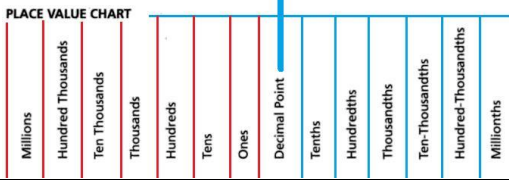
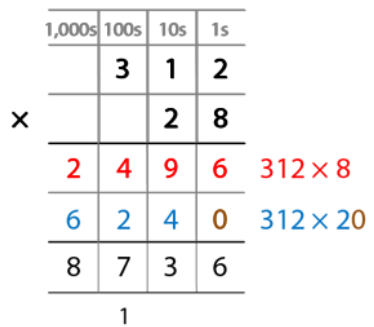
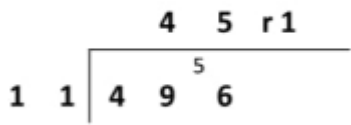


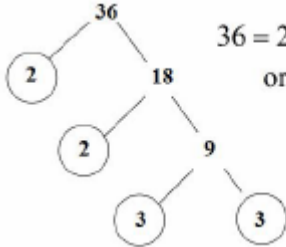
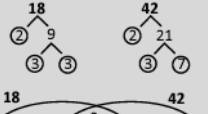
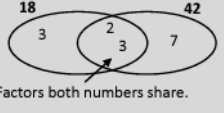
Knowledge Organiser : Number

Topic/Skill	Definition/Tips	Example
Integers and Place Value		
Integer	A whole number that can be positive, negative or zero.	$-3, 0, 92$
Place Value	The value of where a digit is within a number.	In 726, the value of the 2 is 20, as it is in the 'tens' column.
Place Value Columns	The names of the columns that determine the value of each digit. The 'ones' column is also known as the 'units' column.	 PLACE VALUE CHART Columns (from left to right): Millions, Hundred Thousands, Ten Thousands, Thousands, Hundreds, Tens, Ones, Decimal Point, Tenths, Hundredths, Thousandths, Ten-Thousandths, Hundred-Thousandths, Millionths.
Addition	To find the total, or sum, of two or more numbers. 'add', 'plus', 'sum'	$3 + 2 + 7 = 12$
Subtraction	To find the difference between two numbers. To find out how many are left when some are taken away. 'minus', 'take away', 'subtract'	$10 - 3 = 7$
Multiplication	Can be thought of as repeated addition. 'multiply', 'times', 'product'	$3 \times 6 = 6 + 6 + 6 = 18$  Grid showing multiplication of 312 by 8 and 20. 312 × 8 = 2496 312 × 20 = 6240 Total: 2496 + 6240 = 8736
Division	Splitting into equal parts or groups. The process of calculating the number of times one number is contained within another one. 'divide', 'share'	$20 \div 4 = 5$ $\frac{20}{4} = 5$ Short Division 496 ÷ 11 becomes  4 5 r1 1 1 4 9 6 Answer: $45 \frac{1}{11}$

		Long division 432 ÷ 15 becomes $ \begin{array}{r} 28 \text{ r } 12 \\ 15 \overline{) 432} \\ \underline{30 } \\ 132 \\ \underline{120} \\ 12 \end{array} $
Remainder	The amount ' left over ' after dividing one integer by another.	The remainder of $20 \div 6$ is 2, because 6 divides into 20 exactly 3 times, with 2 left over.
BIDMAS	An acronym for the order you should do calculations in. BIDMAS stands for 'Brackets, Indices, Division, Multiplication, Addition and Subtraction'. Indices are also known as 'powers' or 'orders'. With strings of division and multiplication, or strings of addition and subtraction, and no brackets, work from left to right.	$6 + 3 \times 5 = 21$, <i>not</i> 45 $5^2 = 25$, where the 2 is the index/power. $12 \div 4 \div 2 = 1.5$, <i>not</i> 6
Place Value	The value of where a digit is within a number.	In 726, the value of the 2 is 20, as it is in the 'tens' column.
Rounding	To make a number simpler but keep its value close to what it was. If the digit to the right of the rounding digit is less than 5, round down. If the digit to the right of the rounding digit is 5 or more, round up.	74 rounded to the nearest ten is 70, because 74 is closer to 70 than 80. 152,879 rounded to the nearest thousand is 153,000.
<u>Decimals</u>		
Decimal Place	The position of a digit to the right of a decimal point .	In the number 0.372, the 7 is in the second decimal place. 0.372 rounded to two decimal places is 0.37, because the 2 tells us to round down. Careful with money - don't write £27.4, instead write £27.40
Significant Figure	The significant figures of a number are the digits which carry meaning (ie. are significant) to the size of the number. The first significant figure of a number cannot be zero.	In the number 0.00821, the first significant figure is the 8. In the number 2.740, the 0 is not a significant figure.

