

MATHS FACTS FOR AUTOMATICITY

Overview:

Research has shown that automaticity is a building block for mastering higher-level mathematical concepts. Automaticity is essential for turning basic skills into tools for future learning, which creates an independent learner who is self-confident and successful. Having to think consciously about basic skills while doing a higher-level task results in a cognitive overload.

Automaticity is the ability to recall knowledge quickly and effortlessly without occupying the mind with the low-level details required to do it. Automaticity is attained through learning, focused repetition and practice. In maths, pupils have attained automaticity when they can instantly retrieve key facts from their long-term memory, in areas across the curriculum, without conscious effort or attention. There is an expectation that facts can be recalled accurately 100% of the time, by all pupils, unless there is a specific individual need. Occasional human error should be considered when monitoring automaticity.

An example of instant recall is evident within the Year 4 Multiplication Times tables Check, which allows 6 seconds for pupils to respond.

Pre-school:

	Facts	Vocabulary to understand	Vocabulary to use
Number and place value	<ul style="list-style-type: none"> Say number names up to 5 in order Subitise up to 3 (recognising dice formations and fingers) Show fingers for numbers up to 5 		
Addition and subtraction			
Multiplication and division			
Fractions			
Algebra			
Measurement			
Geometry			
Statistics			

Reception:

	Facts	Vocabulary to understand	Vocabulary to use
Number and place value	<ul style="list-style-type: none"> Count forwards to 20 Identify one more and one less, to 10 Subitise up to 5 Say the cardinal number value when shown a numeral to 10 	Zero Nothing	
Addition and subtraction	<ul style="list-style-type: none"> Say the number bond that goes with 1, 2, 3, 4 and 5, to make 5 	More Less Same	
Multiplication and division	<ul style="list-style-type: none"> Double numbers and quantities of objects up to 5+5 	Double	
Fractions			
Algebra			
Measurement		First, then, next, after, later, <i>e.g. when discussing the visual timetable</i>	First, then, next, after, later, <i>e.g. when discussing the visual timetable</i>
Geometry	<ul style="list-style-type: none"> Find shapes: circle, square, triangle, rectangle 	Positional language: top, bottom, middle, inside, in front, behind, next to	
Statistics			

Year One:

	Facts	Vocabulary to understand	Vocabulary to use
Number and place value	<ul style="list-style-type: none"> Count to 100 forwards and backwards from any given number Write numbers to 20 Count in multiples of two, from zero, in order (up to 20) Count in multiples of fives, from zero, in order (up to 50) Count in multiples of ten, from zero, in order (up to 100) Identify one more and one less than a given number, within 100 	Digit Tens Ones	
Addition and subtraction	<ul style="list-style-type: none"> Recall number bonds to 10 including subtraction facts Recall number bonds within 10 (complements) including subtraction facts Read + as 'add' Read – as 'take away' or 'minus' Read = as 'equals' Add zero to any number knowing that it doesn't change the total 	Add Take away Minus Equal Total	
Multiplication and division	<ul style="list-style-type: none"> Double numbers and quantities within and to 20 Halve numbers and quantities within and to 10 	Multiply Divide Halve Lots of	
Fractions	<ul style="list-style-type: none"> Recognise a half within shapes (pictorial representations) 	Share Half Part Whole	
Algebra			

Measurement	<ul style="list-style-type: none"> Say the days of the week 	Comparative language for measures (capacity, length/ height, mass): longer, shorter, taller, full, empty, heavier, lighter	
Geometry	<ul style="list-style-type: none"> Name rectangle, square, circle, triangle Name cube, sphere, pyramid 		
Statistics			

Year Two:

	Facts	Vocabulary to understand	Vocabulary to use
Number and place value	<ul style="list-style-type: none"> Count in steps of 2, 3, 5, 10, forwards and backwards, from 0 Read and write numbers to 100 Recognise odd and even numbers to 10 Identify tens and ones in a number, <i>e.g. 'there are two tens', when pointing to a place value chart with dienes</i> Read < as 'less than' Read > as 'greater than' 	Hundreds Greater than Less than Partition	
Addition and subtraction	<ul style="list-style-type: none"> Recall number bonds to 20 including subtraction facts Say that addition can be done in any order (commutativity) Say that addition and subtraction are the inverse of one another 	Fewer Subtract Inverse Sum Difference	

