Whole Numbers

Skill	Achieved ?
Know the meaning of ***count*** and be able to count	
Know that a ***whole number*** is a normal counting number such as 0, 1, 2, 3, 4, …	
Know the meaning of ***even number*** and ***odd number***	
Know that ***approximating*** means to get an answer close to the actual (true) answer	
Know that ***rounding*** means to approximate (estimate) to a given level of accuracy	
Round a whole number to the nearest unit	
Know the meaning of ***add*** and ***subtract***	
Add and subtract whole numbers (no more than 4 digits) without a calculator	
Know the meaning of ***multiply***	
Multiply a whole number (up to 4 digits) by a single digit without a calculator	
Know the meaning of ***divide*** and ***remainder***	
Divide simple whole numbers without a calculator	
Add, subtract, multiply and divide other whole numbers using a calculator	
Multiply two 2-digit whole numbers without a calculator	
Know the meaning of ***square number***	
Know the meaning of ***square root*** and work out square roots of square numbers without a calculator, for example: $\sqrt{16} = 4$ $\sqrt{49} = 7$	

Fractions, Percentages and Decimals

Skill	Achieved ?
Know that a ***fraction*** is (usually) part of a whole and is written as: $\frac{\textit{numerator}}{\textit{denominator}}$	
Work out ***unitary fractions*** (numerator = 1) of a whole number without a calculator	
Know that a ***proper fraction*** is one where the numerator is smaller than the denominator	
Know that an ***improper fraction*** (aka ***top-heavy***) is one where the numerator is bigger than the denominator	
Know that to multiply two fractions, multiply the numerators and multiply the denominators	
Know that a ***mixed number*** is a whole number plus a proper fraction	
Change a mixed number into an improper fraction, for example: $4\frac{1}{3} = \frac{4 \times 3 + 1}{3} = \frac{13}{3}$	
Multiply a mixed number by a whole number, for example: $6 \times 4\frac{1}{3}$	
Change an improper fraction into a mixed number, for example: $\frac{17}{6} = \frac{12}{6} + \frac{5}{6} = \frac{17}{6}$	
Know that ***equivalent fractions*** are ones that are the same	
Simplify fractions and write fractions in ***simplest form***, for example: $\frac{16}{24} = \frac{16 \div 8}{24 \div 8} = \frac{2}{3}$	
Work out fractions of a whole number without a calculator, for example: $\frac{3}{5}$ of 185	
Know that a ***percentage*** is a fraction with denominator = 100	
Know that 100 % = 1 whole	
Know that 1 % = 1 out of 100	

Know important equivalences between fractions and common percentages such as: $50\ \% = \frac{1}{2}$ $25\ \% = \frac{1}{4}$ $75\ \% = \frac{3}{4}$ $20\ \% = \frac{1}{5}$ $10\ \% = \frac{1}{10}$ $33\frac{1}{3}\ \% = \frac{1}{3}$	
Change simple percentages to fractions, for instance: $70\ \% = \frac{70}{100} = \frac{7}{10}$	
Change fractions to percentages, for example: $\frac{3}{5} = \frac{3 \times 20}{5 \times 20} = \frac{60}{100} = 60\ \%$	
Work out commonly used percentages (such as 60 %, 5 %) of a whole number without a calculator	
Work out other percentages with a calculator, for example: 34 % of 900	
Work out one number as a percentage of another with a calculator, for example: 17 out of 59 $\rightarrow$ 17 $\div$ 59 $\times$ 100 %	
Know that a ***decimal*** is a whole number with a decimal point and a specific number of digits (fractional part) after the point	
Round a decimal to the nearest unit	
Round decimals to a certain number of decimal places	
Find a decimal on a number scale (up to hundredths)	

