

Grade 4 checklist

75 skills. Tick each one when you can do it. For grade 4 you need the skills for the grades below it too.

Number

- ☐ **Use one calculation to find another** Given $34 \times 26 = 884$, adjust the place value to get $3.4 \times 2.6 = 8.84$ or $884 \div 2.6 = 340$. (Place value, ordering and order of operations)

- ☐ **Find and use reciprocals** The reciprocal of a number is 1 divided by it, so the reciprocal of 4 is $\frac{1}{4}$ and of $\frac{2}{3}$ is $\frac{3}{2}$. (Place value, ordering and order of operations)

- ☐ **Write a number as a product of primes** Use a factor tree or repeated division:
 $360 = 2 \times 2 \times 2 \times 3 \times 3 \times 5 = 2^3 \times 3^2 \times 5$. (Primes, factors, HCF and LCM)

- ☐ **Multiply and divide fractions** Multiply tops and bottoms; to divide, multiply by the reciprocal of the second fraction. (Fractions and mixed numbers)

- ☐ **Use the laws of indices with numbers** Add indices to multiply, subtract to divide, multiply for a power of a power: $(3^4)^2 = 3^8$. (Indices and roots)

- ☐ **Write small numbers in standard form** A number between 0 and 1 has a negative power: $0.00072 = 7.2 \times 10^{-4}$. (Standard form)

- ☐ **Change standard form to ordinary numbers** $3.06 \times 10^5 = 306,000$ and $3.06 \times 10^{-3} = 0.00306$. (Standard form)

- ☐ **Order numbers in standard form** Compare the powers of 10 first, then the values of A . (Standard form)

- ☐ **Use a calculator with standard form** Use the $\times 10^x$ key, and write the answer in proper standard form, not calculator notation. (Standard form)

- ☐ **Decide if an estimate is over or under** Use how each number was rounded, e.g. rounding up the numbers you multiply gives an overestimate. (Rounding, estimation and error intervals)

- ☐ **Use the product rule for two choices** If there are m ways to do one thing and n ways to do another, there are $m \times n$ ways to do both. (Listing and the product rule)

Algebra

- ☐ **Substitute negative numbers into formulae** Put negative values in brackets, e.g. when $x = -3$, $x^2 = (-3)^2 = 9$. (Algebraic notation, substitution and identities)

- ☐ **Expand and simplify two single brackets** Expand each bracket, then collect like terms, e.g.
 $3(x + 2) - 2(x - 5) = x + 16$. (Expanding brackets)

- ☐ **Expand with a letter outside the bracket** Multiply letters as well as numbers, e.g.
 $2a(3a + b) = 6a^2 + 2ab$. (Expanding brackets)

- ☐ **Take out a single common factor** Find a number or letter that divides every term, e.g.
 $6x + 15 = 3(2x + 5)$. (Factorising)

- ☐ **Multiply powers of the same letter** Add the indices: $a^4 \times a^3 = a^7$. (Laws of indices in algebra)

- ☐ **Divide powers of the same letter** Subtract the indices: $y^9 \div y^4 = y^5$. (Laws of indices in algebra)

- ☐ **Rearrange a two-step formula** Undo the operations in reverse order, e.g. $y = 3x - 5$ gives $x = \frac{y+5}{3}$.
(Changing the subject)

- ☐ **Solve equations with brackets** Expand first, e.g. $2(x + 5) = 18$ gives $2x + 10 = 18$, so $x = 4$. (Linear equations)

- ☐ **Solve with the unknown on both sides** Collect the x terms on one side, e.g. $7x - 3 = 4x + 12$ gives $3x = 15$, so $x = 5$. (Linear equations)

- ☐ **Read solutions from a quadratic graph** The solutions of $x^2 + bx + c = 0$ are the x-coordinates where $y = x^2 + bx + c$ crosses the x-axis. (Solving quadratic equations)

- ☐ **Read a solution from two line graphs** The solution is the coordinates of the point where the two lines cross. (Simultaneous equations)

- ☐ **List integers that satisfy an inequality** e.g. $-2 < n \leq 3$ gives $n = -1, 0, 1, 2, 3$. (Inequalities)

