

# BRAINTastic! Scope and Sequence

This document details the learning objectives addressed in the BRAINTastic! Maths Series.

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## BRAINtastic! Numeration

Numeration Outcome	Content Module
Count the number of objects in a set 1 – 10	<b>P-K</b>
Check the count of the numbers in a set 1 – 10	
Count rearranged number arrays and get the same total 0 – 10	
Count an irregular arrangement of up to 10 objects – different in size, shape, colour.	
Say the number after any number up to 9 – (Count on by 1).	
Start counting from a starting point other than 1, up to 10.	
Recognise when an error has been made in counting e.g. which number is missing from a number track.	
Select the correct word to represent 1 to 9 objects.	
Select the correct numeral to represent 1 to 9 objects.	
Compare equivalent and non-equivalent sets 1 – 5 by matching (dogs in kennels, eggs in eggcups, etc)	
Order sets of objects 1 – 5 in ascending order.	
Use ordinal language first to fifth.	
Use objects to form number patterns.	
Count down to zero.	
Recognise the numeral zero as symbolizing the empty set.	
Count the number of objects in a set 1 – 20.	
Recognise different patterns and arrays of the same number.	
Say which collection is more, less or the same as another collection.	
Can identify an inequality – there are 2 more bears than ducks.	
Read and write the numerals 0 – 10.	
Order sets of objects by number 0 – 10.	
Order numerals 0 – 10.	
Order a set of numbers in the range 1 to 6 given in random order.	
Use the ordinal numbers first to ninth.	

Identify the empty set and the numeral 0.	<b>Lower Primary 1</b>
Recognize number patterns and predict subsequent numbers 0 – 20 (1 gap).	
Detect an inconsistency in a repeating pattern numbers 0 – 20.	
Link patterns made with objects with number sequences – (2 elements).	
Say if a collection is more or less than another collection 0 – 15.	
Identify groups of objects of equal number 0 – 15.	
Identify the equality between 2 groups 0 – 15.	
Read and write numerals 0 – 15.	
Order given sets of objects 0 – 15.	
Order numerals 0 –15.	
Say a number that lies between 2 given numbers 0 – 15.	
Use the ordinal numbers first to tenth.	
Recognise number patterns and predict subsequent numbers 0 – 20 (2 gaps – non-consecutive).	
Detect inconsistencies in repeating patterns 0 – 20 (2 inconsistencies).	
Link patterns made with symbols or objects with number sequences- (2 and 3 elements).	
Recognize odd/even numbers.	
Count in tens 0 – 100.	
Count back in tens 100 – 0.	
Identify groups of objects of equal number 0 – 20.	
Specify an inequality between 2 groups 0 – 20.	
Read and write numerals 0 – 20.	
Order sets of objects by number 0 – 20.	
Order a given set of selected numbers in the range 0 – 20 (ascending).	
Say a number that lies between 2 given numbers 0 – 20.	
Use the ordinal numbers first to twentieth.	
Recognize patterns and predict subsequent numbers 0 – 20 (2 gaps – non-consecutive and 2 gaps – consecutive).	
Link patterns with objects or symbols – (2, 3 or 5 elements).	
Link together different representations of the same number	
Say the number 1 more than any number 0 – 29.	

Say the number 1 less than any number 0 – 29.	<b>Lower Primary 1 – Lower Primary 2</b>
Say the number 10 more than any number 0 20.	
Say the number 10 less than any number 0 – 30.	
Identify numbers grouped in T and U and write the number.	
Partition a teens number into T and U.	
Use zero as a place holder.	
Count by 2s.	
Count by 5s.	
Count by 3s.	
Read and write numbers to 20.	
Say the number 1 more or less than any number up to 30.	
Say the number 10 more or less than a number up to 30.	
Ordinal numbers to 20.	
Compare 2 numbers – more or less.	
Order numbers to 20.	
Know numbers in order forwards from 0 to 100.	
Know numbers backwards from 100 to 0.	
Count by 10s 0 – 100.	
Count by 1's 100 – 0.	
Count by 2s 0 – 100.	
Count by 2s 100 – 0.	
Count by 5s 0 – 100.	
Count by 5s 100 – 0.	
Describe and extend simple number sequences.	
Count on in 1s from any 2-digit number.	
Count back in 1s beginning from any 2-digit number.	
Count on in 10s beginning from any 2-digit number.	
Count back in 10s beginning from any 2-digit number.	
Read and write whole numbers to 100 in figures and words.	
Know what each figure in a two digit number represents.	

Partition 2-digit numbers into T and U.	<b>Lower Primary 2</b>
Rebuild 2-digit numbers from T and U collections.	
Order whole numbers to 100 and position on a Number Line or 100s Grid.	
Ordinal numbers to hundredth.	
Read and write whole numbers to 1000 – figures and words.	<b>Middle Primary 1  and  Middle Primary 2</b>
Count on in 10s from any 2- or 3-digit number.	
Count back in 10s from any 3- or 2-digit number.	
Count on in 100s from any 2- or 3-digit number.	
Count back in 100s from any 3-digit number.	
Recognise 2-digit and 3-digit multiples of 2, 5 and 10.	
Recognise 3-digit multiples of 50 and 100.	
Know what each figure in a 3-digit number represents.	
Partition 3-digit numbers into H, T and U.	
Rebuild 3-digit numbers from H, T U collections.	
Say the number that is 1 more or less than any 3-digit number.	
Say the number that is 10 more or less than any 3-digit number.	
Say the number that is 100 more or less than any 3-digit number.	
Compare any pair of 3-digit numbers – more, less or equal.	
Order whole numbers to 1000.	
Round any 2-digit number to the nearest 10 multiple.	
Round any 3-digit number to the nearest 100 multiple.	
Read and write whole numbers to 10 000 – figures and words.	
Know what each digit represents in any 4-digit number.	
Partition 4-digit numbers into Th, H, T and U.	
Rebuild 4-digit numbers from Th, H, T U collections.	
Add/subtract 1 to/from any integer.	
Add/subtract 10 to/from any integer.	
Add/subtract 100 to/from any integer.	
Add/subtract 1000 to/from any integer.	
Count on/back in 10s from any whole number up to 10 000.	

Count on/back in 100s from any whole number up to 10 000.	<b>Middle Primary 2</b>
Count on/back in 1000s from any whole number up to 10 000.	
Multiply any integer up to 1000 by 10.	
Divide any 10-multiple up to 10 000 by 10.	
Begin to multiply by 100.	
Count on/back in 1000s from any whole number up to 10 000.	
Order a set of whole numbers up to 10 000.	
Round any positive integer less than 1000 to the nearest 10.	
Round any positive integer less than 1000 to the nearest 100.	
Begin to recognize and understand decimal notation and place value for tenths and hundredths.	
Recognise and extend number sequences – counting on and back in steps of constant size.	
Recognise multiples of 2, 3, 4, 5 and 10 – up to the 10 <sup>th</sup> multiple.	<b>Upper Primary 1  and  Upper Primary 2</b>
Read and write any whole number in figures or words.	
Know what each digit represents in any whole number or decimal with up to 2 decimal places.	
Multiply any positive integer up to 10 000 by 10.	
Multiply any positive integer up to 10 000 by 100.	
Divide any positive integer up to 10 000 by 10.	
Divide any positive integer up to 10 000 by 100.	
Order a set of integers less than a million.	
Order a set of numbers with up to 2 decimal places – every number with same number of decimal places.	
Recognise and extend number sequences containing numbers with up to 2 decimal places.	
Recognise negative numbers in context –on a Number Line, on a temperature scale.	
Order a given set of positive and negative integers.	
Calculate a temperature rise or fall across 0 degrees C.	
Recognise multiples of 6, 7, 8 and 9 up to the 10 <sup>th</sup> multiple.	
Recognise multiples of more than one number.	
Recognise and use tests of divisibility for 100, 10, 2, 4, 5.	
Know squares of numbers up to 10 x 10 and corresponding square roots.	
Find factor pairs of any number up to 100.	

Round a number with one decimal place to the nearest integer.	<p><b>Upper Primary 2</b></p> <p><b>and</b></p> <p><b>Lower Secondary</b></p>
Round a number with two decimal places to the nearest integer.	
Multiply any positive integer by 10, 100 or 1000.	
Divide any positive integer by 10, 100 or 1000.	
Round any integer to the nearest 10, 100 or 1000.	
Order a set of positive and negative integers.	
Recognise and extend number sequences such as the sequence of square numbers or the sequence of triangular numbers.	
Count on or back in steps of 0.1, 0.2, 0.25, 0.5.	
Know multiples up to 10 x 10.	
Use tests of divisibility by 3, 6, 8, 9, 25.	
Find simple common multiples.	
Know squares of numbers up to 12 x 12 and corresponding square roots.	
Know prime numbers to 20.	
Know what each digit represents in numbers with up to 3 decimal places.	
Round a number with 2 decimal places to the nearest tenth or nearest whole number.	
Order a set of positive and negative integers.	
Order a mixed set of numbers with up to 3 decimal places.	
Read and write any number from 0.001 to 1 000 000 and know what each digit represents.	
Count forwards and backwards from any number in any of the increments 0.01, 0.1, 1, 10, 100, 1000, 10 000, 100 000, 1 000 000.	
Multiply or divide numbers by 10, 100 or 1000.	
Order decimals – know which decimal place determines the place of a number in the order.	
Round positive whole numbers to the nearest 10, 100 or 1000.	
Round decimals to the nearest whole number or to one decimal place.	
Use positive and negative integers in context.	
Know prime numbers up to 30.	
Know squares of numbers 0.1 to 0.9.	
Know squares of multiples of 10 up to 100 and corresponding square roots.	
Know pairs of factors of numbers up to 100.	