	In a number with a decimal, trailing zeros are not significant.	0.00821 rounded to 2 significant figures is 0.0082. 19357 rounded to 3 significant figures is 19400. We need to include the two zeros at the end to keep the digits in the same place value columns.																								
Truncation	A method of approximating a decimal number by dropping all decimal places past a certain point without rounding .	3.14159265... can be truncated to 3.1415 (note that if it had been rounded, it would become 3.1416)																								
Estimate	To find something close to the correct answer .	Estimate for the height of a man is 1.8m																								
Approximation	When using approximations to estimate the solution to a calculation, round each number in the calculation to 1 significant figure . ≈ means 'approximately equal to'	$\frac{348 + 692}{0.526} \approx \frac{300 + 700}{0.5} = 2000$ 'Note that dividing by 0.5 is the same as multiplying by 2'																								
Add and Subtract Decimals	Use your place value columns to line the numbers up accurately	$0.24 + 0.5$ <table border="1" style="margin-left: auto; margin-right: auto;"><tr><td></td><td>0</td><td>•</td><td>2</td><td>4</td><td></td></tr><tr><td>+</td><td>0</td><td>•</td><td>5</td><td>0</td><td></td></tr><tr><td colspan="6"> </td></tr><tr><td></td><td>0</td><td>•</td><td>7</td><td>4</td><td></td></tr></table>		0	•	2	4		+	0	•	5	0									0	•	7	4	
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+	0	•	5	0																						
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Multiply decimals	Convert to an integer calculation Use any method to multiply Convert the answer back	$0.35 \times 0.2 = 0.07$ $\begin{array}{c} \times 10 \\ \times 10 \end{array} \downarrow \quad \downarrow \begin{array}{c} \times 10 \\ \times 10 \end{array}$$35 \times 2 = 70$$\begin{array}{c} \div 10 \\ \div 10 \\ \div 10 \end{array} \downarrow$$0.07$																								
Divide by a decimal	Multiply BOTH numbers by, 10, 100 or 1000 to eliminate the decimal point in the divisor (The number you are dividing by) Do the division This will be the answer. Do NOT count the decimal point back in	<u>Example 1</u> $\begin{array}{ccc} \times 100 & \curvearrowright & 0.3 \div 0.15 \\ & & 300 \div 15 \\ & & = 20 \end{array}$ <u>Example 2</u> $\begin{array}{ccc} \times 10 & \curvearrowright & 18 \div 1.2 \\ & & 180 \div 12 \\ & & \times 10 \end{array}$ <table border="1" style="margin-left: auto; margin-right: auto;"><tr><td></td><td></td><td></td><td>0</td><td>1</td><td>5</td><td></td></tr><tr><td>1</td><td>2</td><td>1</td><td>8</td><td>6</td><td>0</td><td></td></tr></table>				0	1	5		1	2	1	8	6	0											
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1	2	1	8	6	0																					

