Long Term Planning 2020/2021

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|  | Term 1 | Term 2 | Term 3 | Term 4 | Term 5 | Term 6 |
| Subject:  Year 9 Science  (based on 4 lessons per week) | * Energy * Atomic Structure * Cell structure and cell transport | * Energy * The Periodic table * Structure and bonding * Cell division | * Energy * Structure and bonding   Organisation in plants and animals | * Energy * Quantitative Chemistry * Communicable diseases | * Electric circuits * Chemical changes * Communicable diseases   Preventing and treating diseases | * Electricity in the home * Electrolysis   Non-communicable diseases |
| Assessment objectives | 3 RQ, AO1, AO2 | 2 RQ, AO1, AO2 | AO1, AO2 | AO1, AO2 | 3 RQ, AO1, AO2 | 1 RQ, AO1, AO2 |
| Skills: | MS 1a/1a, 1b/1b, 1c/1c, 1d, 2a, 2c, 2h, 3a, 3b, 3c, 4a/ 4a, 4b, 4c,4d, 5b, 5c  WS 1.1/1.1, 1.2/1.2/1.2, 1.3/1.3, 1.4, 1.5, 1.6, 2.2/2.2, 2.3, 2.4, 3.5, 4.3/4.3, 4.4/4.4/4.4, 4.5, 4.6  AT 1/1, 3, 4/ 4, 5/5, 6, 7, 8 | MS 1a/1a, 1b/1b, 1c/1c, 1d, 2a, 2c, 2h, 3a, 3b, 3c, 4a/ 4a, 4b, 4c,4d, 5b, 5c  WS 1.1/1.1, 1.2/1.2/1.2, 1.3/1.3, 1.4, 1.5, 1.6, 2.2/2.2, 2.3, 2.4, 3.5, 4.3/4.3, 4.4/4.4/4.4, 4.5, 4.6  AT 1/1, 3, 4/ 4, 5/5, 6, 7, 8 | MS 1a/1a/1a, 1b/1b, 1c/1c/1c, 1d, 2a, 2c/2c, 2d, 2g, 2h, 3b, 3c, 4a/4a/4a, 5b, 5c/5c  WS 1.2/1.2/1,2, 1.3/1.3/1.3, 1.4/1.4/1.4, 1.5/1.5, 3.5/3.5, 4.1, 4.2, 4.3/4.3, 4.4/4.4, 4.5/4.5, 4.6  AT 1, 2, 3, 4, 5, 6, 7, 8 | MS 1a/1a, 1b/1b, 1c/1c, 2a, 2c, 3a, 3b3b, 3c/3c, 3d, 4a  WS 1.2/1.2, 1.3, 1.4/1.4, 1.6, 3.4, 3.5, 4.1, 4.2, 4.3/4.3, 4.4/ 4.5/4.5, 4.6/4.6  AT 1/1, 2, 5, 6 | MS 1c/1c, 2c, 2e, 2h, 3a, 3b, 3c, 3d, 4a, 4c, 4d, 4e  WS 1.1, 1.2/1.2/1.2, 1.3, 1.4/1.4, 1.5/1.5, 1.6, 4.5  AT 1, 3, 6/6, 7, 8 | MS 1a, 1c/1c, 2a, 2c, 2d, 2g, 2h, 3b, 3c, 3d, 4a, 4c/4c, 4d, 4e, 5c  WS 1.2/1.2/1.2, 1.3, 1.4/1.4, 1.5/1.5, 3.5, 4.5  AT 1/1, 2, 3/3, 4, 5, 6/6/6, 7/7, 8/8 |

Outline of Assessment Objectives:

RQ; Required practical

AO1; Show knowledge and understanding of science, and how it works, and apply it where appropriate. Students should be able to:

* Recall scientific facts
* Apply scientific facts

AO2; Demonstrate the ability to design an investigation, take measurements, present data and identify patterns and relationships. Students should be able to:

* Plan a simple investigation, identifying the techniques or equipment needed and the method to be followed
* Make a simple prediction about the outcome of the investigation
* Use equipment and materials safely to take simple measurements or observations that are meaningful and valid
* Record the results in an appropriate way
* Display the data using an appropriate method
* State what has been found out during the investigation (drawing a conclusion) and describe simple relationships in the data
* Simply evaluate the investigation for its success in justifying the initial prediction.

