



KEY MATHEMATICAL TERMS & CONCEPTS

A Guide for Parents/Carers



Key Mathematical Terms and Concepts

The following information is designed to help you to become more familiar with some of the mathematical terms and concepts that your children will be experiencing during their time at Marlborough. This section aims to provide some key definitions supported with examples, it is divided into four main mathematical strands of number and the number system, calculations and problem solving, shape, space and measures and data handling.

Clearly not all pupils or year groups will be experiencing all of these mathematical aspects each year and for a more extensive glossary you may wish to consider buying a published mathematical dictionary.

Numbers and the number system

Integers - An integer is any whole number, these can be positive or negative therefore

7, 4 & -5 are all examples of integers.

Place Value - The value of any digit in a number is determined by its position / place in the number. For example the place value of 2 in 23.45 is "tens", the place value of 3 is "units", the place value of 4 is "tenths" while that of 5 is "hundredths"

Factors - A number is a factor of another number if it divides into that number without leaving a remainder. Since 12 is divisible by 1, 2, 3, 4, 6 & 12 these numbers are all factors of 12.

Multiples - The multiples of a number are simply numbers from its times-table e.g. 13, 26, 39, 52, 65 & 78 are all multiples of 13.

Prime Numbers - A prime number is any number whose only factors are one and itself, therefore 2, 3, 5, 7, 11 are all examples of prime numbers.

Fractions - Fractions represent a part of a whole and can be shown in the form of a common or vulgar fraction e.g. $\frac{1}{2}$, where the top number is called the **numerator** and the bottom number the **denominator**. In a **proper**

fraction the numerator is less than the denominator and in an **improper fraction** the opposite is true. Improper fractions can also be shown as **mixed numbers** i.e. the sum of the whole number and a proper fraction e.g. $\frac{7}{3}$ can also be shown as $2\frac{1}{3}$.

Fractions can also be shown as decimal or percentage equivalents $\frac{1}{10} =$

0.1 = 10%.

Note that the decimal point separates the whole number from the fractional parts and the % symbol represents how much out of 100, where 100 is the whole.

Ratio and Proportion - A ratio describes the relationship between two or more quantities.

E.g. if there are 10 boys and 20 girls in a class the ratio is one boy to every two girls or 1:2.

If two quantities increase and decrease at the same rate they can be said to be in **direct proportion** e.g. the distance we travel in our car compared to the amount of petrol used. If however an increase in one quantity causes a decrease in the other the quantities are in **inverse proportion** e.g. the faster you travel the shorter your journey time.

Number Sequence - A set of numbers that are connected by a definite rule e.g. 4, 8, 12, 16, where each number is formed by adding four to the previous term.

Square Numbers - To find the square of a number you multiply the number by itself or raise by the power of two e.g. 1×1 , 2×2 , 3×3 etc. Therefore 1, 4, 9, 16, 25 & 36 are all examples of square numbers. Note that as $4 \times 4 = 16$, sixteen is the square of four and four is the square root of 16.

Cube Numbers - The cube of a number is the number raised to the power of three

E.g. $1 \times 1 \times 1$, $2 \times 2 \times 2$, $3 \times 3 \times 3$ etc. Therefore 1, 8, 27, 64, 125 are also examples of cube numbers. Note that as $7 \times 7 \times 7 = 343$, three hundred and forty three is the cube of seven and seven is the cube root of 343.

Triangle Numbers - The triangular number sequence is 1, 3, 6, 10, 15, 21, 28 etc. Note that the second term 3, is found by adding two to the first, the third term, 6 by adding three to the second and the fourth term, 10 by adding four to the third. This is a continuing pattern.

Calculations and Problem Solving

Operation - A number operation is the general term used for any of the four rules of addition, subtraction, multiplication and division.

Inverse Operation - An inverse operation describes the function that produces the reverse effect of the original operation. Subtraction is the inverse of addition and division is the inverse of multiplication.

E.g. $3 + 4 = 7$ and $7 - 4 = 3$

& $6 \times 7 = 42$ and $42 \div 7 = 6$.

Algorithm - An algorithm describes a standard procedure of calculation. This could take the form of a step-by-step method using pencil and paper.

Estimation - An estimation of the solution to a calculation is generally achieved by rounding or **approximating** the original numbers into more convenient or manageable numbers in order to gain a quick 'rough' answer e.g. To estimate $234 + 676$ we could use $200 + 700 = 900$.

Sum or Total - This is the result achieved by adding numbers together.

Difference - This is the result of subtracting a smaller number from a larger number.

Product - This is the result gained by multiplying numbers together.

Quotient - This is the result gained by dividing one number by another.