Add and subtract decimals (up to 3 d.p.) without a calculator, for example: $28 \cdot 7 + 4 \cdot 35$ $2 \cdot 685 - 0 \cdot 29$	
Multiply and divide a decimal (up to 3 d.p.) by a single digit whole number, for example: $7 \cdot 35 \times 8$ $5 \cdot 45 \div 5$	
Multiply and divide a decimal (up to 3 d.p.) by a multiple of 10, 100 or 1 000	
Divide two small whole numbers without a calculator, giving the answer to a certain number of decimal places	
Know simple percentage-decimal equivalents such as: $50\ \% = 0 \cdot 5$ $25\ \% = 0 \cdot 25$ $10\ \% = 0 \cdot 1$	
Work out commonly used percentages (such as 60 %, 5 %) of a decimal without a calculator	
Work out fractions of a decimal number without a calculator, for example: $\frac{2}{3}$ of $6 \cdot 99$	
Change simple fractions and percentages to decimals, for example: $\frac{3}{5} = 3 \times \frac{1}{5} = 3 \times 0 \cdot 2 = 0 \cdot 6$ $40\ \% = \frac{40}{100} = 0 \cdot 4$	
Change a decimal into a fraction, for example: $0{\cdot}057 = \frac{57}{1000}$	

Direct Proportion

Skill	Achieved ?
Know that 2 things are in ***direct proportion*** (aka ***direct variation***) if one increases at the same rate as the other	
Solve simple proportion problems such as, if 2 identical bottles weigh 40 grams, find the weight of 12 of these bottles	
Solve more difficult problems involving proportion such as, if 3 identical items cost £ 21 · 36, find the cost of 5 of these items	

1-D Geometry, Length and Perimeter

Skill	Achieved ?
Know that a ***1-dimensional (1D) shape*** is a line (straight or curved)	
Know that the ***length*** of a 1D shape is how much 'space' there is in the line; the distance from one end to the other	
Know that units of length include ***metres (m)***, ***centimetres (cm)***, ***millimetres (mm)***, ***kilometres (km)*** and ***miles***	
Know that ***perimeter*** is the total distance once around the outside of a shape	

2-D Geometry and Area

Skill	Achieved ?
Know that a ***2-dimensional (2D) shape*** is a (closed) shape drawn on a (usually flat) surface	
Know that a 3-sided shape is called a ***triangle***	
Know that a ***quadrilateral*** is a 4-sided shape	
Know that a ***square*** is a quadrilateral with (i) all sides the same (ii) 4 right angles (iii) 2 diagonals that bisect each other (iv) 4 lines of symmetry	
Know that a ***rectangle*** is a quadrilateral with (i) 2 pairs of parallel lines (different length) (ii) 4 right angles (iii) 2 diagonals that bisect each other (iv) 2 lines of symmetry	
Know that an ***isosceles triangle*** is one that has 2 sides the same length and the remaining side different (equivalently, 2 angles the same and the remaining angle different)	
Know that an ***equilateral triangle*** has all sides the same length (equivalently, 3 angles the same)	

Reflect a quadrilateral on a coordinate grid in the x - axis or y - axis	
Know that a ***parallelogram*** is a quadrilateral with (i) 2 pairs of parallel sides (different length) (ii) 2 equal opposite acute and 2 equal opposite obtuse angles (iii) 2 bisecting diagonals that bisect each other (iv) half-turn symmetry, but no lines of symmetry	
Know that a ***rhombus*** is a quadrilateral with (i) 2 pairs of parallel lines (all 4 lines have the same length) (ii) 2 equal opposite acute and 2 equal opposite obtuse angles (iii) 2 diagonals (different length) that bisect each other at 90° (iv) 2 lines of symmetry	
Know that a ***kite*** is a quadrilateral with (i) 2 pairs of equal sides (each pair a different length), with none parallel (ii) 2 equal opposite angles (iii) 2 diagonals that bisect each other at 90° (iv) 1 line of symmetry	
Work out the perimeter of a triangle or quadrilateral	
Know that ***area*** measures how much 2D space there is in a shape	
Know that units for area include ***square centimetres (cm ^{2})*** and ***square metres (m ^{2})***	
Work out the area of a square (L = length), rectangle (L = length, B = breadth) and right-angled triangle (B = base, H = height) by using the equations: $A = L \times L$ (Square) $A = L \times B$ (Rectangle) $A = B \times H \div 2$ (Triangle)	
Work out areas of other shapes by counting squares and half-squares	

