End of Block (here) WRM End of Term (here) Weekly Arithmetic Tests 2018 & 2019 Practice SATs papers AFL, MWB activities and feedback from marking **Pupils should be taught to:** ▪ use simple formulae ▪ generate and describe linear number sequences ▪ express missing number problems algebraically ▪ find pairs of numbers that satisfy an equation with two unknowns ▪ enumerate possibilities of combinations of two variables	Pupils should be introduced to the use of **symbols and letters** to represent variables and unknowns in mathematical situations that they already understand, such as: ▪ missing numbers, lengths, coordinates and angles ▪ formulae in mathematics and science ▪ equivalent expressions (for example, a + b = b + a) ▪ generalisations of number patterns ▪ number puzzles (for example, what two numbers can add up to). **Very Important Points (VIPs):** In previous years children have experience of missing number problems such as ☐ - 9 = 7. In algebra we don't use blank boxes, we use a letter (usually an x or y). So we write: $x - 9 = 7$ The letter (in this case an x) just means "we don't know this yet", and is often called the **unknown** or the **variable**. And when we solve it we write: $x = 16$ Here is a step-by-step approach to solving algebraic equations: • Work out **what to remove** to get "x = ..." • Remove it by **doing the opposite** (e.g. adding is the opposite of subtracting) • Do that to **both sides**
Links to prior learning (sequencing) and canon book	Canon Book – ***Goodnight Mister Tom*** Although algebraic notation is not introduced until Y6, algebraic thinking starts much earlier as exemplified by the missing number objectives from Y1/2/3. In Year 1, children solve one-step problems that involve addition and subtraction, using concrete objects and pictorial representations, and missing number problems such as ☐ - 9 = 7. In Year 2, children recognise and use the inverse relationship between addition and subtraction and use this to check calculations and solve missing number problems. In Year 3, children solve problems including missing number problems.	
Links to other learning (cross fertilisation)	**Science** – Children will use letters and symbols to represent variables in science, they use these in their predictions and explanations. They will use symbols to represent parts of an electrical circuit and can be challenged to think about missing symbols in order to complete circuits.	



We must do the same to "both sides" to keep the balance; balance is very important in algebra.

Computing – During their work on spreadsheets, children can investigate the use of formula. Consider the = symbol and how pupils use this to ensure balance when formulating algebraic equations in spreadhseets. In scratch, children can use equations, symbols and simple formulae to direct an object through a maze.

PE – Children to consider the use of algebra when deciding how much force is required to hit a six in cricket or score a goal in netball. During the active mile, encourage children to use algebra to estimate the speed needed to cover the distance to reach the end point in the quickest time or to beat a pb.

Thematic Questions:

The World Beyond Us:

How did astronauts use algebra to ensure they could return to Earth safely? In WW2, how might aircraft pilots have used algebra to calculate distance to a target?

The World Around Us:

Think of a country from each continent; how does each country use algebra differently? How might a child living in Ethiopia use algebra when travelling to school? How might this be different to a child living in New York?

Modern Britain:

Having an algebraic brain helps with logical thinking and enables a person to break down a problem first and then find its solution. Which famous people have proved that they think algebraically, can you give examples? Explain why Boris Johnson could be said to use algebra?

Healthy Bodies & Healthy Minds:

Can having a knowledge of algebra prove beneficial for your health? How did the government decide how much of each ingredient would be suitable for families to live on during rationing? How might algebraic operations be used in the kitchen? Would you need to use equations and formulae when cooking?

Culture:

How has algebra's methods changed over time? Will they change again? How have the achievements and discoveries over ancient times impacted our understanding today?

Technology in Action:

In WWII how might algebra have been used to calculate the distance between ammunitition and the target? How did the use of serial numbers

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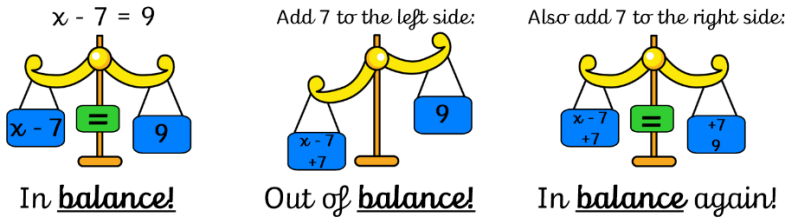


Enumerating means making a complete list of answers to a problem.

- Use a system for finding the possibilities
- Organise your findings in an ordered list or table
- Have a way of deciding when all the possibilities have been found.

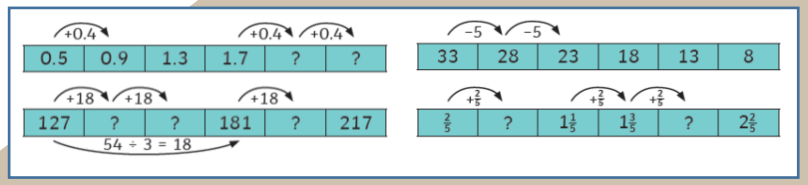
There are four donut flavours:

You choose 2 donuts to take home; this gives six possible combinations.

