Yearly learning steps: Science (Physics)

The grade descriptors given here are indicative only. Please see the mastery learning goal sheets and PLCs for more detailed content.

Physcis			
Year	**Subject content and skills**	**Working scientifically**	**Assessments**
7	**Grade 1**: Describe in simple terms, the effect of electrical current. Describe in simple terms, the concept of electrical voltage. Recognise that electricity in generated in a number of ways, each of which has advantages and disadvantages. **Grade 2**: Describe in simple terms the effects of electrostatic attraction and repulsion. Explain in simple terms how resistance reduces voltage. Calculate the cost of home energy use. Recognise the concept of conservation of energy **Grade 3**: Turn circuit diagrams in to real life series and parallel circuits and vice versa. Draw a circuit diagram to explain how voltage can be measured. Compare the amount of energy transferred by different activities. Show how energy is transferred using real life examples. **Grade 4**: Use a diagram to explain how an insulator can become positively and negatively charged. Use the idea of energy to explain voltage and resistance. Explain the advantages and disadvantages of different energy resources. Calculate energy transferred and dissipated.	**Grade 1**: Make and record observations and measurements using a range of apparatus and methods **Grade2**: Carry out experiments appropriately having due regard to the correct manipulation of apparatus, the accuracy of measurements and health and safety considerations. Use scientific vocabulary, terminology and definitions, including SI units **Grade3**: Apply the cycle of collecting, presenting and analysing data, including observation, analysis, interpretation and communication. Recognise the importance of scientific quantities and understand how they are determined. Use prefixes and powers of ten for orders of magnitude **Grade 4**: Plan experiments or devise procedures to make observations, produce or characterise a substance, test hypotheses, check data or explore phenomena. Recognise when to apply a knowledge of sampling techniques to ensure any samples collected are representative. Use an appropriate number of significant figures in calculations.	One end of topic test and levelled task per unit.
8	**Grade 2**: Simply describe waves in terms of energy transferred. Simply describe the properties of transverse waves. Simply describe work done and energy	**Grade2**: Carry out experiments appropriately having due regard to the correct manipulation of apparatus, the accuracy of measurements and health and safety considerations.	One end of topic test and levelled task per unit.

	transferred by a system. Describe how thermal energy can be transferred. **Grade 3**: Explain the damage done to living cells by light and other waves Describe the different properties of transverse and longitudinal waves. Use a diagram to explain how levers work. Explain observation about temperature change in terms of energy transfer. **Grade 4**: explain how audio equipment converts sound in to electrical current. Use the wave model to explain observations, for example reflection and refraction. Compare the work needed to move objects different distances. Explain how a method of thermal insulation works. **Grade 5**: Suggest why sound waves can agitate materials. Compare and contrast the properties of sound and light waves. Calculate energy transferred for different objects moving horizontally. Sketch a graph to show the pattern of temperature change against time.	Use scientific vocabulary, terminology and definitions, including SI units **Grade3**: Apply the cycle of collecting, presenting and analysing data, including observation, analysis, interpretation and communication. Recognise the importance of scientific quantities and understand how they are determined. Use prefixes and powers of ten for orders of magnitude **Grade 4**: Plan experiments or devise procedures to make observations, produce or characterise a substance, test hypotheses, check data or explore phenomena. Recognise when to apply knowledge of sampling techniques to ensure any samples collected are representative. Use an appropriate number of significant figures in calculations **Grade 5**: Understand how scientific methods and theories develop over time. Use scientific theories and explanations to develop hypotheses. Evaluate methods and suggest possible improvements and further investigations. Interconvert units. Apply a knowledge of a range of techniques, instruments, apparatus, and materials to select those appropriate to the experiment	
9	**Grade 2**: Simply explain the effect of balanced and unbalanced forces. Describe pressure in a liquid. **Grade 3**: Describe factors which affect the size of frictional and drag forces. Explain why objects sink or float in terms of the forces acting on them.	**Grade2**: Carry out experiments appropriately having due regard to the correct manipulation of apparatus, the accuracy of measurements and health and safety considerations. Use scientific vocabulary, terminology and definitions, including SI units **Grade3**: Apply the cycle of collecting, presenting and analysing data, including observation, analysis, interpretation and communication.	One end of topic test and levelled task per unit.

