My mathematical journey

What do I need to remember from before?

Place value of numbers up to 10 000 000 (KS2)

Rounding numbers to the nearest 10, 100, 1000, 10 000 and 100 000 (KS2)

Rounding decimals to 1, 2 or 3 decimal places (KS2)

Ordering negative numbers on a number line (KS2)

Multiplying and dividing numbers by 10, 100 and 1000

What will I learn about in this unit?

Writing integers and decimals in expanded form and words

Ordering numbers

Rounding to decimal places and to significant figures

Converting metric units

Finding the midpoint of two numbers

Finding the median of discrete data

Where does this lead?

Addition & subtraction (NP2)

Multiplication & division (NP3)

Percentages, fractions & decimals (NP8)

Estimation (NP9)

Analysing discrete data (SP1)

Using units of measure (all GM units and many SP units)

Standard form (NP12)

Indices & surds (NP15)

Key words & symbols

Word	Explanation
number	a value or a quantity used to count or measure
digit	a symbol we use to make numbers, such as "0" or "9"
numeral	a number written with digits, such as "213" or "0.5"
integer	a "whole" number (with no decimal part), such as 15 or 510, but not 2.5
base 10	our numeral system, where each column is worth a different power of 10
decimal	means "base 10" but more often used for non-integers written like this: 2.5 or 38.7
less than	numbers further left on the number line
greater than	numbers further right on the number line
ascending	going up
descending	going down

Symbol	How to read it
$<$	is less than
$>$	is greater than
$\leq$	is less than or equal to
$\geq$	is greater than or equal to
$=$	is equal to
$\neq$	is not equal to
$\approx$	is approximately equal to

Fingertip facts: what I need to learn by heart

Prefix	micro-	milli-	centi-	kilo-	mega-	giga-
Symbol	μ	m	c	k	M	G
Scale factor	0.00 001	0.00 1	0.01	1000	1 000 000	1 000 000 000
Example (using grams)	1 μg is one millionth of a gram	1 mg is one thousandth of a gram	1 cg is one hundredth of a gram	1 kg is one thousand grams	1 Mg is one million grams	1 Gg is one billion grams

My mathematical journey

What do I need to remember from before?

Place value (NP1)

Vectors on a number line (NP1)

Adding and subtracting whole numbers with pen and paper and mentally (KS2)

Using rounding to check answers to calculations (KS2)

What will I learn about in this unit?

Addition and subtraction with integers and decimals

Commutativity & mental methods with integers and decimals

Number bonds, complements, working with decimals

Vectors, inverse operations, equality and zero pairs

Perimeter

Angle facts

Mean and range

Where does this lead?

Order of operations (NP5)

Directed numbers (NP6)

Simplifying expressions (A1)

Adding & subtracting fractions (NP7)

Solving linear equations (A2)

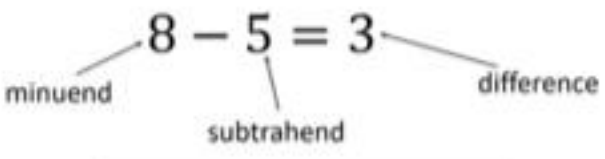
Adding & subtracting numbers in standard form (NP12)

Adding and subtracting surds (NP15)