- blueberry and strawberry
- blueberry and custard
- blueberry and chocolate
- strawberry and custard
- strawberry and chocolate
- custard and chocolate

How could you write this using letters?

A **linear number sequence** is a sequence where each value increases or decreases by the same amount each time. To find the "rule" of the **linear number sequence**, find the difference between each adjacent number.



An **expression** is a group of numbers, letters and operation symbols.

	help the allies to determine how many German tanks were being produced? Would flat-screen TVs or smartphones exist without algebra?	
Links to future learning	In Year 6, the children are introduced to the terminology of algebra for the first time; this is the foundation for building on when they move on to algebraic thinking in Year 7. They will need this knowledge in order to apply their skills when exploring sequences, understanding and using algebraic notation, as well as working with equivalence.	
Character/ Wider Development ('50 things', cultural capital, skills)	Relate and use this knowledge and understanding in real-life contexts and make these relevant and purposeful links: **When shopping**, children will need to think about the number of bags they will need to carry their purchases, thinking about the amount each bag can hold and then dividing this by the number of items will help children to understand how many bags they will require. **Solving money problems** in everyday situations: - I am buying ice creams for everyone in the family, each ice cream costs £1.35, how much money would I need? Let's say you need to buy a PS3. You have £400 to spend on everything. You know a new system costs £200 and extra controller £20. Assuming a game costs £30 how many games could you get? **Learn to cook a meal:** When children are making items like cakes, vegetable soups etc. The correct combination of the ingredients is crucial. Algebra helps you find the correct quantity of ingredients to make the food sufficient for different sizes of servings. All quantities of the ingredients and the number of servings make the variables. **Try rock climbing:** Children can use their understanding of logical thinking to calculate jumping distances between rocks, understanding where to place their hands and feet when climbing rocks.	

Add 14 to a	$a + 14$
Subtract 20 from b	$b - 20$
Multiply c by 4	$4c$
12 more than d	$d + 12$
Multiply e by 3 and subtract 5	$3e - 5$
Add 12 to f and then multiply by 2	$2(f + 12)$

An **equation** is a number statement with an equal sign (=).

$a + 14 = 20$
$b - 20 = 15$
$4c = 28$
$d + 12 = 30$
$3e - 5 = 10$
$2(f + 12) = 44$

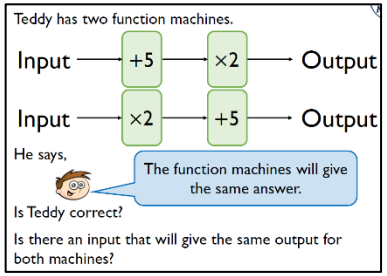
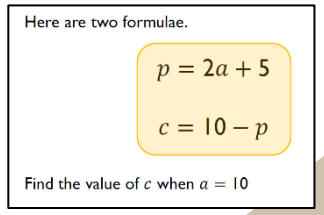
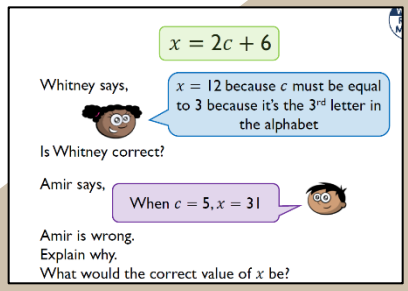
Expressions on either side of the equal sign are of equal value.

Fat Questions:

- The word "Algebra" comes from the Arabic word "al jabr," which translates to "reunion of broken parts". Explain why you think this is.
- How do we use algebra in every day life?
- Consider the reason why people set an alarm on their phone to wake up at a certain time. Describe how this is an example of algebra. (Think about the calcualtions involving time, money and distance.)

