KEY STAGE 3 PROGRESS LADDER

SUBJECT: Physics

STM STAGE	Scientific Experiments	Quantities & Units	Numerical Skills
1	I answer in full sentences and attempt to use scientific words. I **make simple observations** and describe familiar events. What / How I can link ideas to every day examples.	I can recall some familiar quantities and units with support.	I can put simple numbers into a formula.
2	I answer in paragraphs with scientific words mostly used correctly. I can **explain familiar events** (Why, Because) And make simple connections between ideas e.g. **this** is happening because of **that.** I can use familiar models to support explanations.	I can recall most quantities and units studied but may occasionally forget to express answers with the correct units. I can use simple prefixes m, cm, k	Use a formula triangle to rearrange equations.
3	I answer in logical paragraphs with correct use of the expected scientific vocabulary. I can explain things that we cannot normally see e.g. how particles cause things to happen and make multiple connections between ideas e.g. **this** is causing **that** to happen **because of**.	I can identify almost all quantities, units studied and included units with my answers. I can do simple unit conversions e.g. hours-seconds, Km-m	I can rearrange equations without a formula triangle with occasional prompts.
4	I produce extended responses with a logical structure and correct use of complex scientific terminology. I can explain complex ideas that require a high level of scientific understanding and fully explain how all the parts of my answer give a whole picture/theory.	I frequently use a wide range of units correctly, can work out simple units from equations e.g. m/s or kgm/s and identify links between base and compound units w –J/s. I can do complex unit conversions Km/h to m/s	I can independently rearrange equations including nonlinear equations or equations with more than three variables. I can use standard form.
5	I produce fluent extended responses which with a clear development and justification of ideas and skillful use of scientific language. My explanations demonstrate a high level of scientific understanding which I can apply in unfamiliar contexts. I can make multiple connections between explanations and ideas.	I routinely and independently convert prefixes (over the range nano to Giga) and can use prefixes in standard form in my calculations. I can do a range of difficult unit conversions e.g. KWh to J and visa versa.	I can solve problems requiring more than one calculation and confidently solve problems with use standard form.
5*	I can independently research, structure and produce pieces of work with well-developed arguments and reasoning. Skillful use of scientific language is well embedded. The quality of explanation, and subject matter is at or beyond the highest expectations at GCSE.	I can use dimensional analysis to work out the units of new quantities and express a range of compound units in this base units and identify compound units from their base units.	I can independently structure solutions to complex problems requiring multiple steps from advanced level material.

KEY STAGE 3 PROGRESS LADDER

SUBJECT: Physics

STM STAGE	Proportionality	Analysing Data	Planning Experiments
1	I can describe in simple terms how one variable affects another. I can identify balanced & unbalanced systems.	I can draw a simple chart or graph with support and occasional errors and write a simple conclusion which agrees with the data .	I can identify a simple input and output variable and write a simple plan. I can identify obvious risks and plan to work safely e.g. use goggles MRC
2	I can numerically describe simple relationships between variables e.g. as you double the independent variable the dependent variable increases from ? to ?	I can draw a line graph with a simple scale or help to scale the axis. I use data from the graph to support my conclusion.	I can identify the independent, dependent and control variable and write a simple step by step plan. I can draw a simple results table with support .
3	I can numerically explain direct & inverse proportionality *e.g. as this variable doubles* the other halves and identify linear and nonlinear relationships e.g. drawing and describing a curved line of best fit.	I can draw my own scales for a line graph, plot points accurately with few errors and draw a line of best fit and identify anomalies.	I can write a reproducible plan stating the volumes and amounts of quantities used. I plan to repeat measurements and can draw a suitable results table with limited prompting.
4	I can solve problems using simple ratios and numerically explain proportionality in non linear relationships e.g KE & v2. If v is doubled KE is 4 times greater.	I can calculate the gradient of a linear graph and use it to quantitatively describe the relationship between two variables.	I can come up with a question to investigate and plan to collect data with precision giving simple reasons for equipment choices / volumes & amounts used, explaining how errors and how to control most variables. I construct my own results table.
5	I can independently use ratios and proportionality to solve complex problems, produce fluent quantitative explanations of the rate of change of linear and nonlinear relationships and express linear relationships in the form y=mx+c	I can draw a tangent to calculate the gradient a a point on a curved graph and use simple percentage error calculations to analyse the uncertainty in my data.	I use scientific knowledge and understanding to plan my investigation, producing a scientific hypotheses and justifying methods, techniques & equipment choices with reference to accuracy, repeatability and resolution.
5*	I can convert complex nonlinear equations into the form y=mx+c to determine unknown constants. I can use nonlinear ratios to solve complex problems.	I can use a worst fit line to calculate the percentage error in my gradient and work out the absolute error in my result. I can also work out the percentage error with respect to an agreed value and justify whether my experiment was accurate and reliable.	I can use detailed scientific knowledge and understanding to independently plan and carry out a complex investigation with a complex hypothesis, reproducible plan, risk assessment and a logical results table. Justifying the choices I make to conduct an accurate and reliable experiment.