Multiplication and division	<ul style="list-style-type: none"> • Halve numbers to and within 20 • Recall multiplication and division facts for 2 (up to 24) • Recall multiplication and division facts for 5 (up to 60) • Recall multiplication and division facts for 10 (up to 120) • Count in odd numbers to 20 • Read \times as 'multiply' • Read \div as 'divide' 		Multiply Divide Halve
Fractions	<ul style="list-style-type: none"> • Say half of any even number to 20 • Recognise a half, quarter, third, three quarters within shapes • Read $\frac{1}{2}$ as 'half' • Read $\frac{1}{4}$ as 'quarter' • Read $\frac{1}{3}$ as 'third' • Read $\frac{3}{4}$ as 'three quarters' 	Quarter Third Three quarters	
Algebra			
Measurement	<ul style="list-style-type: none"> • Say the longer/shorter length of time, <i>e.g. when comparing day and week</i> • Say that there are 60 minutes in an hour • Say that there are 24 hours in a day • Say the months of the year • Recall time to o'clock and half past on an analogue clock • Read £ as 'pounds' • Read p as 'pence' • Recognise the value of coins and notes (<i>1p, 2p, 5p, 10p, 20p, 50p, £1, £2 coins; £5, £10, £20 notes</i>) • Say that 'm' and 'cm' are linked with length and height • Say that 'ml' and 'l' are linked with capacity and volume • Say that 'g' are linked with mass 	Pounds Pence Coins Notes	
Geometry	<ul style="list-style-type: none"> • Name regular pentagon, hexagon, octagon 	Side Face	

	<ul style="list-style-type: none"> Say the number of sides on 2D shapes (square, triangle, rectangle, pentagon, hexagon, octagon) Name prism, cone, cuboid, cylinder, pyramid 	Edge Vertex Vertices	
Statistics	<ul style="list-style-type: none"> Read III as 'a five in tally marks' Identify the most/least on block graphs 		

Year Three:

	Facts	Vocabulary to understand	Vocabulary to use
Number and place value	<ul style="list-style-type: none"> Count in steps of 4 and 8, forwards and backwards, from 0 Count in steps of 50 and 100, forwards and backwards, from 0 and any given number Find 10 or 100 more or less than any given number, with no bridging across 100 or 1000 Say the place value of digits in a three-digit number (hundreds, tens and ones) Read and write numbers to 1000, including in words Read Roman numerals to 12 Read I as '1' Read V as '5' Read X as '10' 		Roman numeral
Addition and subtraction	<ul style="list-style-type: none"> Recall number bonds within 100, including subtraction facts Add and subtract ones to a 3 digit number Add and subtract multiples of ten to a 3 digit number, with no exchange Add and subtract multiples of a hundred to a 3 digit number, with no exchange 		

Multiplication and division	<ul style="list-style-type: none"> Recall multiplication and division facts for 3 (up to 36) Recall multiplication and division facts for 4 (up to 48) Recall multiplication and division facts for 8 (up to 96) Say that multiplication can be done in any order (commutativity) Say that multiplication and division are the inverse of one another 		
Fractions	<ul style="list-style-type: none"> Count in tenths, up to one whole Count in halves and quarters up to 10 Identify the numerator and denominator in a fraction Read $1/10$ as 'a tenth' 	Denominator Numerator	
Algebra			
Measurement	<ul style="list-style-type: none"> Say that there are 60 seconds in a minute Say that there are 365 days in a year Say the months of the year, in order Recall time to quarter past and quarter to Recall times using 24-hour analogue clock and am/pm Point left and right 	Clockwise Anti-clockwise	
Geometry	<ul style="list-style-type: none"> Say how many sides are on heptagon, nonagon, decagon Say if an angle is a right angle or greater than/less than a right angle Name quadrilaterals: rectangle, square, parallelogram, rhombus, trapezium, kite 	Regular Irregular Horizontal Vertical Parallel Perpendicular	
Statistics			

Year Four:

	Facts	Vocabulary to understand	Vocabulary to use
Number and place value	<ul style="list-style-type: none"> Count in steps of 6, 7, 9, forwards and backwards, from 0 Count in steps of 25 and 1000, forwards and backwards, from 0 and any given number Count backwards through zero to include negative numbers Recognise place value of each digit in 4-digit numbers (thousands, hundreds, tens, ones) Write a zero (place holder) where there are no hundreds, tens or ones Read C as '100' Read L as '50' 	Place holder	
Addition and subtraction	<ul style="list-style-type: none"> Recall addition and subtraction facts with multiples of 10, within thousands Add and subtract multiples of a thousand to a 4 digit number, with no exchange 		
Multiplication and division	<ul style="list-style-type: none"> Recall multiplication and division facts for 6 (up to 72) Recall multiplication and division facts for 7 (up to 84) Recall multiplication and division facts for 9 (up to 108) Recall multiplication and division facts for 11 (up to 132) Recall multiplication and division facts for 12 (up to 144) Multiply any given number by 1 Multiply any given number by 0 		
Fractions	<ul style="list-style-type: none"> Count up and down in hundredths (<i>1 hundredth, 2 hundredths etc. and 0.1, 0.2 etc.</i>) Say decimal equivalents of $\frac{1}{4}$, $\frac{1}{2}$, $\frac{3}{4}$ Say decimal equivalents of tenths and hundredths 		