Find the factors of non-prime numbers up to 100.	<b>Lower Secondary</b>
Problem solving e.g. Make the largest possible odd number with the digits 3, 5 and 2; Write in figures the number two and a quarter million; Which two numbers have a sum of 14 and a product of 48?	
Find LCM of 2 numbers.	
Find HCF of 2 numbers.	
Use index notation and square root sign.	
Find square roots of multiples of 100 and 10 000 by factorising.	
Read and write positive integer powers of 10 – $10^1$ , $10^2 = 100$ , $10^3 = 1000$ etc.	
Add/subtract (count on or back by) 0.001 to/from any number	
Multiply and divide numbers by 0.1 and 0.01.	
Order decimals in ascending and descending order, including negative decimal numbers.	
Round positive whole numbers to a given power of 10.	
Round decimals to the nearest whole number or to one or two decimal places.	
Know cubes of 1, 2, 3, 4, 5 and 10 and the corresponding cube roots.	
Know that a positive integer has two square roots – one positive and one negative.	
Read and write positive and negative integer powers of 10.	
Know common prefixes associated with the powers of 10.	
Multiply and divide by any integer power of 10.	
Link multiplication and division by 10 and 100 to conversions – mm <sup>2</sup> to cm <sup>2</sup> , cm <sup>2</sup> to m <sup>2</sup> , mm <sup>3</sup> to cm <sup>3</sup> , cm <sup>3</sup> to m <sup>3</sup> .	
Begin to write numbers in standard form (as $A \times 10^N$ where A is a no between 1 and 10 and N is an integer).	
Round decimals to the nearest whole number or to one, two and three decimal places.	
Round numbers to a given number of significant figures.	
Know that $(x \text{ to the power } 0) = 1$ for any value of x.	
Know that $(\text{square root of } a) + (\text{square root of } b)$ does not = $(\text{square root of } a + b)$ .	
Know that the cube root of a positive number is positive and the cube root of a negative number is negative.	

## BRAINtastic! Addition & Subtraction

### Addition

Addition Outcome	Content Module
Identify number pairs that total 5 – Can use + sign (but no =)	<b>P-K</b>  <b>&amp;</b>  <b>Lower Primary 1</b>
Addition word form 1 – “and” – using numerals.	
Combine two sets of objects and state total (up to 5).	
Identify pairs of related facts – totals up to 5.	
Add 1 more (or “one more”) to any given set of objects 0 – 4.	
Solve simple word or picture problems including money and measurement relating to totals 0 – 5.	
Know all addition pairs with totals up to 10 (Use + sign).	
Addition word form 1 – and.	
Addition word form 2 – add.	
Addition word form 3 – plus.	
Addition word form 4 – more than.	
Addition word form 5 – total.	
Addition word form 6 – altogether.	
Recognise commutative property for addition – totals up to 10.	
Find “1 (or one) more than” numbers 1 – 9.	
Knows all addition pairs with totals up to 10 ( use + sign).	
Select two groups of objects to make a given total – up to 5.Can total 3 groups of objects – totals up to 10.	
Recognise commutative property for pairs up to 10.	
Recognise commutative property for 3 addends – totals up to 10.	
Find “1 (or <i>one</i> ) more than” numbers 0 – 14 on a Number Line.	
Find “2 (or <i>two</i> ) more than” numbers 0 – 13 on a Number Line.	
Can “count on” by 3, 4, or 5 on a Number Line up to 15.	

Solve simple word or picture problems including money and measurement – Combinations totalling up to 10.	<b>Lower Primary 1</b>
Know all addition pairs with totals up to 10 (Use + and = signs)	
Know addition doubles up to “double 5”.	
Respond to number sentences using + and =.	
Identify the effect of zero in addition.	
Recognise commutative property for pairs up to 10.	
Recognise commutative property for 3 addends – totals up to 10.	
Total 2 sets of objects – totals up to 10.	
Total 3 sets of objects – totals up to 10.	
Select 2 groups of objects to make a given total – up to 10.	
Select 3 groups of objects to make a given total – up to 10.	
Identify complementary addition and subtraction pairs.	
Know addition facts for all pairs of numbers that total 10.	
Know addition doubles for all numbers 0 – 5.	
Use + and – signs.	
Use # to stand for an unknown number in a number sentence.	
Addition word form 1 – and.	
Addition word form 2 – add.	
Addition word form 3 – plus.	
Addition word form 4 – more than.	
Addition word form 5 – total.	
Addition word form 6 – altogether.	
Solve simple money problems involving addition up to 10c/p.	
Identify the effect of zero in addition.	
Recognize alternative groupings for 3 addends.	
Add a single digit to teens number without crossing 20.	
Add 10 to any single digit number including 0.	
Write any teens number as the sum of 10 and a single digit.	
Know addition facts for all pairs of numbers that total between 10 and 15.	

Know addition doubles for all numbers 0 – 7.	<p style="text-align: center;"><b>Lower Primary 2</b></p> <p style="text-align: center;"><b>&amp;</b></p> <p style="text-align: center;"><b>Middle Primary 1</b></p>
Use + and = signs.	
Use a symbol to stand for an unknown number in a number sentence.	
Join 2 numbers across the 10s bridge – in 2 stages – e.g. $6 + 7 = 6 + 4 + 3 = 10 + 3 = 13$ .	
Add a single digit to a teens number without crossing 20.	
Add a single digit to a 20s number without crossing 30.	
Add 10 to any single digit number including 0.	
Add 20 to any single digit number including 0.	
Write any twenties number as the sum of 20 and a single digit.	
Know addition facts for all single digit number pairs and all additional pairs to total 15.	
Addition doubles up to double 10.	
Add a single digit to a teens number without crossing 20.	
Add a single digit to a teens number across the 20s bridge in 2 steps.	
Use known addition doubles to calculate near doubles.	
Know all addition pairs that total 20.	
Add 3 single digit numbers totals up to 20.	
Addition doubles up to double 20.	
Know all pairs of 10-multiples which total 100.	
Understand that subtraction is the reverse of addition and state the subtraction corresponding to a given addition.	
Add a single digit number to any 2-digit number without crossing the tens boundary.	
Add a teens number to another teens number without crossing the tens boundary.	
Add a single digit to a multiple of 10 or 100.	
Add a 2-digit number to a multiple of 10 without crossing 100.	
Add a 2-digit number to a teens number without crossing tens or 100 bounds.	
Add 10 to any 2-digit number without crossing 100.	
Add a pair of 10-multiples without crossing 100.	
Add a multiple of 10 to a 2-digit number without crossing 100.	
Add a pair of 100 multiples without crossing 1000.	
Add a pair of single digit numbers crossing 10.	

Add a single digit number to a teens number, crossing 20.	<b>Middle Primary 1</b>		
Mentally add 9 or 11 to any 2-digit number.			
Know all pairs of multiples of 4 that total 100.			
Know all addition doubles up to “double 25”.			
Addition doubles for all 10 multiples up to “double 90”.			
Add mentally 3 small numbers within the range 1 – 50.			
Add mentally 4 small numbers within the range 1 – 50.			
Recognise and use addition patterns.			
Mentally add 9 or 11 to any 3-digit number.			
Mentally add 9, 19, 29 ... or 11, 21, 31 ... to any 2-digit number without crossing 100.			
Add a single digit number to any 3-digit number without crossing a tens bound.			
Add any 2-digit number to a multiple of 100.		<b>&amp;</b>	
Add a multiple of 10 to a 2-digit number, crossing 100.			
Add a pair of 2-digit numbers without crossing tens boundary or 100.			
Add 10 to any 2- or 3-digit number, including crossing the hundreds bound.			
Add a pair of ten multiples crossing 100.			<b>Middle Primary 2</b>
Find what must be added to a 3-digit multiple of ten to reach the next hundreds bound.			
Add a 2-digit number to a multiple of ten, crossing 100.			
Add a pair of 100 multiples crossing 1000.			
Add 100 to any 3-digit number without crossing 1000.			
Add any single digit number to cross the 100s bound. Number range up to 1000.			
Add any pair of 2-digit numbers.			
Recognise all number pairs that total 100.			
Recognise all pairs of 50 multiples that total 1000.			
Add collections of small numbers using strategies such as addition doubles and grouping into tens.			
Addition doubles up to “double 50”.			
Extend known addition doubles.			
Add 2-digit multiples of 10.			
Add a pair of 100 multiples, crossing 1000.			
Add a multiple of 10 to a 3-digit number without crossing the hundreds bound.			



Add 4-digit hundred multiples.	<b>Upper Primary 2</b>  <b>&amp;</b>  <b>Lower Secondary</b>
Add a pair of decimals each less than 1 and with up to 2 decimal places.	
Derive decimal complements in 10 and 100 with 1 – to 2 decimal places.	
Derive doubles of 2-digit numbers including decimals to 2 decimal places.	
Derive doubles of 10 multiples to 1000.	
Derive doubles of 100 multiples to 10 000.	
Order of operations (BODMAS calculations)	
Add a 2-digit whole number to a 3-digit whole number.	
Add 2-digit decimals.	
Add integers (up to 2 digits).	
Near doubles including decimals.	
Addition of “nearly” numbers e.g. $48 + 39$ , $427 + 102$ , $92 + 51$ , $7.6 + 8.8$ .	
Calculations involving roots.	
What needs to be added to change 4.257 to 4.277? 6.132 to 6.139?	
Derive complements in 1, 10, 50, 100, 1000.	
Add several positive or negative numbers including larger multiples of 10.	
Add and subtract pairs of the same order (both with 2 significant figures).	