		Recognise the importance of scientific quantities and understand how they are determined. Use prefixes and powers of ten for orders of magnitude	
	Grade 4: Describe how materials behave as they are stretched or squashed. Calculate fluid pressure in unfamiliar contexts.	**Grade 4**: Plan experiments or devise procedures to make observations, produce or characterise a substance, test hypotheses, check data or explore phenomena. Recognise when to apply a knowledge of sampling techniques to ensure any samples collected are representative. Use an appropriate number of significant figures in calculations	
	Grade 5: Explain the effect of drag and other forces on objects as they move. Use the idea of pressure to explain underwater effects.	**Grade 5**: Understand how scientific methods and theories develop over time. Use scientific theories and explanations to develop hypotheses. Evaluate methods and suggest possible improvements and further investigations. Interconvert units. Apply a knowledge of a range of techniques, instruments, apparatus, and materials to select those appropriate to the experiment	
	Grade 6: Evaluate how well sports or vehicle design reduces drag or frictional forces. Carry out calculations involving pressure, force and area.	**Grade 6**: Evaluate risks both in practical science and the wider societal context, including perception of risk in relation to data and consequences. Recognise the importance of peer review of results and of communicating results to a range of audiences.	
10	**Grade3**: Describe in simple terms, basic physical principles. For example energy transfers, electrical circuits, states of matter and forces.	**Grade3**: Apply the cycle of collecting, presenting and analysing data, including observation, analysis, interpretation and communication. Recognise the importance of scientific quantities and understand how they are determined. Use prefixes and powers of ten for orders of magnitude	End of topic tests and mock exams in years 10 and 11.
	Grade4: Describe in detail complex physical processes, for example energy stores, the structure of the atom and the effects of	**Grade 4**: Plan experiments or devise procedures to make observations, produce or characterise a substance,	

	resultant forces. **Grade 5**: Describe in detail complex physical systems and begin to make links between them. For example, changes in state of matter, vectors and scalars, voltage, current and resistance and forces and motion. **Grade6**: compare and contrast complex physical processes, for example the different types of radioactive decay, gas pressure and temperature, momentum and safety and energy efficiency. **Grade7**: Evaluate complex physical interactions, for example the effects of different electrical appliances on energy transfer, the analysis of motion graphs and the forces acting on a falling object including terminal velocity. **Grade8:** Make informed suggestions and predictions about complex ethical issues, for example, nuclear energy and vehicle safety.	test hypotheses, check data or explore phenomena. Recognise when to apply a knowledge of sampling techniques to ensure any samples collected are representative. Use an appropriate number of significant figures in calculations **Grade 5**: Understand how scientific methods and theories develop over time. Use scientific theories and explanations to develop hypotheses. Evaluate methods and suggest possible improvements and further investigations. Interconvert units. Apply a knowledge of a range of techniques, instruments, apparatus, and materials to select those appropriate to the experiment **Grade 6**: Evaluate risks both in practical science and the wider societal context, including perception of risk in relation to data and consequences. Recognise the importance of peer review of results and of communicating results to a range of audiences. **Grade 7**: Explain everyday and technological applications of science; evaluate associated personal, social, economic and environmental implications; and make decisions based on the evaluation of evidence and arguments. **Grade 8**: Use a variety of models such as representational, spatial, descriptive, computational and mathematical to solve problems, make predictions and to develop scientific explanations and understanding of familiar and unfamiliar facts.	
11	**Grade3**: Describe in simple terms, basic physical principles. For example waves, electromagnetism and light	**Grade3**: Apply the cycle of collecting, presenting and analysing data, including observation, analysis, interpretation and communication. Recognise the importance of scientific	End of topic tests and mock exams in years 10 and 11.

		quantities and understand how they are determined. Use prefixes and powers of ten for orders of magnitude	
	Grade4: Describe in detail complex physical processes, for example reflection and refraction and the uses of electromagnetic waves in communication	**Grade 4**: Plan experiments or devise procedures to make observations, produce or characterise a substance, test hypotheses, check data or explore phenomena. Recognise when to apply a knowledge of sampling techniques to ensure any samples collected are representative. Use an appropriate number of significant figures in calculations	
	Grade 5: Describe in detail complex physical systems and begin to make links between them. For example, the properties of the different parts of the electromagnetic spectrum and the motor effect	**Grade 5**: Understand how scientific methods and theories develop over time. Use scientific theories and explanations to develop hypotheses. Evaluate methods and suggest possible improvements and further investigations. Interconvert units. Apply a knowledge of a range of techniques, instruments, apparatus, and materials to select those appropriate to the experiment	
	Grade6: compare and contrast complex physical processes, for example the life history of different sized stars, electrical generators and theories for the formation of the universe.	**Grade 6**: Evaluate risks both in practical science and the wider societal context, including perception of risk in relation to data and consequences. Recognise the importance of peer review of results and of communicating results to a range of audiences.	
	Grade7: Evaluate complex physical interactions, for example the medical uses of x-rays and ultrasound, transformers and the possible future of the universe	**Grade 7**: Explain everyday and technological applications of science; evaluate associated personal, social, economic and environmental implications; and make decisions based on the evaluation of evidence and arguments.	
	Grade8: Make informed suggestions and predictions about complex ethical issues, for example theories of creation of the universe.	**Grade 8**: Use a variety of models such as representational, spatial, descriptive, computational and mathematical to solve problems, make predictions and to develop scientific explanations and	

	Grade 9: Evaluate complex and novel information and apply to new contexts. For example, voltage calculations in transformers.	understanding of familiar and unfamiliar facts. **Grade 9**: Appreciate the power and limitations of science and consider any ethical issues which may arise.	