Estimation and Rounding

Term	Definition
Approximate **Approximation**	To give a "rough" answer that is slightly more or slightly less than the actual answer.
Degree of accuracy	The level of accuracy that a number is rounded to, for example • to the nearest 10, 100, 1000 • to 1 decimal place • to 3 significant figures
Estimation	A reasonable guess. Estimation can be used to predict solutions and check the accuracy of calculations. For example, estimating 317 + 498 as approximately 300 + 500 = 800 and then comparing the estimate to the actual solution.
Rounding	The process of giving an approximation of an actual answer to a suitable degree of accuracy.
Significant figures	Digits that carry meaning expressing the size of a number. The digit in the largest place value position is a number's most significant digit and gives the greatest indication of the number's overall size.
Tolerance	Tolerance describes the margin for error acceptable in measurement. For example, 3 ± 0•2 cm (3 plus or minus 0•2 centimetres) describes an ideal length of 3 cm but any lengths that are between a minimum of 2•8 cm and a maximum of 3•2 cm would be within tolerance. Lengths shorter than 2•8 cm or longer than 3•2 cm would be outside of tolerance and would be rejected. The tolerance that is set depends very much on the context – in precision engineering the tolerance will be very small, but when making handmade goods it is likely to be larger.

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Skill	Illustration
Rounding to the nearest whole number	Any decimal fraction can be rounded to the nearest whole number. 3•42 would round down to 3 as it is nearer to 3 than 4. 15•682 would round up to 16 as it is nearer to 16 than 15. 24•5 would round up to 25, this approach should be used whenever a value is exactly halfway between two whole numbers.
Rounding to the nearest 10, 100, 1000 …	Rounding to the nearest 10, 100 or 1000 (for example) is often used to give a helpful approximation of large whole numbers. 78 rounded to the nearest 10 would be 80 as it is nearer to 80 than 70. 1432 rounded to the nearest 100 would be 1400 as it is nearer to 1400 than 1500. 23 500 rounded to the nearest 1000 would be 24 000 as it is exactly halfway between 23 000 and 24 000.
Rounding to a given number of decimal places	Rounding to a given number of decimal places is often used to shorten lengthy decimal fractions to an appropriate degree of accuracy. 1•67392 rounded to 1 decimal place would be 1•7 as it is nearer to 1•7 than 1•6. 135•89125 rounded to 2 decimal places would be 135•89 as it is nearer to 135•89 than 135•90 23•845 rounded to 2 decimal places would be 23•85 as it exactly halfway between 23•84 and 23•85.
Rounding to a given number of significant figures	Rounding to a given number of significant figures is often used to give lengthy whole numbers and decimal fractions to an appropriate degree of accuracy. 35124 rounded to 2 significant figures is 35000 as it is nearer to 35000 than 36000. 0•021289 rounded to 3 significant figures is 0•0213 as it is nearer to 0•0213 than 0•0212. 2500 rounded to 1 significant figure is 3000 as it is exactly halfway between 2000 and 3000.