## Subtraction

Subtraction Outcome	Content Module
Compare sets of objects – <i>more, less, the same.</i>	<b>P-K</b>
<i>Take away</i> 1 object from any given set 1 – 5 objects.	
Explore subtraction pairs number range 1 – 5.	
Partition sets of objects.	
Solve simple word or picture problems involving subtractions 5 – 0.	
Look at 2 different sets of the same objects – how many have been taken?	
Respond to number statements in form $A - B$ .	
Subtraction word form <i>take</i>	
Subtraction word form <i>take away</i>	
Subtraction word form <i>1 less than</i>	
Subtraction word form <i>count back</i>	
Subtraction word form: <i>how many more?</i>	
Subtraction word form: <i>difference</i>	
Subtraction word form: <i>subtract</i>	
Subtraction word form: <i>minus</i>	
Subtraction word form: <i>from</i>	
Identify the empty set and the number zero.	
Recognize the effect of zero in subtraction.	
Partition sets of objects 2 - 5.	
Solve simple word and picture problems involving subtraction 5 – 0.	
Partition sets of objects 2 – 8.	
Solve simple word and picture problems involving subtraction 8 – 0 (including money).	
Respond to number sentences in form $A - B = \#$ .	
Use a number line – 1 less than — number range 12 – 0	
Use a number line – 2 less than — number range 12 – 0	

Count back (any single digit amount), number range 10 – 0.	<b>Lower Primary 1</b>  <b>&amp;</b>  <b>Lower Primary 2</b>
Compare sets of objects. How many more?	
Compare sets of objects. How many have been taken?	
Link complementary addition and subtraction pairs (totals to 10).	
Solve simple word and picture problems involving subtraction 8 – 0.	
Count on to find the first number 0 – 10.	
Given a number total and some objects displayed – how many are hidden?	
Use a symbol to represent the unknown quantity in a number sentence, totals up to 10.	
Use symbol for unknown number. $A - B = (\#)$ .	
Use symbol for unknown number. $(\#) - B = C$	
Use symbol for unknown number. $A - (\#) = C$	
Write facts for complementary addition and subtraction pairs.	
Identify number sentences with the same difference. Choose number sentences with the same answer.	
Count back by 10 from any 10-multiple up to 50.	
Use subtraction facts associated with doubles 1+1 to 9+9.	
Identify complementary addition and subtraction pairs that total 20.	
Count back using a number line or grid.	
Count on to find the first number 0 – 50 using a number line or grid.	
Subtract a single digit from any 2 digit number without crossing 10.	
Subtraction pairs for 10 multiples totalling 100.	
Count on to find the first number 0 – 50. Use a number line or grid.	
Use subtraction facts associated with doubles 1+1 to 15+15.	
Use subtraction facts associated with near doubles 1+1 to 15+15.	
Minus 11, use numbers 11-99.	
Minus 9, use numbers 9-99.	
Subtract a single digit from a 2- or 3-digit ten multiple.	
Subtract a teens number from a 2-digit number without crossing tens bound.	
Subtraction pairs for 10 multiples totalling 100.	
Use subtraction facts associated with doubles 1+1 to 25+25.	



Identify small differences lying either side of a 1000 bound.	<b>Middle Primary 2</b>	
Take 9 from any 3-digit number without crossing 100 bound.		
Take 11 from any 3-digit number without crossing 100 bound.		
Subtraction pairs for 50 multiples totalling 1000.		
Subtract any pair of 2 digit numbers including crossing tens bound.		
Subtract a ten multiple from a 2- or 3-digit number without crossing the 100 bound.		
Subtract a ten multiple from a 3-digit multiple crossing 100.		
Subtract any pair of 2-digit numbers including crossing tens bound.		<b>&amp;</b>
Subtract a 2-digit number from 3-digit number without crossing 10's or 100's bound.		
Subtract a ten multiple from a 2-, 3- or 4-digit number without crossing the 100 bound.		
Subtract a ten multiple from a 3-digit ten multiple crossing 100.		
Subtract a single digit from a multiple of 100 or 1000.		
Identify 3-digit number pairs with the same difference.		
Identify pairs of hundred multiples with the same difference up to 10 000.		
Identify small differences in 3, 4 and 5 digit numbers.	<b>Upper Primary 1</b>	
Take 9, 19 or 29 from any 3 digit number without crossing 100 bound.		
Take 11, 21 or 31 from any 3 digit number without crossing 100 bound.		
Subtraction pairs for 500 multiples totalling 10 000.		
Subtract a ten multiple from a 2-, 3- or 4-digit number without crossing the 100 bound.		
Subtract a ten multiple from a 3- or 4-digit ten multiple crossing 100.		
Subtract a 3-digit ten multiple from a 3- or 4-digit number without crossing 100s bound.		
Subtract a single digit from a multiple of 100 or 1000.		
Subtract a 3-digit number from another 3-digit number without crossing the tens or hundreds bound.		
Subtract a single digit hundred multiple from a 3- or 4-digit number crossing 1000.		
Take 109, 119, 129 from any 3 digit number without crossing the hundred bound.		
Take 111, 121, 131 from any 3 digit number without crossing the hundreds bound.		
Word problems involving totals to 1000. Include money and measure.		
Take away 1000 from any number.		
Take away 0.1 from any 1- or 2-digit number.		
Subtraction for pairs of decimal tenths totalling 1.		

Subtraction for 3-digit ten multiples from 1000 multiples.	<b>Middle Primary</b> <b>2</b>  <b>&amp;</b>  <b>Upper Primary</b> <b>1 &amp; 2</b>
Subtraction for 3-digit numbers to make the next highest 100 multiple.	
Subtraction pairs for 1000 multiples totalling 10 000.	
Subtraction pairs for 50 multiples totalling 1000 multiples.	
Subtraction pairs for 500 multiples totalling 10 000.	
Subtract 4-digit multiples of 100.	
How much more? Add to a decimal with units and tenths to make the next highest whole number.	
Subtract a pair of decimal fractions each with units and tenths. Number range up to 30.	
Identify decimal number pairs with the same difference.	
Find the difference between a pair of numbers lying either side of a 1000 multiple.	
Word problems involving subtractions with totals up to 10 000.	
Take away 0.1 from any 1- or 2-digit number.	
Take away 0.1 from any 1-, 2- or 3-digit number.	
Take away 0.01 from any number with 2 decimal places.	
Subtraction for pairs of decimal tenths totalling 1.	
Subtraction for units and tenths totalling 10.	
Subtract a 3 digit ten multiple from a 3- or 4-digit number without crossing 100s bound.	
Subtract a 3-digit ten multiple from a 3- or 4-digit number crossing 100s bound.	
Subtract 4-digit multiples of 100.	
Subtract pairs of 4-digit numbers without crossing 10s, 100s or 1000s bounds.	
How much more? Add to a decimal with units, tenths and hundredths to make the next highest whole number.	
Subtract a pair of decimal fractions each with units, tenths, and hundredths without crossing tenths or hundredths bounds.	
Identify decimal number pairs with the same difference – 2 decimal places without crossing tenths or hundredths.	
Word problems involving subtractions with totals up to 10 000.	
Take away any 1000 multiple from any 4, 5, 6 or 7 digit number.	
Take away 0.1 from any 1, 2 or 3 digit number.	
Take away 0.01 from any number with 2 decimal places.	

Take away 0.01 from any positive integer.	<b>Upper Primary 2  &amp;  Lower Secondary</b>
Take away 0.001 from any number with 3 decimal places, including numbers without placeholders.	
Subtraction for pairs of decimal tenths totalling 1.	
Subtraction for units and tenths totalling 10.	
How much more? Add to a decimal with units, tenths and hundredths to make the next highest whole number.	
How much more? Add to a decimal with units, tenths, hundredths and thousandths to make the next highest whole number.	
Subtract a pair of decimal fractions each with 2 decimal places without crossing tenths or hundredths bounds.	
Subtract a pair of decimals with 3 decimal places without crossing tenths, hundredths or thousandths bounds.	
Subtract a pair of decimal fractions with 2 decimal places crossing tenths or hundreds bounds.	
Identify decimal number pairs with the same difference, 1 or 2 decimal places, including crossing tenths or hundredths.	

## BRAINtastic! Multiplication & Division

### Multiplication

Multiplication Outcome	Content Module
Represent multiplication as repeated addition	<b>Lower Primary 2</b>
Represent multiplication as an array	
Recognise commutative property of multiplication (Multiplication can be done in any order)	
Recognise that 'double' is the same as '2 groups of'	
Begin to use the symbols <b>x</b> and <b>=</b> to make number sentences related to multiplication	<b>Middle Primary</b>
Word form: <b>a</b> groups of <b>b</b>	
Word form: <b>a b's</b>	
Word form: <b>a</b> times <b>b</b>	
Word form: <b>a</b> multiplied by <b>b</b>	
Word form: Multiply <b>a</b> by <b>b</b>	
Use a symbol to stand for an unknown number in a number sentence.	
Interpret real life situations as multiplication	
Multiply any single digit by 1 or 10	
Double of any 5-multiple up to 20	
Multiplication facts 2x, 5x, 10x	
Recognise properties of 2-multiples (even nos)	
Recognise properties of 5-multiples (end in 0 or 5)	
Recognise properties of 10-multiples (end in 0)	
Money multiplication	
Represent multiplication as scaling	
Doubles of all whole numbers to 20	
Doubles of any 5-multiple up to 100	
Doubles of any 50-multiple up to 500	