Key words: what I need to say and write accurately

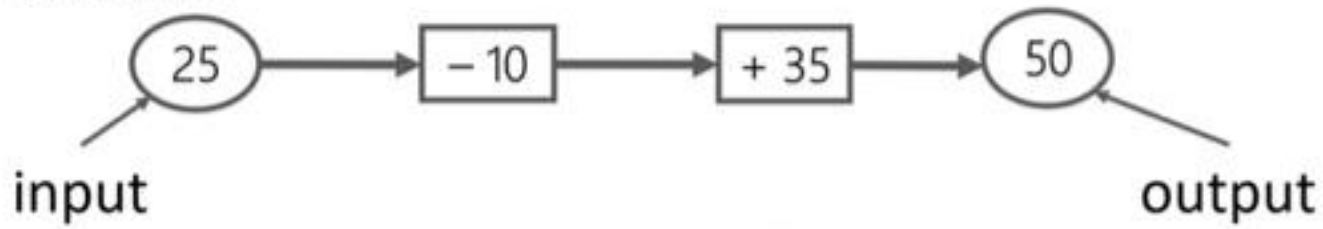
Word	Explanation
commutative	if you can change the order of the numbers and not change the answer, then the operation is commutative. e.g. 5 + 7 = 12 and 7 + 5 = 12, so addition *is* commutative e.g. 20 – 6 = 14 and 6 – 20 = –14, so subtraction *is not* commutative
complement of a decimal	the number you add to get to 1, e.g. the complement of 0.7 is 0.3
inverse operations	operations that 'undo' each other, such as addition and subtraction
function	a combination of one or more operations
zero pair	a pair of numbers whose sum is 0, e.g. 3 and –3
additive inverse	the numbers in a zero pair are called additive inverses of each other
perimeter	total length of all the sides of a 2D shape
rectilinear shape	a shape with only right angles and straight lines

summand + summand = sum



minuend – subtrahend = difference

A function machine:



My mathematical journey

What do I need to remember from before?

Place value (NP1)

Vectors on a number line (NP1)

Multiplying and dividing on paper and mentally (KS2)

Using rounding to check answers to calculations (KS2)

What will I learn about in this unit?

Multiplication and division with integers and decimals

Area models for multiplication

Multiples and factors

Multiplying to stretch

Area and volume

Where does this lead?

Powers, roots and primes (NP4)

Order of operations (NP5)

Directed numbers (NP6)

Fractions (NP7)

Percentages (NP8)

Proportional reasoning (NP10)

Key words: what I need to say and write accurately

Word	Explanation
area	a measure of the space inside a two-dimensional shape
volume	a measure of the space inside a three-dimensional shape
multiple	you find the multiples of a number by multiplying it by an integer. e.g. the first six positive multiples of 7 are 7, 14, 21, 28, 35, 42
factor	a number which divides into another leaving no remainder. e.g. the factors of 12 are 1, 2, 3, 4, 6 and 12 because 1×12, 2×6 and 3×4 all equal 12

Fingertip facts: what I need to learn by heart

The times tables

×	1	2	3	4	5	6	7	8	9	10	11	12
1	1	2	3	4	5	6	7	8	9	10	11	12
2	2	4	6	8	10	12	14	16	18	20	22	24
3	3	6	9	12	15	18	21	24	27	30	33	36
4	4	8	12	16	20	24	28	32	36	40	44	48
5	5	10	15	20	25	30	35	40	45	50	55	60
6	6	12	18	24	30	36	42	48	54	60	66	72
7	7	14	21	28	35	42	49	56	63	70	77	84
8	8	16	24	32	40	48	56	64	72	80	88	96
9	9	18	27	36	45	54	63	72	81	90	99	108
10	10	20	30	40	50	60	70	80	90	100	110	120
11	11	22	33	44	55	66	77	88	99	110	121	132
12	12	24	36	48	60	72	84	96	108	120	132	144

My mathematical journey

What do I need to remember from before?

Multiplication and division (NP3)

Multiplying by composing and decomposing (NP3)

Multiples and factors (NP3)

What will I learn about in this unit?

Repeated multiplication

Powers and roots

Prime numbers

Composing and decomposing primes

Where does this lead?