Algebra			
Measurement	<ul style="list-style-type: none"> • Read time to 5 minute intervals on an analogue clock • Read times on a 24 hour digital clock and convert pm hours to 12 hour times, e.g. read 17.45 as 5.45pm • Say that there are 1000m in 1km; 100cm in 1m; 100mm in 1cm; 1000g in 1kg; 1000ml in 1l • Say that there are 30 minutes in half hour; 15 minutes in a quarter of an hour; 45 minutes in three quarters of an hour • Say that there are 120 minutes in 2 hours • Say that there are 366 days in a leap year • Say that there are 7 days in a week and 14 days in a fortnight • Say the amount of days in each month 	Perimeter	
Geometry	<ul style="list-style-type: none"> • Name rhombus, parallelogram, trapezium, kite • Name types of triangles: right-angle, equilateral • Say that a right angle is 90° • Say that obtuse angles are bigger than right angles and acute angles are smaller than right angles • Say the order of coordinates in a pair of coordinates 	Right angle Equilateral	
Statistics			

Year Five:

	Facts	Vocabulary to understand	Vocabulary to use
Number and place value	<ul style="list-style-type: none"> • Read and write numbers to 1,000,000 including words • Count forwards and backwards in powers of 10, up to 1,000,000 • Read D as '500' • Read M as '1000' 		
Addition and subtraction	<ul style="list-style-type: none"> • Add and subtract multiples of ten-thousand to a 5 digit number, with no exchange 		
Multiplication and division	<ul style="list-style-type: none"> • Recall prime numbers up to 20 • Recall square numbers up to 12 squared • Multiply and divide by 10 and 100 • Read the notation for square and cubed numbers 	Factor Multiple	
Fractions	<ul style="list-style-type: none"> • Round decimals with 1dp to the nearest whole • Count in thousandths • Say percentage equivalents of $\frac{1}{2}$, $\frac{1}{4}$, $\frac{1}{5}$, $\frac{3}{4}$ • Say the percentages for any tenth fraction or decimal • Say the percentage for any hundredth fraction or decimal • Read % as the percentage symbol 	Percentage	
Algebra	<ul style="list-style-type: none"> • Recognise equity within algebra, including missing numbers 		
Measurement	<ul style="list-style-type: none"> • Say that there are 500m in half of 1km; 50cm in half of 1m; 500g in half of 1kg; 500ml in half of 1l • Recall complements within 60 	Area	
Geometry	<ul style="list-style-type: none"> • Recall multiples of 90, up to 360 • Recall complements to and within 180 and 360 • Say that the angles in a rectangle add up to 360° 	Translation	

	<ul style="list-style-type: none"> Say that angles on a straight line add up to 180° Say that a reflex angle is more than 180° and less than 360° 		
Statistics			

Year Six:

	Facts	Vocabulary to understand	Vocabulary to use
Number and place value	<ul style="list-style-type: none"> Read and write numbers to 10,000,000 including words Say the place value of digits, using a place value chart, in numbers up to 10,000,000 		
Addition and subtraction	<ul style="list-style-type: none"> Say what the letters of BIDMAS mean: Brackets, Indices, Division, Multiplication, Addition, Subtraction 		
Multiplication and division			
Fractions	<ul style="list-style-type: none"> Say the place value of digits, using a place value chart, in numbers with up to three decimal places 		
Algebra	<ul style="list-style-type: none"> Say the formulae for calculating perimeter and area of rectangles: height x width Say the formula for calculating area of triangles: height x width, divided by 2 Say the formula for calculating volume of cubes and cuboids: height x width x depth 		
Measurement	<ul style="list-style-type: none"> Recall the equivalent conversion of measure for km and miles 	Volume	
Geometry	<ul style="list-style-type: none"> Say that angles in quadrilaterals add up to 360° 		

	<ul style="list-style-type: none">• Say that angles in triangles add up to 180°• Say that vertically opposite angles are always equivalent• Say that angles around a point add up to 360°		
Statistics	<ul style="list-style-type: none">• Say that a whole pie chart represents 100%		

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