**Mandatory Science experiments to be written up for Christmas exams (from First and Second Year)**

**Biology**

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| **First Year** |
| Qualitative food tests for starch, reducing sugar, protein and fat. |
| Investigate the conversion of chemical energy in food to heat energy. |
| Investigate the action of amylase on starch; identify the substrate, product and enzyme. |
| Investigate the variety of living things by direct observation of animals and plants in their environment; classify living organisms as plants or animals, and animals as vertebrates or invertebrates. |
| Prepare a slide from plant tissue and sketch the cells under magnification. |
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| **Second Year before Christmas** |
| Carry out qualitative tests to compare the carbon dioxide levels of inhaled and exhaled air |
| **Second Year after Christmas** |
| Investigate the presence of micro-organisms in air and soil |
| Study a local habitat, using appropriate instruments and simple keys to show the variety and distribution of named organisms |

**Chemistry**

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| **First Year** |
| Separate mixtures using a variety of techniques: filtration, evaporation, distillation and paper chromatography. |
| Grow crystals using alum or copper sulphate. |
| Investigate the pH of a variety of materials using the pH scale |
| Show that approximately one fifth of the air is oxygen;Show that there is CO2 and water vapour in air. |
| Prepare a sample of oxygen by decomposing H2O2 using MnO2  as a catalyst. |
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| **Second Year before Christmas** |
| Prepare carbon dioxide and show that it does not support combustion. |
| Conduct a qualitative experiment to detect the presence of dissolved solids in water samples |
| Test water for hardness (soap test) |
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**Physics**

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| **First Year** |
| Measure the mass and volume of a variety of solids and liquids |
| Show that light travels in straight lines. |
| Investigate the reflection of light by plane mirrors, and illustrate this using ray diagrams;  demonstrate and explain the operation of a simple periscope. |
| Plot the magnetic field of a bar magnet. |
| Identify different forms of energy and carry out simple experiments to show the following energy conversions:  (a) chemical to electrical to heat energy (b) electrical to magnetic to kinetic energy  (c) light to electric to kinetic energy. |
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| **Second Year before Christmas** |
| Investigate and describe the expansion of solids, liquids and gases when heated, and contraction when cooled |
| Transfer of heat energy by conduction: To compare the ability of different metals to conduct heat |
| Transfer of heat energy by conduction: Water is a poor conductor of heat |
| Transfer of heat energy by convection: Convection currents in air |
| To show the transfer of heat energy by convection: Convection currents in water |
| **Second Year before Christmas** |
| To show the transfer of heat energy by radiation: Dark materials are better radiators of heat than shiny materials |
| Investigate the relationship between the extension of a spring and the applied force |
| Investigate flotation for a variety of solids and liquids in water and other liquids, and relate the results of this investigation to their densities |