Order of operations (NP5)

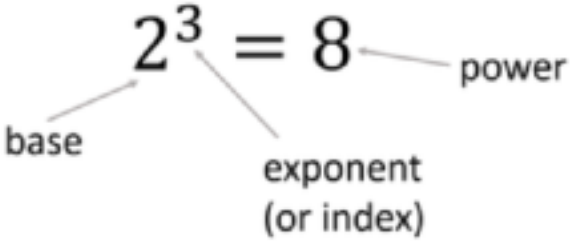
Directed numbers (NP6)

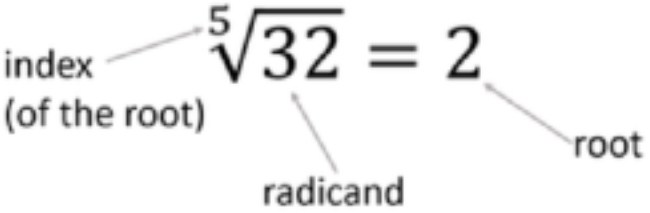
Quadratics (A11)

Index laws (NP15)

Exponential growth (NP16)

Key words and symbols: what I need to say and write accurately





The "radical" or "root" symbol: $\sqrt{}$

Fingertip facts: what I need to learn by heart

The first fifteen square numbers:

Square number	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th	11th	12th	13th	14th	15th
Value	1	4	9	16	25	36	49	64	81	100	121	144	169	196	225

The first ten cube numbers:

Cube number	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th
Value	1	8	27	64	125	216	343	512	729	1000

The prime numbers less than 100:

2, 3, 5, 7, 11, 13, 17, 19, 23, 29, 31, 37, 41, 43, 47, 53, 59, 61, 67, 71, 73, 79, 83, 89, 97

My mathematical journey

What do I need to remember from before?

Addition and subtraction (NP2)

Multiplication and division (NP3)

Exponents and roots (NP4)

What will I learn about in this unit?

Flexible calculating

The order of operations

Using visible and invisible brackets to break the order of operations

Where does this lead?

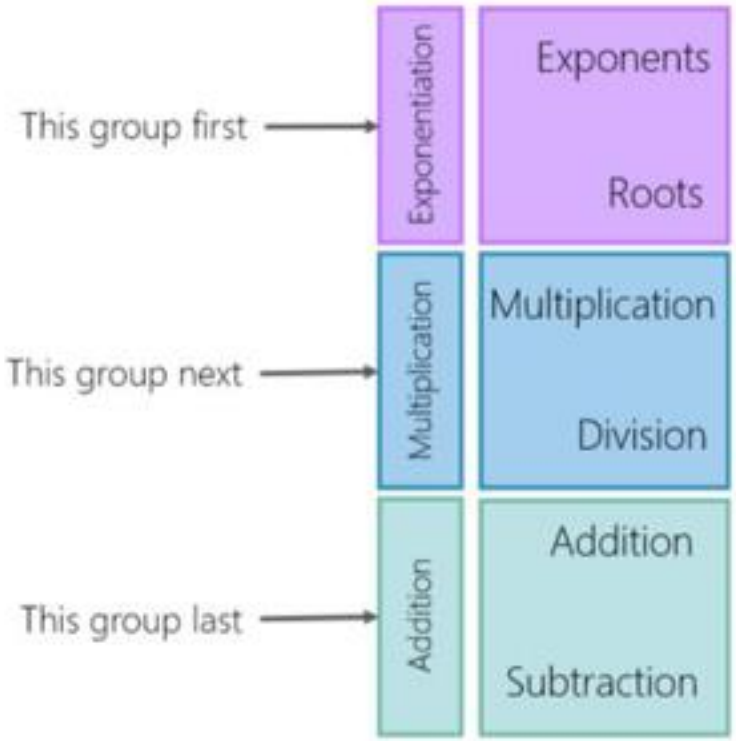
Directed numbers (NP6)

Substitution (A1, A2, A5)

Linear equations (A4)

Fingertip facts: what I need to learn by heart

The order of operations is:



To break the order, use brackets.

( )

My mathematical journey

What do I need to remember from before?

Addition and subtraction with integers and decimals (NP2)

Multiplication and division with integers and decimals (NP3)

Exponents and roots (NP4)

Order of operations (NP5)

What will I learn about in this unit?