<u>Indices, powers and roots and Standard Form</u>		
Square Number	The number you get when you multiply a number by itself .	1, 4, 9, 16, 25, 36, 49, 64, 81, 100, 121, 144, 169, 196, 225... $9^2 = 9 \times 9 = 81$
Square Root	The number you multiply by itself to get another number. The reverse process of squaring a number.	$\sqrt{36} = 6$ because $6 \times 6 = 36$
Cube Number	The number you get when you multiply a number by itself and itself again .	1, 8, 27, 64, 125... $2^3 = 2 \times 2 \times 2 = 8$
Cube Root	The number you multiply by itself and itself again to get another number. The reverse process of cubing a number.	$\sqrt[3]{125} = 5$ because $5 \times 5 \times 5 = 125$
Powers of...	The powers of a number are that number raised to various powers .	The powers of 3 are: $3^1 = 3$ $3^2 = 9$ $3^3 = 27$ $3^4 = 81$ etc.
Multiplication Index Law	When multiplying with the same base (number or letter), add the powers . $a^m \times a^n = a^{m+n}$	$7^5 \times 7^3 = 7^8$ $a^{12} \times a = a^{13}$ $4x^5 \times 2x^8 = 8x^{13}$
Division Index Law	When dividing with the same base (number or letter), subtract the powers . $a^m \div a^n = a^{m-n}$	$15^7 \div 15^4 = 15^3$ $x^9 \div x^2 = x^7$ $20a^{11} \div 5a^3 = 4a^8$
Brackets Index Laws	When raising a power to another power, multiply the powers together. $(a^m)^n = a^{mn}$	$(y^2)^5 = y^{10}$ $(6^3)^4 = 6^{12}$ $(5x^6)^3 = 125x^{18}$
Notable Powers	$p = p^1$ $p^0 = 1$ Anything to the power of zero is equal to 1	$8^0 = 1$ $x^0 = 1$
Negative Powers	A negative power performs the reciprocal. $a^{-m} = \frac{1}{a^m}$	$3^{-2} = \frac{1}{3^2} = \frac{1}{9}$
Standard Form	$A \times 10^n$ <i>where $1 \leq A < 10$, $n = \text{integer}$</i>	$8400 = 8.4 \times 10^3$ $0.00036 = 3.6 \times 10^{-4}$
Multiplying or Dividing with Standard Form	Multiply: Multiply the numbers and add the powers . Divide: Divide the numbers and subtract the powers .	$(1.2 \times 10^3) \times (4 \times 10^6) = 8.8 \times 10^9$ $(4.5 \times 10^5) \div (3 \times 10^2) = 1.5 \times 10^3$
Adding or Subtracting with Standard Form	Convert in to ordinary numbers, calculate and then convert back in to standard form	$2.7 \times 10^4 + 4.6 \times 10^3$ $= 27000 + 4600 = 31600$ $= 3.16 \times 10^4$

Factors, Multiples and Primes		
Multiple	The result of multiplying a number by an integer. The times tables of a number.	The first five multiples of 7 are: 7, 14, 21, 28, 35
Factor	A number that divides exactly into another number without a remainder. It is useful to write factors in pairs	The factors of 18 are: 1, 2, 3, 6, 9, 18 The factor pairs of 18 are: 1, 18 2, 9 3, 6
Lowest Common Multiple (LCM)	The smallest number that is in the times tables of each of the numbers given.	The LCM of 3, 4 and 5 is 60 because it is the smallest number in the 3, 4 and 5 times tables.
Highest Common Factor (HCF)	The biggest number that divides exactly into two or more numbers.	The HCF of 6 and 9 is 3 because it is the biggest number that divides into 6 and 9 exactly.
Prime Number	A number with exactly two factors . A number that can only be divided by itself and one. The number 1 is not prime , as it only has one factor, not two.	The first ten prime numbers are: 2, 3, 5, 7, 11, 13, 17, 19, 23, 29
Prime Factor	A factor which is a prime number.	The prime factors of 18 are: 2, 3
Product of Prime Factors	Finding out which prime numbers multiply together to make the original number. Use a prime factor tree . Also known as 'prime factorisation'.	 $36 = 2 \times 2 \times 3 \times 3$ $\text{or } 2^2 \times 3^2$
HCF and LCM from a Venn Diagram	Create the Venn Diagram from the Product of Prime Factors HCF : Multiply the prime factors in the intersect together LCM: Multiply ALL the prime factors together	EXAMPLE 1) Find the Highest Common Factor (HCF) & Lowest Common Multiple (LCM) of 18 and 42. a) Start by finding the Prime Factors of each number. $18 : 2 \times 3 \times 3$ $42 : 2 \times 3 \times 7$  b) Complete a Venn diagram with the factors.  Factors both numbers share. c) The HCF is the product of the shared factors. $\text{HCF} = 2 \times 3 = 6$ ✓ d) The LCM is the product of all the factors in the Venn diagram. $\text{LCM} = 3 \times 2 \times 3 \times 7 = 126$ ✓
Where else is the Number topic used:		Links to other subjects:
Percentages Decimals Fractions		Sciences (Biology, Chemistry and Physics)
Number 2 Ratio and proportion		Humanities (Geography and History)
		Art and Design