Multiplication facts for 3x, 4x	<b>Middle Primary 1 &amp; 2</b>  <b>&amp;</b>  <b>Upper Primary 1 &amp; 2</b>
Multiply a single digit number by 100	
Multiply a 2-digit ten multiple up to 50 by 2, 3, 4, 5 or 10	
Multiply a 2-digit number by 2, 3, 4 or 5 without crossing the 10s bound	
Recognise the division statement that corresponds to a given multiplication statement	
Word form: Product of <b>a</b> and <b>b</b>	
Real life problems including money and measurement	
Doubles of all whole numbers to 50	
Doubles of 10-multiples to 500	
Doubles of 100-multiples up to 5000	
Convert \$ amounts to cents	
Convert cent amounts to \$ and cents	
Use commutative principle ( $4 \times 3 = 3 \times 4$ )	
Use associative principle ( $6 \times 15 = 6 \times 5 \times 3$ )	
Use distributive principle ( $6 \times 15 = 6 \times 10 + 6 \times 5$ )	
Use related facts and doubling (Double 34 = double 30 + double 4)	
Use zero property of multiplication	
Multiplication facts 6x, 7x, 8x, 9x	
Squares of all numbers from 1 to 10	
Doubles of all whole numbers to 100	
Doubles of 10-multiples to 1000	
Doubles of 100-multiples to 10 000	
Double a number ending in 5 and halve the other number ( $35 \times 14 = 70 \times 7$ )	
Multiply by 5 – Multiply by 10 then halve	
Multiply by 50 – Multiply by 100 then halve	
Squares of numbers up to 12	
Derive squares of 10-multiples up to $100 \times 100$	
Multiply a decimal with 1 decimal place by 10	
Multiply a decimal with 1 decimal place by 100	
Multiply a decimal with 2 decimal places by 10	

Multiply a decimal with 2 decimal places by 100	<b>Upper Primary</b>  <b>&amp;</b>  <b>Lower Secondary</b>
Use known number facts to perform multiplications involving decimals	
Know doubles of all 2-digit numbers including decimals	
Multiply a number with 1 decimal place by a single digit number	
Multiply a 2-digit number (including a decimal) by a single digit number	
Multiply any number by 10 or any small 10-multiple	
Multiply any number by 100 or 1000	
Use multiplication facts and place value to solve examples such as $0.2 \times 8$ , $80 \times \# = 8$	
Derive squares of tenths numbers 0.1 to 0.9	
Derive squares of 10-multiples to 100	
Calculate with mixed operations, using the BODMAS rules	
Find perimeters and areas of simple shapes.	
Convert metric units to smaller units (m to cm)	
Multiply and divide positive and negative integers.	
Derive products of 10-multiples	
Multiply and divide whole numbers by 0.1	
Multiply and divide whole numbers by 0.01	
Know the general form of the index law for multiplication of integer powers	
Know the use of fractional index powers implies a surd.	

## Division

Division Outcome	Content Module
Understand division as sharing equally	Lower Primary
Understand division as grouping or repeated subtraction	
Understand that division is the opposite of multiplication	Middle Primary
Use a symbol to stand for an unknown number in a number sentence	
Know division facts for 2 up to $20 \div 2$	
Know division facts for 5 up to $50 \div 5$	
Know division facts for 10 up to $100 \div 10$	
Understand that halving is the same as dividing by 2	
Recognise half of 10-multiples up to 100	
Recognise half of 10-multiples up to 200	
Word form: Share <b>a</b> between <b>b</b>	
Word form: Divide <b>a</b> by <b>b</b>	
Word form: How many <b>a</b> 's make <b>b</b> ?	
Word form: Is <b>a</b> a multiple of <b>b</b> ?	
Word form: Group <b>a</b> into <b>b</b> groups	
Word form: Is <b>a</b> divisible by <b>b</b> ?	
Know division facts for 3 up to $30 \div 3$	
Know division facts for 4 up to $40 \div 4$	
Know division facts for 6 up to $60 \div 6$	
Know division facts for 7 up to $70 \div 7$	
Know division facts for 8 up to $80 \div 8$	
Know division facts for 9 up to $90 \div 9$	
Understand <b>factor</b>	
Understand <b>quotient</b>	

Understand <b>remainder</b>	<b>Upper Primary</b>
Find quarters by finding half of half	
Complementary multiplication and division facts	
Divide a 3-digit 100 multiple by 10 or 100	
Understand that division by 1 leaves a number unchanged	
Can relate division and fractions	
Know division cannot be done in reverse	
Know a number cannot be divided by 0	
Make sensible decisions about whether to round up or down after a division	<b>Lower Secondary</b>
Know square roots of square numbers to 100	
Know halves of all even numbers to 100	
Perform divisions of mixed measurements	
Use patterns to solve division problems	
Halve any 3-digit 10 multiple	
Division of a decimal number by a whole number	
Give a quotient as a decimal number when dividing by a whole number	
Halve a decimal fraction less than 1 with one or two decimal places.	

## BRAINtastic! Fractions, Decimals & Percentages (including Ratios & Proportions)

### Fractions, Decimals & Percentages

Fractions, Decimals & Percentages Outcome	Content Module
Identify half of sets to 20.	<b>Lower Primary</b>
Identify half of a whole object or shape	
Identify a quarter of small numbers of objects	
Identify a quarter of a whole object or shape	
Relate 2 halves to a whole	
Relate 4 quarters to a whole	
Relate 2 quarters to one half	<b>Middle Primary</b>
Recognise common unit fractions	
Use unit fractions to find fractions of number collections and shapes	
Recognise common equivalent fractions	
Compare familiar fractions	
Order familiar fractions	
Estimate the fraction of shapes that are shaded	
Estimate fractions and percentages from graphic displays	
Recognise common simple fractions that are several parts of a whole	
Use fraction notation	
Write mixed numbers	
Relate fractions to division	
Find fractions of numbers and quantities	
Use decimal notation. Know what each digit in a decimal fraction represents	
Order decimal numbers	
Count on or back in steps of 0.1	
Count on or back in steps of 0.01	

Count on or back in steps of 0.001	<b>Upper Primary</b>
Recognise common equivalences between decimals and fractions	
Convert improper fractions to mixed numbers and vice versa	
Recognise patterns in equivalent fractions	
Recognise equivalences related to parts in 100 ( $50/100 = 1/2$ )	
Convert metric units to larger units (cm to metres)	
Round decimals with one decimal place to the nearest whole number	
Round decimals with 2 decimal places to the nearest whole number	
Round decimals with 3 decimal places to the nearest whole number	
Recognise different percentages of a 100 grid	
Know that one whole = 100%	
Know common fraction and percentage equivalents	
Identify a percentage of a shape	
Reduce fractions to their lowest terms	
Produce equivalent fractions by multiplying numerator and denominator by the same number	
Order mixed numbers	
Write smaller metric units as fractions of a larger unit	
Round decimal numbers with 2 or more decimal places to the nearest tenth	
Recognise that 33% and 67% are 'about $1/3$ and about $2/3$ '	
Mentally calculate with percentages	
Express a smaller number as a percentage of a larger number	
Simplify fractions by cancellation	
Convert decimals to fractions	
Compare 2 or more simple fractions	
Add and subtract simple fractions with the same denominator	
Add and subtract fractions with different denominators	
Multiply an integer by a fraction or a fraction by an integer	
Recognise the equivalence of fractions, decimals and percentages	
Calculate percentages and use them to solve problems	
Express a number as a fraction (in its lowest terms) of another number	

Compare and order fractions by converting them to fractions with a common denominator	<b>Lower Secondary</b>
Compare and order fractions by converting them to decimals	
Divide an integer by a fraction	
Understand that dividing a positive integer by a fraction less than 1 gives a bigger answer	
Convert fractions and decimals to percentages by multiplying by 100	
Use fraction, decimal and percentage equivalences to solve problems	
Find the outcome of a given percentage increase or decrease	
Understand fractions as multiplicative operators	
Multiply a fraction by a fraction	
Divide a fraction by a fraction	
Use percentage changes to solve problems	

## Ratio and Proportion

Ratio & Proportion	Content Module
Solve simple problems involving ratio and proportion.	Upper Primary
Understand that 'a <b>to</b> every b' compares part to part and 'a <b>in</b> every b' compares part to whole.	
Use the terms <i>ratio</i> and <i>proportion</i> , and the ratio notation <b>a:b</b>	Lower Secondary
Use direct proportion in simple contexts	
Simplify a 3-part ratio to an equivalent simpler form.	
Simplify a ratio expressed in different units (50cm:2m)	
Understand the relationship and the difference between ratio and proportion (i.e. the ratio of <b>a</b> to <b>b</b> versus the proportion of <b>a</b> to the whole)	
Divide a quantity into 2 or more parts in a given ratio.	

## BRAINtastic! Chance & Data

### Probability

Probability Outcome	Content Module
Recognise that some events have two equally likely outcomes.	<b>Upper Primary</b>
Understand and use the probability scale from 0 to 1. (Recognise that, for a finite number of possible outcomes, probability is a way of measuring the chance or likelihood of a particular outcome on a scale from 0 to 1, with the lowest probability at zero (impossible) and the highest probability at 1 (certain).)	
Find probabilities based on equally likely outcomes in simple contexts.	
Know that probability is related to proportion and can be represented by a fraction, a decimal or a percentage.	
Know that if several equally likely outcomes are possible, the probability of a particular outcome chosen at random can be measured by <b>Number of events favourable to the outcome <u>over</u> Total number of possible events</b>	<b>Lower Secondary</b>
Identify all the possible outcomes of a single event.	
Identify inaccuracies in statements related to probability.	
Use the vocabulary of probability when interpreting the results of an experiment, appreciating that random processes are unpredictable.	
Know that if the probability of an event occurring is $p$ , then the probability of its not occurring is $1 - p$ . Use this knowledge to solve problems.	
Find and record all possible outcomes for a single event and two successive events in a systematic way.	
Use the vocabulary of probability in interpreting results involving uncertainty and prediction.	
Know that the sum of probabilities of all mutually exclusive outcomes is 1.	
Identify all the mutually exclusive outcomes of an experiment.	