Direction of numbers

Using negative numbers

Calculating with negative numbers

Where does this lead?

Algebraic expressions (A2, A3)

Linear equations (A4)

Formulae (A5)

Quadratic expressions (A11)

My mathematical journey

What do I need to remember from before?

Addition and subtraction (NP2)

Multiplication and division (NP3)

Exponents and roots (NP4)

Order of operations (NP5)

Directed numbers (NP6)

What will I learn about in this unit?

Representing fractions with pictures and numerals

Calculating with fractions

Finding fractions and wholes

Where does this lead?

Percentages, decimals and fractions (NP8)

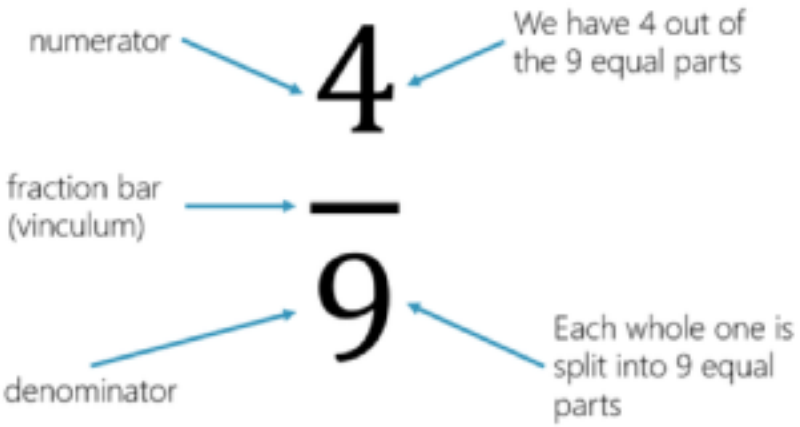
Proportional reasoning (NP10)

Ratio (NP11)

Linear equations (A4)

Algebraic fractions (A17)

Key words and symbols: what I need to say and write accurately



Word	Explanation
proper fraction	a number less than 1, written as a fraction where the numerator is less than the denominator. e.g. $\frac{4}{9}$
improper fraction	a number greater than 1, written as a fraction where the numerator is greater than the denominator. e.g. $\frac{14}{9}$
mixed number	a number greater than 1, written as an integer and a proper fraction. e.g. $1\frac{5}{9}$

My mathematical journey

What do I need to remember from before?

Number lines (NP1, 2, 3, and 6)

Decimals (NP1, 2, and 3)

Fractions (NP7)

Finding a fraction of a number (NP7)

What will I learn about in this unit?

Equivalent fractions, decimals and percentages

Terminating and recurring decimals

Working with percentages

Where does this lead?

Proportional reasoning (NP10)

Contextual graphs (A9)

Percentage change (NP10, NP13)

Recurring decimals to fractions (NP14)

Key words and symbols: what I need to say and write accurately

32% means $\frac{32}{100}$

"percent" means "out of 100"

A **terminating decimal** has a finite (fixed) number of decimal places,
e.g. 0.215
e.g. 0.3

A **recurring decimal** has an infinite number of decimal places and its digits have a repeating pattern. The **repetend** is the repeating part. We use dots to show the start and end of the repetend.
e.g. $0.333333333\ldots = 0.\dot{3}$
e.g. $0.804804804\ldots = 0.\dot{8}0\dot{4}$

Fingertip facts: what I need to learn by heart

Tenths and fifths:

Fraction	$\frac{1}{10}$	$\frac{2}{10}=\frac{1}{5}$	$\frac{3}{10}$	$\frac{4}{10}=\frac{2}{5}$	$\frac{5}{10}=\frac{1}{2}$	$\frac{6}{10}=\frac{3}{5}$	$\frac{7}{10}$	$\frac{8}{10}=\frac{4}{5}$	$\frac{9}{10}$	$\frac{10}{10}=1$
Decimal	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1
Percentage	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%