OVERVIEW OF TEACHING SEQUENCE

Key Facts / Learning	Learning Focus or Key Question	Learning Outcomes (NC)	Key Words/ Vocabulary	Greater Depth/SEND	Misconceptions	Activities and Resources
Spring 1 Week 5-6 Number: Block 3 Algebra	Find a rule – one step Find a rule – two steps Forming expressions Substitution Formulae Forming equations Solve simple one-step equations Solve two-step equations Find pairs of values Enumerate possibilities	Use simple formulae Generate and describe linear number sequences Express missing number problems algebraically Find pairs of numbers that satisfy an equation with two unknowns Enumerate possibilities of combinations of two variables	input output term to term rule variable unknown expression equation formula formulae one-step equation two-step equation substitution pairs of unknowns enumerate possibilities linear number sequence balance	GD: Ensure these children develop a **deep** conceptual understanding of algebra to ensure they have the true depth and rigour of knowledge that is a foundation for higher maths. Extend children using the editable WRM reasoning and problem solving resources (click here). Ensure children use mathematical vocabulary to support their reasoning and jottings, working out are included. Deepen the moment questions will be used to delve deeper into the learning focus. NCETM and the National Stem Centre E-library have extension activities and challenges to suit each strand of maths.	This is the first time pupils are exposed to the formal methods and vocabulary associated with algebra. It is important that they master this understanding in order to progress in KS3. Children do not understand that the equal sign shows where two sides of an equation are the same / balanced. Children may think that the x represents multiply rather than a missing value. Children may not know that the inverse of addition is subtraction and that the inverse of multiplication is division. Children do not check their answers by reworking the problem once they think they have solved it. Children may write their equations incorrectly by mis-using the = sign. E.g. $3x - 4 = 76$ is worked out using the number sentence: $76 + 4 = 72 \div 3 = 24$	Recapping key concepts and ensuring children are revisiting prior learning is essential. WRM Flashback 4 is a useful support for children at the beginning of sessions, allowing misconceptions to be addressed. DTMs to be created using the following resources and based on CTs AFL of their class/cohort. Further cross-curricular links can and should be made to the 6 themes, for a wider context, which develops children's wider development / character. **WRM**: *click here* **Classroom Secrets**: *click here* **Maths Frame**: *click here* **Third Space Maths Hub**: *click here* **NCETM:** *click here* Please also see Trust shared for Notebooks and resources to support your teaching.

				SEND: Ensure QLA has been completed prior to units being taught, consider the use of pre-teaching videos (links to WRM) and the support booklets provided by WRM and Third Space Learning. Children may be given work with simpler numbers and calculations. Children will focus on one-step problems. Children will be encouraged to use practical resources to support their understanding. Children will have access to modelled examples and definitions of vocabulary. Use of the NCETM mastery approach document can support teachers when planning their assessment opportunities for children.	*AFL to be consistently used, to address misconceptions found within own classes / cohorts of children and address where applicable.*	DTM examples:   

Context (big picture learning):
Mathematics is an important, creative discipline that helps us to understand and change the world. We want all of our children within the Pontefract Academies Trust to experience all that mathematics has to offer and to develop a sense of curiosity about the subject with a clear understanding. When they leave us we want them to continue their love of maths and use it continuously and positively in their future lives.
We foster a positive 'growth mind-set' attitude and we promote the fact that we believe that all children can achieve in mathematics. We teach for secure and deep understanding of mathematical concepts through manageable, bespoke steps and cross fertilize at every opportunity. VIPs (Very Important Points) are implemented in every lesson to ensure knowledge and skills are revisited and retained over time.
We use mistakes and misconceptions as an essential part of learning and provide challenge through rich and sophisticated reasoning and problem solving activities. At our school, the majority of children will be taught the content from their year group only. They will spend time becoming true masters of content, applying and being creative with new knowledge in multiple ways.

Folder name and link to resources: Trust shared > Primaries > Departments > KS2 > Planning Cycle B > Spring 1: Goodnight Mr Tom > Maths > Year 6

Week 1 L1-4

Week 2 L5-8

Year 6 Knowledge Organiser: Algebra

PONTEFRACT ACADEMIES TRUST

Fat Questions:

- The word "Algebra" comes from the Arabic word "al jabr," which translates to "reunion of broken parts". Explain why you think this is.
- How do we use algebra in every day life?
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Key vocabulary

term to term rule
variable
unknown
expression
equation
formula
formulae
one-step equation
two-step equation
substitution
pairs of unknowns
enumerate
possibilities
linear number sequence
balance

Intent

We aim to develop and progress our skills in algebra in order to equip us with the ability to solve real world problems that require a mathematical solution. With these skills, we can help to improve the world in which we live.

VIPs:

In algebra we don't use blank boxes, we use a letter (usually an x or y). So we write: $x - 9 = 7$
The letter (in this case an x) just means "we don't know this yet" and is often called the **unknown** or the **variable**. When we solve it we write: $x = 16$

Here is a step-by-step approach to solving algebraic equations:

- Work out **what to remove** to get "x = ..."
- Remove it by **doing the opposite** (e.g. adding is the opposite of subtracting)
- Do that to **both sides**

We want to remove the "-9"

$x - 9 = 7$

To remove it, **do the opposite**, in this case add 9

$x - 9 = 7$
$+9 \quad +9$
0

Do it to **both sides**

$x - 9 = 7$
$+9 \quad +9$
$0 \quad 16$

SOLVED!

$x = 16$

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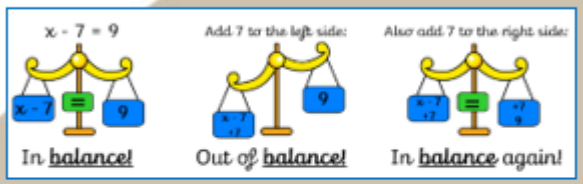

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