Circles

Skill	Achieved ?
Know that a ***circle*** is all points the same distance from a given point (***centre***)	
Know the meaning of ***radius (r)*** and ***diameter (D)*** and what they look like on a circle	
Work out the diameter of a circle when told its radius and vice versa	
Know that: $D = 2 \times r$	
Know that the ***circumference*** of a circle with radius r is its perimeter and calculated using the equation:	

$C = 2\pi r$	
Work out the area of a circle using the equation: $A = \pi r^2$	
Know that a ***semi-circle*** is half a circle	
Calculate the perimeter of a semi-circle	
Calculate the area of a semi-circle	

3-D Geometry and Volume

Skill	Achieved ?
Know that a ***3-dimensional (3D) shape*** is a shape drawn in space	
Recognise shapes such as a ***cube***, ***cuboid***, ***cylinder***, ***pyramid***, ***cone*** and ***sphere*** and be able to name them when shown pictures of them	
Know that a ***net*** of a 3D shape is a flat (2D) shape which, when folded up, makes the 3D shape	
Recognise and draw the nets of a cube and cuboid	
Know that ***volume*** measures how much 3D space there is in a shape	
Know that units for volume include ***cubic centimetres (cm ^{3})***, ***cubic metres (m ^{3})***, ***litres (l)*** and ***millitres (ml)***, and these last two are related by: $1\ l = 1\,000$ ml	
Change litres to millilitres	
Change millilitres to litres	
Work out the volume of a cube or cuboid by using the equations: $V = L \times L \times L$ (Cube) $V = L \times B \times H$ (Cuboid)	
Work out the height of a cuboid when told its volume and 2 sides	
Work out the volume of a shape by counting cubes	
Recognise and draw the nets of a cube and cuboid	
Given the volume of a 3D shape and a cuboid that has this same volume, calculate a missing length of the cuboid given the other 2 lengths	

Substitution in Algebraic Expressions and Formulae

Skill	Achieved ?
Know that an ***algebraic expression*** is a combination of numbers and letters with brackets, multiplication, division, addition or subtraction and possibly indices	
Know the meaning of ***substitute***	
Substitute numbers into algebraic expressions such as: $3ab - c \quad (a = -1, b = 2 \text{ and } c = -10)$	
Know that a ***formula*** is a way of working things out by replacing words or symbols by numbers	
Work out answers using a formula written in words and symbols	
Work out formulae written in symbols only (without a calculator) by substituting in numbers, such as: $D = \sqrt{b^2 + k} \quad (b = 3, k = 7)$ $I = \sqrt{\frac{P}{R}} \quad (P = 144, R = 4)$ $A = \frac{1}{2}h(a + b) \quad (a = 11, b = 7 \text{ and } h = 6)$ $H = 20 - 4t^2 \quad (t = 3)$	
Work out formulae written in symbols only (with a calculator) by substituting in numbers, such as: $S = \frac{1}{2}gt^2 \quad (g = 9 \cdot 8, t = 10)$ $B = \frac{w}{h^2} \quad (w = 70, h = 1 \cdot 68)$ $R = \frac{P}{MN} \quad (P = 180, M = 7 \cdot 5 \text{ and } N = 5)$ $A = 3bc^2 \quad (b = 2 \cdot 4, c = 5)$ $v = \sqrt{gr} \quad (g = 9 \cdot 81, r = 9)$ $T = \frac{rs}{r + s} \quad (r = 2 \cdot 6, s = 1 \cdot 4)$	

Calculations in Context

Skill	Achieved ?
Change pounds into pence and vice versa using the rule: £ 1 = 100 p	
Change euros into cents and vice versa using the rule: € 1 = 100 c	
Know the meaning of ***wage*** and work out wage rises involving percentages	
Know the meaning of ***cost price*** (aka ***buying price***) and ***selling price***	
Know that a ***discount*** is a reduction in the normal cost price	
Work out discounts	
Work out ***profit*** using the equation: *Profit = Cost Price − Selling Price*	
Work out ***loss*** using the equation, *Profit = Selling Price − Cost Price*	
Know the meaning of ***basic rate*** (measured in *pounds per hour*) and calculate ***basic pay*** using the equation: *Basic pay = Basic rate × Number of hours*	
Know the meaning of ***overtime*** and ***bonus*** and know that ***gross pay*** includes these as well as basic pay	
Know that ***double time*** is a type of overtime	
Work out double time pay	
Work out gross pay when told basic pay, overtime and bonuses	
Know the meaning of ***national insurance***, ***income tax*** and ***union dues*** and know that ***deductions*** includes all these	
Work out deductions when told national insurance, income tax and union dues	
Work out ***net pay*** using the equation: *Net pay = Gross pay − Deductions*	
Know that ***interest*** is an increase in money and usually written as a percentage (the ***interest rate***)	
Work out the interest on a certain amount of money over 1 year when told the interest rate per annum	
Work out the interest on a certain amount of money over *n*	

