1.1 Explanations, argument and decisions	YEAR 7	YEAR 8	YEAR 9	YEAR 10	YEAR 11	YEAR 11 EXTENSION
1.1a1 Scientific Thinking - developing explanations using ideas and models	Use an existing model/analogy to explain a phenomenon. Recognise and explain the value of using models and analogies to clarify explanations	Describe more than one model to explain the same phenomenon and discuss the strengths and weaknesses of the model. Describe how the use of a particular model or analogy supports an explanation	Describe the strengths and weaknesses of a range of available models and select the most appropriate. Explain why the manipulation of a model or analogy might be needed to clarify explanations	Justify the selection of a particular model as the most appropriate. Devise own simple models or analogies to explain observations, data or scientific ideas	Evaluate the effectiveness of using models and analogies in their explanations. Evaluate the strengths and weaknesses of their own models and analogies	Recognise that it is possible to have and to use different, and sometimes conflicting, models in their explanation. Explain how the devising and using of alternative models could help to make a 'creative leap' in an explanation
1.1a2 Scientific thinking challenge and collaboration in developing explanations	Recognise that scientists of all disciplines and nationalities often work together to develop explanations. Recognise that sciecne cannot yet explain everything.	Recognise that science is a communal, and therefore fallible, human activity and that different expanations can arise from individual bias. Recognise questions that the scientific process cannot answer.	Explain how bias, a lack of evidence or misconceptions can give rise to inappropriate theories and the role of scientists in questioning these. Identify some questions that the scientific process cannot yet completely answer but can contribute to.	Describe the process of validating the work of other scientists and explain how this influences on the acceptance or rejection of a theory. Identify some questions that the scientific process cannot yet completely answer but can contribute to, and explain the reasons for this.	Explain why it is important for the scientific community to have a process for validating the work of other scientists and how this has influenced the acceptance of current theories. Explain why scientific proof is only ever provisional.	Explain and justify why a 'scientific claim' should be accepted or rejected by the application of the key components of validation to the evidence. Explore the implications of the provisional nature of scientific proof.
1.1a3 Scientific thinking- developing argument	Identify a range of scientific data and other evidence to back an argument and the counterclaim in less complex and /or familiar contexts *e.g. establishing a wind farm.* Recognise that scientific evidence can be used to support or disprove theories.	Identify a range of scientific data and other evidence to back an argument and the counterclaim in more complex and /or less familiar contexts *e.g. use of antibiotics.* Describe how scientific evidence from different sources carries different weight in supporting or disproving theories.	Use criteria to select relevant scientific data and other sources of evidence to support or negate an argument. Explain how scientific evidence from a range of sources can be used to support or disprove theories.	Explain how the use of criteria improves the effectiveness of selecting scientific data and other sources of evidence to support or negate an argument. Describe examples where scientific theories, applications and models have been changed by new evidence or societal norms.	Devise criteria to select relevant scientific data and other sources of evidence to support or negate an argument in familiar contexts. Explain how scientific theories, applications and models have been modified by scientists as a result of new evidence.	Devise criteria to select relevant scientific data and other sources of evidence to support or negate an argument in less familiar contexts. Explain how scientific theories, applications and models have been changed by the strength of new evidence, changes in societal norms or values.
1.1b Applications, implications and cultural understanding	Describe some benefits and drawbacks of scientific developments with which they are familiar. Recognise that decisions about the use and application of science and technology are influenced by society and individuals	Explain some issues, benefits and drawbacks of scientific developments with which they are familiar. Recognise that decisions about the use and application of science and technology are influenced by society and individuals, and how these could impact on people and the environment.	Evaluate the issues, benefits and drawbacks of scientific developments with which they are familiar . Recognise that different decisions on the use and application of scientific and technological developments may be made in different economic, cultural and social contexts.	Evaluate the relevant issues, benefits and drawbacks of scientific developments with which they are familiar and draw conclusions about which would be more appropriate. Recognise that scientific evidence can be shaped by a number of factors (bias, scientific status, political or economic factors) and how this could influence the decisions taken on the application of scientific and technological developments	Describe and evaluate examples of perceived and actual risk arising from the application of scientific or technological developments. Describe the power and limitations of science in addressing a range of moral/ ethical issues and how this could influence the impact of decisions taken on the application of scientific and technological developments	Evaluate and analyse the potential impact of the application of new scientific and technological developments . Explain how scientific evidence can be shaped by bias, scientific status, political or economic factors and how this could influence the impact of decisions taken on the application of scientific and technological developments
1.1c Communication for audience and with purpose	Use key scientific vocabulary and terminology in discussions and written work. Identify and use the conventions of various genres for different audiences and purposes in scientific writing.	Use a range of scientific vocabulary and terminology consistently in discussions and written work. Adapt the stylistic conventions of a range of genres for different audiences and purposes in scientific writing.	Communicate effectively and use appropriate scientific temrinology and conventions in discussions and written work. Adapt the stylistic conventions of a wider range of genres for different audiences and purposes in scientific writing.	Communicate effectively using a wide range of scientific terminology and conventions in discussions and written work. Use simple criteria to judge the appropriateness of a piece of scientific writing for a particular audience.	Communicate qualitative and quantitative evidence effectively using scientific terminology and conventions and drawing on abstract ideas and models as appropriate to the audience and purpose. Devise criteria to judge the appropriateness of a piece of scientific writing for a particular audience.	Use a wide range of technical vocabulary and techniques with fluency, demonstrating communication and numerical skills for a range of audiences and purposes. Critically evaluate criteria udes to judge the appropriateness of a piece of scientific writing for a particular audience.
1.2 Practical and enquiry skills	**YEAR 7**	**YEAR 8**	**YEAR 9**	**YEAR 10**	**YEAR 11**	**YEAR 11 EXTENSION**