- ☐ **Solve a linear inequality** Solve it like an equation, e.g. $4x + 1 > 13$ gives $x > 3$. (Inequalities)

- ☐ **Generate terms from an nth term** Substitute $n = 1, 2, 3, \dots$, e.g. $3n + 2$ gives 5, 8, 11, ... (Sequences and the nth term)

- ☐ **Find the nth term of a linear sequence** The common difference multiplies n, then adjust: 5, 9, 13, 17, ... has nth term $4n + 1$. (Sequences and the nth term)

- ☐ **Find the gradient between two points** Gradient = change in y ÷ change in x, e.g. from (1, 2) to (4, 11): $9 \div 3 = 3$. (Straight-line graphs)

- ☐ **Identify gradient and intercept from an equation** In $y = 5x - 2$, the gradient is 5 and the line crosses the y-axis at (0, -2). (Straight-line graphs)

- ☐ **Recognise the shapes of standard graphs** Linear, quadratic (U or $\cap$ shape), cubic (S shape) and reciprocal $y = \frac{1}{x}$ (two separate curves). (Graphs of functions)

- ☐ **Interpret distance–time graphs** The gradient is the speed and a horizontal section means the object is stationary. (Graphs of functions)

Ratio, proportion and rates of change

- ☐ **Convert between ratios and fractions** In the ratio 2 : 5 the first share is $\frac{2}{7}$ of the total, not $\frac{2}{5}$. (Ratio)

- ☐ **Use one share or a difference** Divide the known amount by the number of parts it stands for to find one part. (Ratio)

- ☐ **Write ratios in the form 1 : n** Divide both parts by the first part, e.g. $4 : 10 = 1 : 2.5$. (Ratio)

- ☐ **Increase or decrease by a percentage** Use a multiplier, e.g. $\times 1.15$ for a 15% increase or $\times 0.85$ for a 15% decrease. (Percentages and reverse percentages)

- ☐ **Calculate simple interest** Find one year's interest on the original amount and multiply by the number of years. (Percentages and reverse percentages)

- ☐ **Work out compound interest year by year** Add each year's interest before working out the next, e.g. £500 at 4% becomes £520, then £540.80. (Compound interest, growth and decay)

- ☐ **Compare value for money using unit prices** Work out the cost per item, or per 100 g, for each pack and compare. (Direct and inverse proportion)

- ☐ **Solve inverse proportion problems like workers and days** Find the total work (workers $\times$ days), then divide by the new number of workers. (Direct and inverse proportion)

- ☐ **Convert between minutes and decimal hours** Divide the minutes by 60, e.g. 1 hour 45 minutes = 1.75 hours. (Speed, density and pressure)

- ☐ **Calculate density, mass or volume** Use density = mass $\div$ volume and its rearrangements, with matching units. (Speed, density and pressure)

- ☐ **Use a given metric–imperial conversion** Treat it as a ratio, e.g. with 5 miles $\approx$ 8 km, 40 miles $\approx$ 64 km. (Converting units)

Geometry and measures

- ☐ **Use alternate, corresponding and co-interior angles** On parallel lines, alternate angles and corresponding angles are equal, and co-interior angles add up to 180° . (Angles, parallel lines and polygons)

- ☐ **Find interior and exterior angles of polygons** Sum of interior angles = $(n - 2) \times 180^\circ$, and the exterior angles of any polygon add up to 360° . (Angles, parallel lines and polygons)

- ☐ **Find the hypotenuse of a right-angled triangle** Square the two shorter sides, add, then square root: $c = \sqrt{a^2 + b^2}$. (Pythagoras' theorem (incl. 3D))

- ☐ **Find a shorter side of a right-angled triangle** Square the hypotenuse, subtract the square of the other side, then square root. (Pythagoras' theorem (incl. 3D))

- ☐ **Label the hypotenuse, opposite and adjacent sides** The opposite is across from the angle, the hypotenuse is opposite the right angle, and the adjacent is the other side next to the angle. (Right-angled trigonometry)

- ☐ **Find the area and circumference of circles** Area = πr^2 ; circumference = $\pi d = 2\pi r$. (Area and perimeter)

- ☐ **Find areas and perimeters of compound shapes** Split into rectangles, triangles and parts of circles, finding any missing lengths first. (Area and perimeter)