Biology AT

AT1 – Use of appropriate apparatus to make and record a range of measurements accurately including length, area and mass and volume of liquids and pH. Use appropriate apparatus to make and record a range of measurements accurately, including time and volume of a gas

AT2 – Safe use of appropriate heating devices and techniques including the use of a Bunsen burner and a water bath and an electric heater

AT3 – Use of appropriate apparatus and techniques for the observation and measurement of biological changes and/or processes

AT4 – Safe and ethical use of living organisms (plants or animals) to measure physiological function and responses to the environment

AT5 – Measurement of rate of reaction by a variety of methods including an uptake of water and measurement of rates of reaction by a variety of methods including using colour change of an indicator. Measurement of rates of reaction by a variety of methods including the production of gas.

AT6 – Application of appropriate sampling techniques to investigate the distribution and abundance of organisms in an ecosystem via direct use in the field

AT7 – Use of appropriate apparatus, techniques and magnification, including microscopes to make observations of biological specimens and producing labelled scientific drawings

AT8 – The use of appropriate techniques and qualitative reagents to identify biological molecules and processes in more complex and problem solving contexts including continuous sampling in an investigation

Chemistry AT

AT1 – Use of appropriate apparatus to make and record a range of measurements accurately including volume of liquids and mass

AT2 – Safe use of appropriate heating devices and techniques including the use of a Bunsen burner and water bath or electric heater

AT3 – Use of appropriate apparatus and techniques for conducting and monitoring chemical reactions including appropriate reagents and/or techniques for the measurement of pH in different situations

AT4 – Safe use of a range of equipment to purify and/or separate a chemical mixture including evaporation, filtration, distillation, crystallisation including chromatography

AT5 – Making and recording appropriate observations during chemical reactions including changes in temperature and the measurement of rates of reaction by a variety of methods such as production of gas and colour change

AT6 – Safe use and careful handling of gases, liquids and solids, including careful mixing of reagents under controlled conditions, using appropriate apparatus to explore chemical changes and/or products

AT7 – Use of appropriate apparatus and techniques to draw, set up and use electrochemical cells for separation and production of elements and compounds

AT8 – Use of appropriate qualitiative reagents and techniques to analyse and identify unknown samples or products including the determination of concentrations of strong acids and strong alkalis and including gas tests, flame test and precipitation reactions

Physics AT

AT1 – Use of appropriate apparatus to measure mass, time and temperature accurately and record a range of measurements accurately including length, mass and volume. Use of such measurements to determine densities of solid and liquid objects

AT2 – Use appropriate apparatus to measure and observe the effect of forces including the extension of springs

AT3 – Use appropriate apparatus and techniques to measure motion, including determination of speed and rate of change of speed (acceleration/deceleration)

AT4 – Make observations of waves in fluids and solids to identify the suitability of apparatus to measure speed, frequency and wavelength and make observations of the effects of the interaction of EM waves with matter

AT5 – Use in a safe manner appropriate apparatus measure energy changes/transfers and associated values such as work done

AT6 – Use of appropriate apparatus to measure current, potential difference (voltage) and resistance and to explore the characteristics of a variety of circuit elements

AT7 – Use circuit diagrams to construct and check series and parallel circuits including a variety of common circuit elements

AT8 – Make observations of waves in fluids and solids to identify the suitability of apparatus to measure the effects of the interaction of waves with matter

Working scientifically (WS)

Biology

WS 2.1 – Develop hypotheses about the effectiveness of the antibiotics or antiseptics to be used and use the theory of osmosis to create hypotheses on plant tissue

WS 2.2 – Plan experiments to make observations, test hypotheses and explore phenomena

WS 2.3 – Apply knowledge of a range of techniques, apparatus and materials appropriate to the experiment

WS 2.4 – Have due regard for accuracy of measurements, and health and safety when using bacterial cultures

WS 2.5 – Describe the appropriate sampling technique to ensure samples are representative

WS 2.6 – Make and record observations measurements of mass

WS 2.7 – Evaluate the method and suggest possible improvements and further investigations

WS 3.1 – Present observations and other data in tables and graphical form

WS 3.2 – Translate mass data into graphical form and carry out rate calculations for chemical reactions