Number Bonds - Number Bonds are created by adding or bonding two or more number together in order to achieve a given total e.g. $13 + 7$, $8 + 12$ and $14 + 6$ are examples of number bonds that total 20.

Algebra - Algebra is an extension of arithmetic where letters and symbols are used as well as numbers. This enables **general statements** or rules to be expressed e.g. a specific statement such as £6 can be expressed as a general statement of £P where P represents any number we care to substitute

Substitution - The process of finding the numerical value for the symbols or letters in an algebraic expression e.g. in the equation $5 + y = 17$ we can substitute y for the number 12

Equations - This is where the two sides of an expression balance and is denoted by the equal sign. $2 + 3 = 5$ and $6 + 6 = 4 \times 3$ are examples of equations.

Inequalities - An inequality is where two sides of an expression do not balance. The following symbols are used

$>$ means the left hand side is greater than the right hand side

$<$ means the left hand side is less than the right hand side

\geq means the left hand side is equal to or greater than the right hand side

\leq means the left hand side is equal to or less than the right hand side

Note that the arrow always points to the smaller quantity i.e. $5 > 3$.

Shape, Space and Measures

Polygons - A polygon describes any two dimensional shape that is bound together by 3 or more straight lines, hence a triangle, square, pentagon and hexagon are all examples of polygons. Polygons can be regular where all the sides and angles are equal or irregular where the sides and angles are not all equal.

Dimensions - Dimensions help us to describe the properties of shapes. A shape with only one dimension will only have length, e.g. a straight line. A shape with two dimensions has both length and width / breadth and a shape with three dimensions has length, width / breadth and height / depth.

Area - This is the measurement of the region taken up by a two-dimensional (2D) shape and is usually measured in squared metres or squared centimetres.

Perimeter - This is the measurement of the distance around a polygon shape.

Volume - This is the measurement of the space taken up by a three-dimensional (3D) shape and is usually measured in cubic metres or cubic centimetres.

Capacity - This is the measurement of the amount of fluid a container will hold when it is full. This is usually measured in litres or millilitres.

Angle - An angle is a measurement of a turn. An angle is measured from the point that two lines meet. This point is called the **vertex** (plural vertices).

Radius - The radius measures the distance of a straight line from the centre of a circle to its edge

Diameter - The diameter measures the distance of a straight line from one edge of a circle to another passing through its centre.

Circumference - The circumference measures the distance around the edge of any circle.

Symmetry - Line Symmetry occurs when a 2D shape can be divided equally by a straight line or axis of symmetry. **Rotational Symmetry** occurs when a shape can be rotated exactly around a central point e.g. square can be rotated four times about its centre and therefore has rotational symmetry of order 4. **Planes of Symmetry** describe where a 3D shape can be separated into equal cross-sections.

Prism - A prism is a 3D shape that has the same cross-section throughout its length. Cubes, cuboids and cylinders are therefore examples of prisms.

Tessellation - A pattern made by repeating polygon shapes that cover a given space without leaving any gaps.

Data Handling

Statistics - This is the name given for the process of collecting and analysing information or data.

Averages - The Mean Average of a set of numbers or data values is calculated by finding the sum of the values and dividing this by the number of values e.g. the mean of 3, 5, 9 & 13 is calculated by: $\frac{3+5+9+13}{4} = 7.5$

The **Median** is the value that lies half-way along a set of data values that have been arranged in ascending or descending order e.g. the median of 2, 5, 7, 8, 9 is 7. If there are an even number of values the median is found by calculating the mean of the two middle numbers e.g. the median of 1, 4, 5, 7, 8, 9 is calculated by $\frac{5+7}{2} = 6$.

The **Mode** is the value that occurs most often or frequently e.g. the mode of 4, 6, 6, 7, 9 is 6. The mode need not be exclusive, in other words there can be more than one mode e.g. 2, 2, 2, 6, 6, 8, 8, 8 has two modes i.e. 2 and 8.

Frequency - The frequency describes the number of times a certain value occurs e.g. in 2, 4, 4, 4, 6, 7, 8, 9, 9. The number four occurs three times and therefore has a frequency of 3.

Range - The range is the difference between the largest and smallest data value e.g. the range of the values 4, 5, 6, 9, 17, 20 is calculated by $20 - 4 = 16$.

Probability - Probability is the mathematical study of the likelihood of events occurring. If an event has the probability value of 0 it is said to be impossible e.g. throwing the total of 13 using two dice, the value of $\frac{1}{2}$ or 0.5 shows with an equal chance of occurring e.g. throwing a head with one toss of a coin. The value of 1 represents an event that is certain to happen e.g. that Friday will be followed by Saturday. From this we can see that all uncertain events are represented by fractions between 0 and 1.