## Organising & Interpreting Data

Organising & Interpreting Data Outcome	Content Module
Classify objects on the basis of one attribute such as colour, shape, texture, size or function.	<b>Lower Primary</b>
Sort collections of objects.	
Add similar objects to a clearly defined set.	
Identify elements that are <b>not</b> part of a given set.	
Match sets, equal and unequal.	
Represent information using pictures.	
Interpret a set of simple mathematical data in two rows or columns using real objects, models and pictures.	<b>Middle Primary</b>
Compare groups using pictorial representations.	
Compare information on situations or objects using two categories.	
Identify the numerical correspondence between a pictorial representation of data and the information displayed.	
Organise a <b>list</b> .	
Compare groups using <b>pictorial representations</b> .	
Classify numbers and organise them into lists and simple tables.	
Use a table to answer questions.	
Organise information into a simple block graph and discuss the information presented.	<b>Upper Primary</b>
Interpret pictograms where one symbol represents one unit.	
Classify objects, numbers or shapes according to one criterion, progressing to two criteria, and display on a Carroll or Venn diagram.	
Show data on a simple <b>frequency table</b> and respond to questions about the information displayed.	
Use a simple bar graph with the vertical axis labelled in ones.	
Read from a simple pictogram where each symbol represents <b>two units</b> :	
Discuss information listed on a <b>tally chart</b> .	
Read information from a <b>pictogram where the symbol represents several units</b> .	

Answer a question or solve a problem by interpreting a <b>bar chart</b> with the vertical axis marked in multiples of 2, 5, 10 or 20, noting that a graph has a title, and that axes are labelled.	<b>Upper Primary</b>
Use <b>sorting diagrams</b> such as two-way Venn and Carroll diagrams to display information about shapes or numbers.	
Test a hypothesis by analysing a <b>bar chart</b> or <b>bar line chart</b> showing the frequency of an event.	
Develop understanding of the <b>mode</b> (most common item) and the <b>range</b> (difference between greatest and least values) of a set of data.	
Interpret a <b>line graph</b> . Understand that midpoints on the line may or may not have value, depending on the context.	
Interpret a <b>bar chart where discrete data are grouped</b> .	
Interpret <b>simple pie charts</b> .	
Interpret a <b>line graph, in which the intermediate values have meaning</b> .	
Know that <b>mean</b> and <b>average</b> are interchangeable terms.	
Know that the <b>mode</b> of a set of numbers is the most frequently occurring number.	
Calculate the <b>mean</b> for a small set of discrete data.	<b>Lower Secondary</b>
Find and use the <b>range</b> of a small set of discrete data.	
Find the <b>median</b> of a small set of discrete data.	
Calculate statistics.	
Read bar charts for categorical data.	
Read bar charts for discrete (discontinuous) data.	
Compare the distributions of two sets of data, and the relationships between them, using the <b>range</b> and one of the <b>mode, mean</b> or <b>median</b> .	
Identify misleading graphs and statistics.	

## BRAINtastic! Patterns & Algebra

### Patterns, Relationships & Reasoning

Patterns, Relationships & Reasoning Outcome	Content Module
Can <b>identify</b> patterns in <b>colour, shape, size</b> and <b>number</b> .	<b>P-K &amp; Lower Primary</b>
Can <b>copy</b> patterns in <b>colour, shape, size</b> and <b>number</b> .	
Can <b>extend</b> patterns in <b>colour, shape, size</b> and <b>number</b> .	
Can identify process to form a pattern.	
Can recognise inconsistencies in a pattern.	
Can order new objects to make a set like a given one.	
Can sort and classify sets of objects.	
Can order sets of objects (largest to smallest, number order)	<b>Middle Primary</b>
Can recognise equivalence in patterns.	
Can recognise equivalence in number.	
Can identify and continue counting patterns.	
Can recognise the accuracy of a general statement.	
Can reason about number operations and find unknown numbers or quantities in everyday contexts.	
Can recognise that the <i>equals</i> sign indicates equivalence in number relationships, not that an operation is to be performed.	
Can find examples that match a general statement.	
Can match a general statement to a given set of numbers.	<b>Middle/ Upper Primary</b>
Can match a number statement that uses a symbol for an unknown quantity to a simple “story problem”.	
Can formulate a general statement or rule about a mathematical operation.	
Can solve word problems and investigate in a number of contexts.	

## Formulae & Equations

Formulae & Equations Outcome	Content Module
Begin to understand the use of letters to stand for unknown numbers in number sentences.	<b>Lower Secondary</b>
Know that algebraic expressions follow the same conventions and order as arithmetic conventions.	
Know that the same commutative and associative laws apply to algebraic expressions as they do to arithmetic progressions.	
Simplify linear expressions by collecting like terms.	
Construct and solve simple linear equations with integer coefficients, the unknown on one side only.	
Generate a sequence given a rule for finding each term from its position in the sequence.	
Know that an algebraic expression is formed from letters, symbols and numbers combined with operations signs.	
Know that algebraic operations follow the same conventions and order as arithmetic operations.	
Use index notation and the index laws for small positive index powers.	
Consolidate forming and solving linear equations with an unknown on one side only.	
Explore alternative ways of solving simple equations.	
Substitute positive and negative numbers into linear expression and positive integers into simple expressions involving powers.	
In simple cases, find an unknown quantity where it is not the subject of the formula, and where an equation must be solved.	
Derive algebraic expressions and formulas.	
Can use letter symbols and distinguish their different roles in algebra.	
Can interpret equalities in equations with expressions on each side.	
Use simple instances of the index laws for multiplication and division of small integer powers.	
Use the distributive law to multiply a single term over a bracket.	
Simplify or transform algebraic expressions by taking out single-term common factors.	

<p>Add simple algebraic fractions. Generalise from arithmetic that</p> $\frac{a}{b} \pm \frac{c}{d} = \frac{ad \pm bc}{bd}$	<p><b>Lower Secondary</b></p>
<p>Square a linear expression, and expand and simplify the product of two linear expressions of the form <math>x \pm n</math>. E.g.</p>	
<p>Formulate algebraic expressions to express relationships between unknown numbers.</p>	
<p>Construct and solve linear equations with negative signs anywhere in the equation, or a negative solution.</p>	
<p>Solve linear equations using inverse operations, by transforming both sides in the same way, or by other methods.</p>	
<p>Form linear equations with unknowns on both sides and solve them by transforming both sides</p>	
<p>Solve a pair of simultaneous linear equations by eliminating one variable.</p>	
<p>Know that simultaneous equations can be solved in a variety of ways.</p>	
<p>Use algebraic methods to solve simple non-linear equations. E.g.</p>	
<p>Substitute positive and negative numbers into linear expressions and expressions involving powers.</p>	
<p>Change the subject of simple formulae using inverse operations.</p>	
<p>Derive more complex algebraic expressions and formulae.</p>	
<p>Find the <math>n</math>th term of some simple linear sequences, knowing that the <math>n</math>th term is of the form <math>T(n) = an + b</math>, where <math>a</math> is the constant <i>difference</i> between successive terms and <math>b</math> is a constant number related to the starting point of the sequence.</p>	

## Functions & Graphs

Functions & Graphs Outcome	Content Module
Given inputs and outputs, find the function.	<b>Lower Secondary</b>
Explore inverse functions operations, to find the input, given the output and the function.	
Given the output and function, find the input.	
Given one of the two functions, define the other.	
Complete a table of values to satisfy a given rule.	
Begin to consider the features of graphs of simple linear functions where $y$ is given explicitly in terms of $x$ .	
Recognise that equations of the form $y = c$ , where $c$ is a constant, are straight-line graphs parallel to the $x$ -axis, and equations of the form $x = c$ , where $x$ is a constant, are straight-line graphs parallel to the $y$ -axis.	
Consider the intersection of the graphs of two linear expressions, one of which is of the form $y = c$ or $x=c$ .	
Interpret graphs of functions arising from real-life situations e.g. a conversion graph converting from miles to kilometres, or degrees Fahrenheit to degrees Celsius.	
Read values from a graph.	
Interpret straight-line graphs from science or geography.	
Generate sets of values for simple functions.	
Given one of the two functions, define the other.	
Generate co-ordinate pairs in all four quadrants.	
Given a linear expression e.g. $y = 2x - 3$ , generate co-ordinate pairs of points on the corresponding line.	
Recognise the features of a graph of the form $y = mx + c$ <ol style="list-style-type: none"> <li>1. Corresponds to a straight line.</li> <li>2. The values of the co-ordinates at any point on the line satisfy the equation represented by the graph.</li> <li>3. Any co-ordinate pair which represents a point not on the graph does not satisfy the equation.</li> <li>4. The value of <math>m</math> determines the slope of the line.</li> <li>5. The value of <math>c</math> determines the co-ordinates of the <math>y</math>-intercept.</li> </ol>	

Understand that the point of intersection of two lines is the point whose co-ordinates satisfy both equations.	<b>Lower Secondary</b>
Generate co-ordinate pairs in all four quadrants.	