- ☐ **Find volumes of prisms and cylinders** Volume = area of cross-section $\times$ length; for a cylinder, $V = \pi r^2 h$. (Volume and surface area)

- ☐ **Find the surface area of a prism** Add the areas of all the faces; sketch a net so you do not miss any. (Volume and surface area)

- ☐ **Draw a solid on isometric paper** Keep vertical edges vertical and draw the other edges along the sloping lines of dots. (Plans and elevations)

- ☐ **Recognise similar shapes and find scale factors** Check that corresponding sides are all in the same ratio; scale factor = new length $\div$ original length. (Similar shapes (length, area, volume))

- ☐ **Rotate a shape about a given centre** Use tracing paper, the angle and the direction (clockwise or anticlockwise). (Transformations)

- ☐ **Enlarge a shape by a positive scale factor** Multiply the distance from the centre of enlargement to each vertex by the scale factor. (Transformations)

- ☐ **Read and draw column vectors** The top number is the move across and the bottom number the move up or down. (Vectors)

- ☐ **Add and subtract column vectors** Add or subtract the top numbers and the bottom numbers separately.
(Vectors)

- ☐ **Measure and draw bearings** Measure clockwise from north at the starting point, and write the bearing with three figures. (Bearings and scale drawings)

- ☐ **Make a scale drawing from real measurements** Divide each real length by the scale, e.g. at 1 cm to 5 m, 20 m is drawn as 4 cm. (Bearings and scale drawings)

- ☐ **Construct the perpendicular bisector of a line** Draw arcs of equal radius from each end, then join the two points where they cross. (Constructions and loci)

- ☐ **Construct the bisector of an angle** Draw an arc from the vertex, then equal arcs from where it crosses the arms, and join to the vertex. (Constructions and loci)

Probability

- ☐ **Calculate relative frequency from experiment results** Relative frequency = number of times the outcome happened $\div$ total number of trials. (Probability and relative frequency)

- ☐ **Work out an expected number of outcomes** Multiply the probability by the number of trials, e.g. $0.15 \times 200 = 30$. (Probability and relative frequency)

- ☐ **Complete a tree diagram for independent events** Each pair of branches adds up to 1, and the second set of branches repeats the first when the events are independent. (Tree diagrams and combined events)

- ☐ **Understand ξ , intersection and union** ξ is everything, $A \cap B$ is the overlap, and $A \cup B$ is everything inside either circle. (Venn diagrams and set notation)

- ☐ **Find a probability from a Venn diagram** Divide the number in the region you want by the total in ξ , including anything outside the circles. (Venn diagrams and set notation)

Statistics

- ☐ **Draw and interpret a pie chart** Work out each angle as frequency $\div$ total $\times 360^\circ$, and each frequency as angle $\div 360^\circ \times$ total. (Charts, diagrams and time series)

- ☐ **Draw and interpret a frequency polygon** Plot each frequency at the midpoint of its class and join the points with straight lines. (Charts, diagrams and time series)

- ☐ **Describe trends and patterns in time series** Say whether the values are generally rising or falling, and describe any pattern that repeats each year. (Charts, diagrams and time series)

- ☐ **Find averages from a frequency table** Mean = total of the fx column $\div$ total frequency; the mode is the value with the highest frequency. (Averages and spread)

- ☐ **Compare two data sets using average and spread** Compare an average and the range, and say what each comparison means in context. (Averages and spread)

- ☐ **Draw a line of best fit** Draw one straight ruled line that follows the trend, with the points spread evenly on either side. (Scatter graphs and correlation)

- ☐ **Identify and explain an outlier** An outlier is a point that does not fit the general pattern; leave it out when you draw the line. (Scatter graphs and correlation)

- ☐ **Describe how to take a random sample** Number every member of the population and use random numbers to choose, so each has an equal chance. (Sampling and capture–recapture)

 - ☐ **Use a sample to estimate for a population** Scale up the proportion in the sample: $\text{proportion} \times \text{population size}$. (Sampling and capture–recapture)

 - ☐ **Suggest how to make a sample more reliable** Use a larger random sample, taken from the whole population rather than one place or time. (Sampling and capture–recapture)
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