Eighths and quarters:

Fraction	$\frac{1}{8}$	$\frac{2}{8}=\frac{1}{4}$	$\frac{3}{8}$	$\frac{4}{8}=\frac{2}{4}=\frac{1}{2}$	$\frac{5}{8}$	$\frac{6}{8}=\frac{3}{4}$	$\frac{7}{8}$	$\frac{8}{8}=\frac{4}{4}=\frac{2}{2}=1$
Decimal	0.125	0.25	0.375	0.5	0.625	0.75	0.875	1
Percentage	12.5%	25%	37.5%	50%	62.5%	75%	87.5%	100%

Ninths and thirds:

Fraction	$\frac{1}{9}$	$\frac{2}{9}$	$\frac{3}{9}=\frac{1}{3}$	$\frac{4}{9}$	$\frac{5}{9}$	$\frac{6}{9}=\frac{2}{3}$	$\frac{7}{9}$	$\frac{8}{9}$	$\frac{9}{9}=1$
Decimal	$0.\dot{1}$	$0.\dot{2}$	$0.\dot{3}$	$0.\dot{4}$	$0.\dot{5}$	$0.\dot{6}$	$0.\dot{7}$	$0.\dot{8}$	$0.\dot{9}=1$
Percentage	$11.\dot{1}\%$	$22.\dot{2}\%$	$33.\dot{3}\%$	$44.\dot{4}\%$	$55.\dot{5}\%$	$66.\dot{6}\%$	$77.\dot{7}\%$	$88.\dot{8}\%$	$99.\dot{9}\%=100\%$

My mathematical journey

What do I need to remember from before?

Directed numbers (NP6)

What will I learn about in this unit?

Variable unknowns

Algebraic expressions

Substitution

Equations

Where does this lead?

Simplifying expressions (A2)

Multiplying expressions (A3)

Linear equations (A4)

Formulae (A5)

Key words and symbols: what I need to say and write accurately

Word	Explanation
variable	a number that can change its value, represented by a letter such as x or a green tile when we do not know its value
constant	a number that does not change, is fixed
operation	something that takes input numbers and turns them into output numbers, such as addition (including subtraction), multiplication (including division), exponentiation (including roots)
term	the parts of an expression separated by $+$ or $-$. e.g. in the expression $4x - \frac{1}{2}y$, the terms are $4x$ and $\frac{1}{2}y$

My mathematical journey

What do I need to remember from before?

Repeated multiplications and exponents (NP4)

Directed numbers (NP6)

Expressions (A1)

What will I learn about in this unit?

Adding and subtracting expressions

Multiplying and dividing expressions

Index laws

Forming expressions

Where does this lead?

Expanding and factorising brackets (A3)

Solving equations (A4)

Sequences (A7)

Quadratic expressions (A11)

Indices and surds (NP15)

Key words and symbols: what I need to say and write accurately

Word	Explanation
variable	a number that can change its value, represented by a letter such as x or a green tile
constant	a number that does not change, is fixed
operation	something that takes input numbers and turns them into output numbers, such as addition (including subtraction), multiplication (including division), exponentiation (including roots)
expression	a collection of constants, variables and operations e.g. $4x$, $2p-5$ and x^2+3x+6 are all expressions
term	the parts of an expression separated by $+$ or $-$. e.g. in the expression $4x-\frac{1}{2}y$, the terms are $4x$ and $\frac{1}{2}y$

Fingertip facts: what I need to learn by heart

The index laws

1. When we multiply powers with the same base, we can add their exponents.

$$x^7 \cdot x^3 = x^{10}$$

2. When we divide powers with the same base, we can subtract their exponents.

$$\frac{x^7}{x^3} = x^4$$

3. When we find a power of a power, we can multiply the exponents together.

$$(x^2)^3 = x^6$$