## **BRAINtastic! Measurement**

### **Volume**

<b>Volume &amp; Capacity Outcome</b>	<b>Content Module</b>
Understand and use vocabulary of <i>full, nearly full, empty, nearly empty</i> .	<b>P-K &amp; Lower Primary</b>
Compare and order three or four containers of obviously different capacity. Uses vocabulary of <i>holds more/less than/holds as much as</i> .	
Compare and order three objects of similar shape in order of volume. Which one takes up the most/least space?	
Choose objects that take up more or less space than a given object.	
Recognise that objects of the same volume may be different shapes.	
In a large array of containers of different sizes and shapes, group the “pairs” that have the same capacity.	<b>Middle Primary</b>
Identify whether objects will or will not fit a defined space (packing).	
Identify whether a certain volume of liquid in one container will or will not fit into a different container (filling).	
Identify which containers are suitable for holding different substances.	
Understand and use vocabulary of <i>full, nearly full, empty, nearly empty, most, more, least, less, exactly the same, different, difference, amount, quantity, measure, estimate, actual, unit</i>	
Can record and interpret information recorded graphically from experiments measuring the capacity of different containers using informal units.	
Recognise that volume is conserved in objects made from small numbers of identical components.	

Begin to relate capacity of different containers to the standard measurement of one litre.	<b>Middle Primary</b>
Begin to recognise everyday substances that are measured in litres i.e. liquids as opposed to solids.	
Read and interpret measurements of volume to the nearest litre.	
Know that 1 litre = 1 000 millilitres and 1/2 litre = 500mL.	
Read and interpret measurements of volume to the nearest litre and the nearest 100mL.	
Order containers smaller than 1 litre by interpreting capacities expressed in millilitres.	
Know that 1 litre = 1 000 millilitres and ½ litre = 500mL and ¼ litre = 250mL.	
Read and interpret measurements of volume to the nearest litre, the nearest 100mL and to the millilitre on a measuring device calibrated in mL	<b>Upper Primary  &amp;  Lower Secondary</b>
Recognise and write volume measurements using half- and quarter-litres written as decimal numbers E.g. 1.25L	
Solve problems relating to capacity in everyday contexts.	
Identify how many uniform units make up a regular or simple irregular 3-D shape.	
Know that 1 litre = 1 000 millilitres and 1/2 litre = 500mL and 1/4 litre = 250mL and 1/10 litre = 100mL	
Recognise and writes volume measurements using half-, tenth- and quarter-litres written as decimal numbers	
Begin to convert between litres and millilitres.	
Begin to round decimal measurements to the nearest whole unit.	
Recognise that 1 cubic centimetre is the space occupied by a cube whose edges are all 1cm long.	
Can identify how many uniform units (e.g. cubic centimetres) make up a regular or simple irregular 3-D shape.	
Recognise how many cubic centimetres will be needed to fill rectangular containers with simple dimensions marked in grids.	
Relate measurements of volume and capacity.	
Convert between different units of volume and capacity.	
Order containers by interpreting capacities expressed in mixed units of litres and millilitres.	
Know that 1 litre of water has a mass of 1kg. (1mL = 1g)	
Recognise the difference between units of volume and units of capacity, and convert between units of volume and capacity.	

Find the volume of regular prisms using the appropriate formulae: <b><math>V = A \times H</math> where <math>A = \text{area of prism cross-section and } H = \text{height}</math></b>	<b>Lower Secondary</b>
Solve problems related to volume and capacity in real-life situations including volumes of composite shapes.	
Find the volumes of cones and conic sections using the formula <b><math>V (\text{cone}) = 1/3 (\text{volume of corresponding cylinder}) = 1/3 (\pi r^2 h)</math></b>	
Find the volume of pyramids using the formula <b><math>V (\text{pyramid}) = 1/3 (\text{volume of corresponding rectangular prism}) = 1/3 A \times H</math></b>	
Find the volume of spheres using the formula <b><math>V (\text{sphere}) = 4/3\pi r^3</math></b>	

## Area

Area Outcome	Content Module
Recognise <i>surface</i> as an attribute.	<b>Lower Primary</b>
Cover a shape with another shape or shapes.	
Cover spaces with a shape or shapes.	
Recognise <i>open</i> and <i>closed</i> lines. Know that <i>closed lines</i> make a shape.	
Compare two shapes that are obviously different in area.	
Count how many shapes of a uniform size will cover a larger shape.	<b>Middle Primary</b>
Recognise which shape has exactly the same number of squares as another shape.	
Compare and order three shapes that are different in area.	
Begin to recognise uniform units of area e.g. one square centimetre.	
Estimate approximate areas of regular and irregular shapes by counting square centimetres.	
Recognise areas that would be suitable to measure in square centimetres.	
Know that $1\text{m}^2 = 1\text{m} \times 1\text{m} = 100\text{cm} \times 100\text{cm} = 10\,000\text{cm}^2$	
Know that $1\text{cm}^2 = 10\text{mm} \times 10\text{mm} = 100\text{mm}^2$ .	
Make sensible estimates of different areas.	

Choose a suitable unit to estimate the areas of everyday objects.	<b>Middle Primary</b>
Begin to relate the area of triangles to being half the area of corresponding rectangles.	
Begin to recognise that finding the area of a rectangle is a multiplicative operation.	
Know the formula for finding the area of a rectangle.	<b>Upper Primary</b>
Begin to find the area of compound shapes that can be split into rectangles.	
Find the area of right-angled triangles by considering them as half of a rectangle.	
Find the surface area of simple solid shapes e.g. cubes and rectangular prisms.	
Respond to questions linking measurements of length and area	<b>Upper Primary/ Lower Secondary</b>
Know that $1\text{km}^2 = 1\,000\text{m} \times 1\,000\text{m} = 1\,000\,000\text{m}^2$	
Know that 1 hectare = $100\text{m} \times 100\text{m} = 10\,000\text{m}^2$	
Convert between $\text{mm}^2$ , $\text{cm}^2$ , $\text{m}^2$ , hectares, $\text{km}^2$ .	
Know and use the formula for finding the area of a rectangle.	
Use formulae to determine areas from linear measurements and linear measurements from area.	
Recognise that squares are “special-case” rectangles, and find their areas.	
Recognise the equivalence between the areas of rectangles and parallelograms with the same base and height.	<b>Lower Secondary</b>
Know the formula for finding the area of a triangle. Use the formula to determine areas from linear measurements and linear measurements from area.	
Find the areas of compound shapes that can be split into rectangles and triangles.	
Know the formula for finding the area of a circle. Use the formula to determine areas from linear measurements and linear measurements from area.	
Know that the value of $\pi$ is <i>about</i> 3 or 3.14 or $22/7$ .	
Understand the relationships between perimeter and area.	
Use knowledge about areas of rectangles and triangles to derive a formula for areas of trapeziums ( $1/2$ [sum of parallel sides] $\times$ h)	
Find areas of sectors of circles, knowing that the area of a sector is directly proportional to the size of the angle between the two bounding radii.	
Begin to use <b>Heron’s Formula</b> for finding the area of a triangle given the length of each side: <b>A = <math>\sqrt{[s(s-a)(s-b)(s-c)]}</math> where <math>s = (a + b + c) \div 2</math></b>	
Know the formula for areas of trapeziums; ( $1/2$ [sum of parallel sides] $\times$ h)	

Know the formula for finding the area of ▭ hombi and kites. ( $A = \frac{1}{2}(\text{product of diagonals})$ )	<b>Lower Secondary</b>
Know the formula for finding the <b>surface area</b> of a sphere ( $A = 4\pi r^2$ )	
Know that the <b>surface area</b> of a cylinder = the <b>circumference</b> of the circular face x the <b>height</b> of the cylinder. ( $A = 2\pi rh$ )	
Find the areas of compound shapes that can be split into rectangles, triangles and circles. E.g.	
Investigate relationships between surface area and volume.	

## Length

Length Outcome	Content Module
Compare objects according to length, width, height, thickness, size.	<b>P-K &amp; Lower Primary</b>
Order objects according to length, width, height, thickness, size.	
Compare an object with a collection of other objects according to length, width, height, thickness, size.	
Add a matching object to a collection using attributes of length, width, height, thickness, size.	
Compare a collection of objects with another collection of objects according to length, width, height, thickness, size.	
Use appropriate language of approximation to describe length, width, height, thickness, size.	
Describe distances using informal language of <b>near</b> and <b>far</b> .	
Compare distances using informal language of <b>nearer</b> and <b>further</b> .	
Make direct comparisons (side by side) of two items of different length, width, height, thickness, size.	
Use uniform non-standard units.	
Estimate length, width, height, thickness, size, using non-uniform units.	<b>Middle Primary</b>
Compare length, width, height, thickness, size of objects using metres and centimetres.	
Compare length, width, height, thickness, size of objects in relation to 1 metre.	
Begin to recognise when metres or centimetres are appropriate units of measurement.	
Read a simple scale to the nearest labelled division.	

Know that 10mm = 1 cm, 100cm = 1 metre, 1000m = 1 kilometre	<b>Middle Primary</b>
Solve problems involving length, width, height, thickness, size of objects in a variety of contexts, using standard units of length – centimetres, metres	
Use correctly the abbreviations <i>mm, cm, m, km</i> .	
Know the equivalent of one-half, one quarter, three-quarters and one-tenth of 1 metre in centimetres and of 1 kilometre in metres.	
Round measurements of length to the nearest ten or hundred units.	
Measure and calculate perimeters of simple shapes.	
Solve problems involving length, width, height, thickness, size of objects in a variety of contexts, using standard units of length	<b>Upper Primary</b>
Know the equivalent of one-half, one quarter, three-quarters and one-tenth of 1 metre in millimetres and centimetres and of 1 kilometre in metres.	
Recognise lengths written as decimal numbers.	
Convert measurements to equivalent units.	
Use the formula for calculating the perimeter of a rectangle, in words and letters.	
Round measurements of length to the nearest whole unit or tenth of a unit.	
Record halves, quarters and tenths of kilometres in decimal form.	
Calculate perimeters of compound shapes where the components are rectangles.	
Link calculations of perimeter and area.	
Solve problems involving length, width, height, thickness, size of objects in a variety of contexts, using standard units of length – millimetres, centimetres, metres and kilometres.	
Convert between one metric unit and another.	<b>Lower Secondary</b>
Calculate compound measurements involving length E.g. speed = distance/time and solve problems involving rates of change.	
Know and use the formula for calculating the circumference of circles, knowing that different approximations of $\pi$ are 3, $\frac{22}{7}$ and 3.14 (correct to 2 d.p.)	
Calculate perimeters of compound shapes where the components are rectangles, squares and triangles.	
Know that the length of an arc of a circle is directly proportional to the angle $\theta$ between the two bounding radii ( <i>arc length</i> = $2\pi r \times \theta/360$ ).	