months when told the interest rate per annum	
Know that ***Value Added Tax (VAT)*** is an extra charge on items and is usually given as a percentage	
Work out the VAT on an item and then work out the total cost	
Know that ***Hire Purchase (HP)*** is a way of paying for items with a ***deposit*** and regular (usually monthly) ***instalments*** : *HP = Deposit + (Cost of each instalment × Number of instalments)*	
Calculate Hire Purchase	
Given the hire purchase price, deposit and number of instalments, work out the cost of each instalment in a hire purchase agreement; for example, if a camcorder costs £ 499 with a deposit of £ 85 and 9 instalments, calculate the cost of each instalment	
Given the hire purchase price, deposit and cost of each instalment, work out the number of instalments in a hire purchase agreement	
Given the hire purchase price, number of instalments and cost of each instalment, work out the deposit in a hire purchase agreement	
Know the meaning of ***time-and-a-half***	
Solve problems involving basic rate, overtime, number of normal working hours and number of overtime hours	
Calculate the ***(simple) interest*** over a certain number of months	
Calculate ***percentage profit*** using the equation: $\text{Percentage profit} = \frac{s - b}{b} \times 100\ \%$ where s = *selling price* and b = *buying price*	
Calculate ***percentage loss*** using the equation: $\text{Percentage loss} = \frac{b - s}{b} \times 100\ \%$ where s = *selling price* and b = *buying price*	
Know the meaning of ***exchange rate***	
Change money from one currency to another using an exchange rate	
Change money from pounds sterling to another currency given the exchange rate for £ 1	
Change money from a given currency to pounds sterling given the exchange rate for £ 1	
Given the equivalent amounts of 2 currencies, calculate the exchange rate	
Complete an ***electricity bill*** knowing how	

many ***units of electricity*** are used	
Given 2 deals, work out the cheaper option	
Know the meaning of ***commission***	
Solve problems involving commission such as, if someone gets paid £ 250 per month plus 3 % commission on sales and the sales are worth £ 72 000, how much is the person paid each month	
Solve more difficult problems involving commission such as, if £ 500 is earned each month plus 5 % commission on sales and the total earnings in a month are £ 1 900, calculate the sales in a month	
Know the meaning of ***premium***	
Solve problems involving premium such as, if an insurance company charges a premium of £ 1 · 25 for each £ 100 insured, calculate the amount charged on an item that costs £ 2 700	
Solve problems involving combinations of items that can be bought	

Composite Shapes

Skill	Achieved ?
Know that a ***composite shape*** is one made up of simple shapes such as squares, rectangles, triangles and semi-circles	
Calculate the perimeter of a shape consisting of a rectangle with a semi-circle attached to one end	
Calculate the perimeter of a shape made up by joining 2 identical semicircles onto opposite ends of a rectangle in the shape of a running track	
Work out the area of a composite shape consisting of a rectangle and a semicircle	
Work out the area of a shape consisting of a rectangle with a semi-circle inside removed	
Work out the area of a shape consisting of a semi-circle with a rectangle inside removed	
Work out the area of a composite shape consisting of a triangle and a semicircle	
Work out the area of a shape consisting of a triangle with a semi-circle inside removed	
Work out the area of a shape consisting of a semi-circle with a triangle inside removed	
Work out the area of a shape consisting of a rectangle with a triangle inside removed	
Work out the area of a shape consisting of a triangle with a rectangle inside removed	

Int 1 Checklist (Unit 1)