Chemistry

WS 2.1- Use scientific theories and explanations to develop hypotheses

WS 2.2 – Plan experiments or devise procedures to make observations, produce or characterise a substance, test hypotheses, check data or explore phenomena

WS 2.3 – Apply a knowledge of a range of techniques, instruments, apparatus, and materials to select those appropriate to the experiment

WS 2.4 – Carry out experiments appropriately having due regard for the correct manipulation of apparatus, the accuracy of measurements and health and safety considerations

WS 2.5 – Recognise when to apply a knowledge of sampling techniques to ensure any samples collects are representative

WS 2.6 – Make and record observations and measurements using a range of apparatus and methods

WS 2.7 – evaluate methods and suggest possible improvements and further investigations

Physics

WS 1.1 – 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

WS 2.1 – Use scientific theories and explanations to develop hypotheses

WS 2.2 – plan experiments or devise procedures to make observations, produce or characterise a substance, test hypotheses, check data or explore phenomena

WS 2.3 – Apply knowledge of a range of techniques, instruments, apparatus, and materials to select those appropriate to the experiment and carry out experiments appropriately having due regard for the correct manipulation of apparatus, the accuracy of measurements and health and safety considerations

WS 2.4 – Carry out experiments appropriately having due regard for the correct manipulation of apparatus, the accuracy of measurements and health and safety considerations

WS 2.5 – Recognise when to apply a knowledge of sampling techniques to ensure any samples collected are representative

WS 2.6 – Make and record observations and measurements using a range of apparatus and methods

WS 2.7 – Evaluate methods and suggest possible improvements and further investigations

WS 3.1 – present observations and other data using appropriate methods

WS 3.2 – translate data from one form to another

WS 3.3 – carry out and represent mathematical and statistical analysis

WS 3.4 – represent the distribution of results and make estimations of uncertainty

WS 3.5 – interpret observations and other data (presented in verbal, diagrammatic, graphical, symbolic or numerical form), including identifying patterns and trends, making inferences and drawing conclusions

WS 3.6 – present reasoned explanations including relating data to hypotheses

WS 3.7 – be objective, evaluate data in terms of accuracy, precision, repeatability and reproducibility and identify potential sources of random and systematic error

WS 3.8 – communicate the scientific rationale for investigations, methods used, findings and reasoned conclusions through written and electronic reports and presentations using verbal, diagrammatic, graphical, numerical and symbolic forms

WS 4.2 – recognise the importance of scientific quantities and understand how they are determined

WS 4.3 – use SI units (eg kg, g, mg; km, m, mm; kJ, J) and IUPAC chemical nomenclature unless inappropriate

WS 4.6 – use an appropriate number of significant figures in calculation.

Mathematical skills (MS)

Arithmetic and numerical computation

MS 1a – Recognise and use expressions in the decimal form

MS 1b – Recognise and use expression n standard form

MS 1c – Use ratios, fractions and percentages

MS 1d – Make estimates of the results of simple calculations

Handling data

MS 2a – Use an appropriate number of significant figures

MS 2b – Find arithmetic means

MS 2c – Construct and interpret frequency tables and diagrams, bar charts and histograms

MS 2d – Understand the principles of sampling as applied to scientific data

MS 2e – Understand simple probability

MS 2f – Understand the terms mean, mode and median

MS 2g – Use a scatter diagram to identify a correlation between two variables

MS 2h – Make order of magnitude calculations

Algebra

MS 3a – Understand and use the symbols; =, <, <<, >>, >, α, ~

MS 3b – Change the subject of an equation

MS 3c – Substitute numerical values into algebraic equation using appropriate units for physical quantities

MS 3d – Solve simple algebraic equations

Graphs

MS 4a – Translate information between graphical and numeric form

MS 4b – Understand that y = mc + c represents a linear relationship

MS 4c – Plot two variables from experimental or other data

MS 4d – Determine the slope and intercept of a linear graph

MS 4e – Draw and use the slope of a tangent to a curve as a measure of rate of change

MS 4f – Understand the physical significance of area between a curve and the x-axis and measure it by counting squares as appropriate

Geometry and trigonometry

MS 5a – Use angular measures in degrees

MS 5b – Visualise and represent 2D and 3D forms including two dimensional representations of 3D objects

MS 5c – Calculate areas of triangles and rectangles, surface areas and volumes of shapes