Convert between less common units of length measurement e.g. micrometres to millimetres, millimetres to nanometres

**Lower  
Secondary**

## Mass

Mass Outcome	Content Module
Compare objects according to mass, using language of <i>heavier, lighter</i> .	P-K & Lower Primary
Order up to three objects according to mass.	
Predict the action of an equal arm balance when objects of different mass are placed in the pans.	
Compare an object with a collection of objects according to mass.	Middle Primary
Compare a collection of objects with another collection of objects according to mass.	
Can use appropriate language of approximation to describe mass.	
Suggest suitable units to estimate or measure mass.	
Begin to use standard units of measurement for mass.	
Read different types of simple scales to the nearest labelled division.	
Know that 1 kilogram = 1 000 grams.	
Begin to solve problems in a variety of contexts, using standard units such as kilograms, half-kilograms, units of 100g.	
Know and use relationships between familiar units.	
Begin to write weights in equivalent units. E.g. 4kg = 4 000g	
Record weights as either grams, kilograms or in mixed units.	Upper Primary
Round weights to the nearest 100g.	
Use correctly the abbreviations <i>kg</i> and <i>g</i> .	
Round weights to the nearest whole unit.	
Solve problems in a variety of contexts, using standard units such as kilograms, half-kilograms, units of 100g.	
Record measurements involving halves, quarters and tenths of kilograms in decimal form.	
Read different types of simple scales between labelled divisions, in both kilograms and grams.	
Round measurements to an appropriate degree of accuracy.	
Know that 1 tonne = 1 000 kilograms	

Know that one litre of water weighs one kilogram, and use this knowledge to solve problems in everyday contexts.	<b>Lower Secondary</b>
Convert between metric units. E.g. Change 150 000 kilograms into tonnes.	
Convert one rate to another. E.g. Convert 30kg/m <sup>2</sup> into grams/cm <sup>2</sup>	
Round measurements of mass to an appropriate degree of accuracy.	

## Time

<b>Time Outcome</b>	<b>Content Module</b>
Order pictures of familiar daily events in correct time sequence.	<b>P-K &amp; Lower Primary</b>
Sequence events in familiar stories and rhymes.	
Compare duration of familiar daily events.	
Know and order the days of the week.	
Know and order the seasons.	
Sequence pictures representing stages of development.	
Identify errors in a sequence e.g. egg to frog to tadpole	
Read time to the hour on an analogue clock.	<b>Developed across the range of Primary titles</b>
1. Know that:	
1. 1 week = 7 days	
2. 1 hour = 60 minutes	
3. 1 minute = 60 seconds	
4. 1 day = 24 hours	
5. 1 year = 365 days	
6. 1 year = 12 months	
7. 1 year = 52 weeks and 1 day	
8. 1 leap year = 366 days	
9. 1 decade = 10 years	

10.1 century = 100 years 11.1 millenium = 1000 years	
Know and order the months of the year.	<b>Lower Primary</b>
Read time to the hour and half hour on an analogue or a digital clock.	
Make sensible estimates about duration of familiar events.	<b>Middle Primary</b>
Read the time to the hour, half hour and quarter hour on an analogue or a digital clock.	
Match a digital display with an analogue display.	
Read the time to five minutes on an analogue or a digital clock.	
Use a.m. and p.m.	
Suggest suitable units to measure the duration of familiar events.	
Solve problems relating to everyday life involving time.	<b>Upper Primary/ Lower Secondary</b>
Begin to read and interpret timetables.	
Read and understand 24-hour time.	
Convert between 12-hour and 24-hour times.	
Interpret a world time chart and compare various time zones.	
Perform additions, subtractions, multiplications and divisions involving minutes, seconds and hours to solve problems related to everyday life.	

## BRAINtastic! Space & Geometry

### 2D & 3D Shape

2D & 3D Shape Outcome	Content Module
Sort 2D/3D shapes according to given rules.	<b>P-K &amp; Lower Primary</b>
Predict the movement of objects as a consequence of their shape.	
Name 2D and 3D shapes.	
Identify non-examples of 2D/3D shapes	
Match the shapes in a 'shape picture'.	
Find similar shapes on faces of objects.	
Order 2D shapes according to size.	
Make 'families' of the same shape in different sizes.	
Continue simple repeating or symmetrical patterns	
Identify solid shapes in everyday contexts.	
Find similar shapes on faces of objects.	<b>Middle Primary</b>
Use the mathematical names for common 2D and 3D shapes.	
Make collections of cubes, cuboids, cylinders and spheres, and match them to their name labels.	
Sort shapes and describe some of their features, such as the number of sides, corners, whether or not they are symmetrical (2D), shapes of faces, number of faces, edges, corners (3D shapes).	
Match shapes to their properties.	
Recognise 3D shapes from their pictures.	<b>Middle/ Upper Primary</b>
Classify and describe 2D and 3D shapes, referring to properties such as reflective symmetry (2D), the number and shapes of faces, the number of sides, edges and vertices, whether the sides/edges are the same length, whether or not the angles are right angles.	
Know that a prism has the same cross-section along its length, and that the two end faces are identical.	
Match examples of prisms and cylinders to name labels.	
Sort 3D shapes in different ways according to their properties.	

Know that a quadrilateral is any flat shape with four straight sides.	<b>Upper Primary</b>
Name, classify and describe 2D and 3D shapes.	
Know that a <b>polygon</b> is a closed, flat shape with three or more straight sides, and that <b>regular polygons</b> have all sides and all angles equal.	
Name and classify polygons using such criteria as the number of right angles, whether or not they are regular, symmetry properties.	
Know the angles and side properties of equilateral and isosceles triangles.	<b>Upper Primary &amp; Lower Secondary</b>
Know that all heptagons have seven sides	
Know that a quadrilateral is any shape with four straight sides	
Know that the square and the equilateral triangle are both regular polygons.	
Know that an isosceles triangle is an irregular polygon.	
Know that a polygon can be concave or convex.	
Identify particular shapes from a mixed set.	
Count the number of faces and edges of 3D shapes.	
Identify 3D shapes from 2D drawings.	
Identify simple nets of solid shapes – cubes or cuboids.	
Recognise the properties of rectangles.	<b>Lower Secondary</b>
Classify triangles (isosceles, equilateral, scalene), using criteria such as equal sides, equal angles, lines of symmetry.	
Know that in an equilateral triangle all three sides are equal in length and all three angles are equal in size.	
Know that an isosceles triangle has two equal sides and two equal angles	
In a scalene triangle, no two sides or angles are equal	
In a right-angled triangle, one of the angles is a right angle.	
Identify the different nets for an open cube (five square faces)	
Name and classify quadrilaterals, using criteria such as parallel sides, equal angles, equal sides, lines of symmetry, etc.	
Know that a parallelogram has opposite sides equal and parallel	
Know that a rhombus is a parallelogram with four equal sides	
Know that a rectangle is a parallelogram with four right angles	

Know that a square is a rectangle with four equal sides.	<b>Lower Secondary</b>
Know that a trapezium has one pair of opposite parallel sides.	
Know that a kite has two pairs of adjacent sides equal.	
Sort quadrilaterals and place on a Carroll diagram:	
Use correctly the vocabulary, notation and labelling conventions for lines, angles and shapes.	
Know that <b>parallel</b> lines are a constant distance apart,	
Know that <b>perpendicular</b> lines intersect at right angles.	
Visualise 2D shapes in different orientations.	
Know that the diagonals of any square, rhombus or kite <b>intersect at right angles.</b>	
Know that the diagonals of any square, rectangle, rhombus or parallelogram <b>bisect one another.</b>	
Recognise shapes from different representations or combinations of representations E.g. plan view, side view, front view.	
Know and use geometric properties of cuboids and shapes made from cuboids.	
Given a picture of a structure and a plan view diagram, fill in the number of cubes on each base.	

## Angle & Spatial Reasoning

Angle & Spatial Reasoning Outcomes	Content Module
Identify parallel and non-parallel lines in the environment.	Lower Primary
Recognise the point where lines meet.	
Identify angles that are smaller or larger than a given angle.	
Recognise whole turns, half turns and quarter turns.	
Recognise that the corners of doors, books, tables, etc are right angles or square angles.	
Recognise square angles or right angles in the everyday environment.	Middle Primary
Sort 2D shapes according to whether they have all, some, or no right angles.	
Use a template to measure right angles. Decide which angles are right angles, which angles are smaller/larger than right angles.	
In a shape, identify the smallest angle and /or the largest angle.	
Know that angles are measured in <b>degrees</b> and that; 1. One whole turn is $360^{\circ}$ 2. A quarter turn is $90^{\circ}$ or a right angle 3. Half a right angle is $45^{\circ}$ .	
Recognise which of two angles is greater.	Upper Primary
Link descriptors of <b>acute</b> , <b>obtuse</b> and <b>about <math>90^{\circ}</math></b> to pictures of angles.	
Place in order of size a set of angles, each less than $180^{\circ}$ .	
Place in order of size a set of angles of any size.	
Identify angles of turn or direction in everyday contexts.	
Identify acute, obtuse, straight and reflex angles.	Upper Primary
Calculate angles in a straight line, knowing that angles in a straight line total $180^{\circ}$ .	
Calculate angles at a point, knowing that angles at a point total $360^{\circ}$ .	
Know that the angle sum of a triangle is $180^{\circ}$ .	
Know that two straight lines in a plane (on a flat surface) can either cross once or are parallel.	

