



What should I already know?

- How to use diagrams to represent problems
- How to use bar models to show fact families for addition/subtraction and multiplication/division
- Know that addition and multiplication are commutative

What will I know by the end of the unit?

- How to use simple formulae.
- How to generate and describe linear number sequences.
- How to express missing number problems algebraically.
- How to find pairs of numbers that satisfy an equation with two unknowns.
- How to enumerate possibilities of combinations of two variables.

Diagram

### Linear Number Sequences

A linear number sequence is a sequence where each value increases or decreases by the same amount each time. Each number in a linear number sequence is called a **term**. The constant change between each number is called the term to term rule. To identify the **term to term rule**, find the difference between two adjacent terms.

When you know the term to term rule, you can use it to find the next number in the sequence. It can also be used to find a missing number within a sequence.

$-5$     $-5$

33	28	23	18	13	8
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$+2\frac{1}{5}$     $+2\frac{1}{5}$     $+2\frac{1}{5}$

$2\frac{1}{5}$	?	$1\frac{1}{5}$	$1\frac{3}{5}$	?	$2\frac{2}{5}$
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$+0.4$     $+0.4$     $+0.4$

0.5	0.9	1.3	1.7	?	?
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$+18$     $+18$     $+18$

127	?	?	181	?	217
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$54 \div 3 = 18$

### Forming Expressions

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

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      $2(f + 12)$

### Forming Equations

An equation is a number statement with an equal sign (=). Expressions on either side of the equal sign are of equal value.

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

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### Equations with Pairs of Unknowns

In an equation with two unknown numbers, there may be **several** possible values for the unknowns that will balance the equation.

$ab = 18$	
$a$	$b$
1	18
2	9
3	6
6	3
9	2
18	1

$2a + b = 10$	
$a$	$b$
2	6
3	4
4	2
5	0

### Enumerating Possibilities

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 possibilities have been found.

There are four ice cream flavours.

Two scoops of two different flavours give six possible combinations.

- chocolate and strawberry
- chocolate and vanilla
- chocolate and mint
- strawberry and vanilla
- strawberry and mint
- vanilla and mint

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### Solving One-Step and Two-Step Equations

In algebra, missing numbers in equations are represented by letters. Any letter can be used but often the letter  $x$  is used. An algebraic  $x$  is written to look different to a normal letter 'x' to avoid confusion.

$3x = 15$

?
?
?

$3x$       $15$

$\div 3$       $\div 3$

$3x = 15$

$2x + 4 = 10$

?
?

$2x + 4$       $10$

$-4$       $-4$

$\div 2$       $\div 2$

$x = 3$



## Key skills/Timeline/Topic Questions

What do you think "one-step function" means?  
 What examples of functions do you know?  
 Do some functions have more than one name?  
 What do you think input and output mean?  
 What is the output if ....?  
 What is the input if ....?  
 How many sets of inputs and outputs do you need to be able to work out the function? Explain how you know.

How can you write  $+5$  followed by  $-2$  as a one-step function?  
 If I change the order of the functions, is the output the same?  
 What is the output if ....?  
 What is the input if ....?  
 If you add 3 to a number and then add 5 to the result, how much have you added on altogether?  
 What expressions can be formed from this function machine?

What would the function machine look like for this rule/expression?  
 How can you write  $x \times 3 + 6$  differently?  
 Are  $2a + 6$  and  $6 + 2a$  the same? Explain your answer  
 Why do you have to do the same to each side of the equation?  
 Why subtract 1? What does this do to the left hand side of the equation?  
 Does the order the equation is written in matter?  
 What's the same and what's different about solving the equations  $2x + 1 = 17$  and  $2x - 1 = 17$ ?  
 Can  $a$  and  $b$  be the same value?  
 Is it possible for  $a$  or  $b$  to be zero?  
 How many possible integer answers are there? Convince me you have them all.  
 What do you notice about the values of  $c$  and  $d$ ?

Which letter represents the star?  
 Which letter represents the heart?  
 Would it still be correct if it was written as  $a + b + c$ ?  
 What does it mean when a number is next to a letter?  
 Is  $a + b + b$  the same as  $a + 2b$ ?  
 What tells you something is a formula?  
 Which of the rectangles is the odd one out? Why?  
 Could you write the formula for a rectangle in a different way?  
 What other formulae do you know?  
 What does the cube represent?  
 What do the counters represent?  
 Design your own 'think of a number' problems.  
 What's the difference between an expression and an equation?  
 What's the difference between a formula and an equation?  
 Can you make some of your own equations using cups and counters for a friend to solve?  
 Why do you think the equation is set up on a balance? What does the balance represent? How does this help you solve the equation?  
 What is the same and what is different about each bar model?  
 What does  $2a$  mean? (2 multiplied by an unknown number)  
 What is the greatest/smallest number ' $a$ ' can be?  
 What strategy did you use to find the value of ' $b$ '?  
 Can you draw a bar model to represent the following equations:  
 $3f + g = 20$   
 $7a + 3b = 40$   
 What could the letters represent?

## Investigate/Homework tasks

- Homework will be set by your teacher using google classroom
- You should complete at least 30 minutes of maths tasks on Maths Whizz (not games). Please attend help sessions if you do not have access to the internet at home
- Additional work you could complete:
  - Find out more about the meaning of the vocabulary list using <http://www.amathsdictionaryforkids.com/>
- To challenge yourself: Answer the key questions to deepen your knowledge



Topic: Algebra

Year: 6

NC Strand: Algebra

**Vocabulary**

Term to term rule	Expression	One- step equation	Pairs of Unknowns
Variable	Equation	Two-step equation	Enumerate
Unknown	Formula	Substitution	