Know that the point where lines cross is called an intersection.	<b>Lower Secondary</b>
Know that parallel lines are always equidistant.	
Know that perpendicular lines are lines that intersect at right angles.	
Know the conventions for naming lines, angles, polygons, and indicating	
Know that the angle sum of a quadrilateral is $360^{\circ}$ .	
Calculate the base angles of an isosceles triangle .	
Calculate the exterior angle of an equilateral triangle.	
Understand that <b>supplementary</b> angles total $180^{\circ}$ and <b>complementary</b> angles total $90^{\circ}$ .	
Understand conditions for congruency of triangles: <b>SAS, ASA, SSS, RHS.</b>	
Understand that when two lines intersect, vertically opposite angles are equal.	
Understand that when parallel lines are intersected by a transversal, then	
<ol style="list-style-type: none"> <li>1. Corresponding angles are equal</li> <li>2. Alternate angles are equal and</li> <li>3. Co-interior angles are supplementary</li> </ol>	
Identify complementary, supplementary and adjacent angles.	
<p>Know the triangle theorems:</p> <ol style="list-style-type: none"> <li>1. the sum of the angles is <math>180^{\circ}</math>.</li> <li>2. The exterior angle is equal in size to the sum of the two interior opposite angles</li> <li>3. The angles opposite equal sides of an isosceles triangle are equal</li> <li>4. Equilateral triangles have all sides and all angles equal, and all angles are equal to <math>60^{\circ}</math>.</li> </ol>	
<p>Know the quadrilateral theorems:</p> <ol style="list-style-type: none"> <li>1. The sum of the angles is <math>360^{\circ}</math>.</li> <li>2. A parallelogram has opposite sides and opposite angles equal.</li> <li>3. The diagonals of a rhombus bisect each other at right angles.</li> <li>4. The four interior angles of a rectangle are right angles.</li> <li>5. A square has all sides equal, all interior angles equal to <math>90^{\circ}</math>, diagonals bisecting each other at right angles.</li> </ol>	
Know and identify the different parts of a circle: <b>centre, radius, diameter, circumference, chord, arc, segment, sector, tangent, semicircle, quadrant</b>	

<p>Know the theorems relating to angles in a circle:</p> <ol style="list-style-type: none"> <li>1. The angle at the centre of the circle (whether acute, obtuse or reflex) is twice the angle at the circumference subtended by the same arc.</li> <li>2. The angle in a semicircle is <math>90^\circ</math>.</li> <li>3. Angles at the circumference of a circle subtended by the same arc are equal.</li> <li>4. The opposite angles of a cyclic quadrilateral total <math>180^\circ</math>.</li> <li>5. If the opposite angles of a quadrilateral are supplementary, then the four vertices of the quadrilateral are concyclic.</li> </ol>	<p><b>Lower Secondary</b></p>
<p>Know the theorems relating to chords in a circle:</p> <ol style="list-style-type: none"> <li>1. The line from the centre of a circle to the midpoint of a chord is perpendicular to the chord.</li> <li>2. The perpendicular line from the centre of the circle to the chord bisects the chord.</li> <li>3. The bisector of the chord passes through the centre of the circle.</li> <li>4. Chords that are equal in length are the same perpendicular distance from the centre and subtend equal angles.</li> <li>5. The products of intercepts of intersecting chords are equal (whether the point of intersection is internal or external)</li> </ol>	
<p>Know the theorems relating to tangents of a circle:</p> <ol style="list-style-type: none"> <li>1. The tangent to a circle is perpendicular to the radius at the point of contact.</li> <li>2. Two tangents to the same circle drawn from the same external point are equal in length.</li> <li>3. The line from this external point to the centre of the circle is the axis of symmetry.</li> <li>4. When two circles intersect, the line joining the two centres bisects the common chord at right angles.</li> </ol>	

## Position & Co-ordinate Geometry

Position & Co-ordinate Geometry Outcome	Content Module
Can use the vocabulary of position – <b>over, under, up, down, on, beside, in, above, below, near, far</b>	<b>Lower Primary</b>
Can describe the position of an object in relation to another object or objects.	
Can understand simple moving and turning directions.	
Can describe the order of places passed on a journey.	
Can use the vocabulary of position to describe the position of an object in a picture relative to another object.	
Can interpret simple movement instructions.	
Can identify paths connecting two drawn objects.	
Can interpret simple movement instructions, including <b>left</b> and <b>right</b> .	<b>Middle Primary</b>
Can identify the position of an object on an informal grid	
Can identify the position of a square on a grid of squares with rows and columns labelled.	
Can find features or locations on simple maps or plans drawn on squared paper	
Can identify the four basic compass directions N, S, E, W.	
Can describe or find the position of a point on a grid of squares with the lines numbered.	
Understands the language of <b>horizontal</b> and <b>vertical</b> .	
Begin to relate compass positions and direction of movement to grid locations. (N,S,E,W only)	<b>Upper Primary</b>
Identify the new position on a grid after a specified movement.	
Find locations on simple maps or plans with a grid overlay.	
Use vocabulary: <b>co-ordinates, grid, quadrant, parallel, perpendicular, horizontal, vertical, diagonal</b> .	
Understand the language of <b>horizontal, vertical</b> and <b>diagonal</b> .	<b>Upper Primary</b>
Find locations on simple topography maps or street maps using compass directions.	
Use scale to estimate the distance between 2 points on a map.	

Use vocabulary of <b>grid, x-axis, y-axis, coordinates, quadrants, plane, intersecting, intersection.</b>	<b>Lower Secondary</b>
Read and plot points in first and second quadrants.	
Begin to understand that a line segment joining 2 given points on the number plane passes through an infinite number of other points.	
Understand <b>locus</b> as a set of points that satisfy a given set of conditions or constraints.	
Read and plot points in all quadrants.	
Identify turns using compass directions.	
Use scale to estimate the distance between 2 points on a map.	

## Transformations & Symmetry

Transformations & Symmetry Outcome	Content Module
Show awareness of symmetry – recognise symmetry in the environment.	<b>Lower Primary</b>
Can use shape and orientation to fit several of the same shapes onto a template showing internal lines.	
Can complete simple shape jigsaws.	
Can put shapes in order of size.	
Can put identical shapes of different dimensions into “families”.	
Can continue repeating patterns	
Identify objects that will slide, roll, both slide and roll.	<b>Middle Primary</b>
Can relate the appearance of an object to the same object once it has been turned.	
Can complete a simple symmetrical pattern.	
Can begin to identify full turns and half turns.	
Can put shapes together to copy a simple model.	
Can begin to identify full turns, half turns and quarter turns.	
Can recognise whether a shape or pattern has been turned.	
Can identify the <b>reflection</b> of a simple shape in a mirror line parallel to one side (all sides parallel or perpendicular to the mirror line).	
Identify a design made using two tiles and turning one of them around (a <b>rotation</b> pattern).	<b>Upper Primary</b>
Identify a design made using a mirror to reflect the tile (a <b>reflection</b> pattern).	
Classify 2-D shapes according to their lines of symmetry.	
Recognise that the number of lines of symmetry in a regular polygon is equal to the number of sides.	
Identify the reflection of a simple shape in a mirror line parallel to one of its edges, where the edges of the shape are not all parallel or perpendicular to the mirror line.	<b>Upper Primary</b>
On a grid with coordinates, translate shapes by a specified amount and give coordinates of the new position.	

Identify the reflection of a simple shape in a mirror line which touches the shape at one point, where the edges of the shape are not necessarily perpendicular or parallel to the mirror line.	<b>Lower Secondary</b>
Identify the reflection of a simple shape in two mirror lines at right angles, where the sides of the shape are perpendicular to the mirror lines.	
Translate a simple shape with reference to both axes	
Recognise and visualise transformations and symmetries of shapes.	
Understand that <b>reflections</b> in two dimensions map points to images in a mirror line or axis of reflections, so that: 1. The mirror line or axis of reflection is the perpendicular bisector of the line joining point A to its image A' 2. The image is the same distance behind the mirror line as the object is in front of the line. 3. Points on the mirror line do not change their position. 4. Reflection is self-inversive. Point A reflects to Point A'. Point A' reflects to Point A.	
Understand that <b>rotation</b> is specified by a <b>centre of rotation</b> about which the shape turns and an (anticlockwise) angle of rotation.	
Understand that the centre of rotation remains fixed throughout the rotation and can be <b>inside or outside the shape</b> .	
Understand that the inverse of any rotation is either an equal rotation about the same point in the opposite direction or a rotation in the same direction such that the two rotations total $360^\circ$ .	
Rotate shapes anticlockwise about the centre of rotation (0,0) through right angles and simple fraction of a whole turn.	
Rotate shapes about points other than (0,0)	
Transform 2D shapes by repeated reflections. Explore the effect of repeated reflections in parallel or perpendicular lines.	
Transform 2D shapes by combining translations, rotations and reflections.	
Know that reflections, rotations and translations preserve <b>length</b> and <b>angle</b> , and thus map objects onto <b>congruent images</b> .	
Understand that reflection in 2 parallel lines is equivalent to a translation.	
Understand that reflection in 2 perpendicular lines is equivalent to a rotation of $180^\circ$ .	

Understand that two rotations about the same centre are equivalent to a single rotation.	<b>Lower Secondary</b>
Understand that two translations are equivalent to a single translation.	
Recognise <b>order of rotation symmetry</b> .	