ST ALBERT’S CATHOLIC SCHOOL

SCIENCE POLICY

Introduction
At St Albert’s Catholic School we believe that Science Education contributes to developing scientifically literate citizens who will be able to make informed decisions about the interaction between their personal lives and the environment. Science is a process of discovery as well as the gaining of knowledge about the physical and biological world. Science develops ability and aptitude in learners to make inquiries about nature through observation and experimentation.

We acknowledge students curiosity about the world and extend this through an inquiry approach to teaching and learning. Students’ questions become the focus for investigations and the basis for developing scientific explanations. Students appreciate that current scientific knowledge continues to evolve and they build on past experiences by challenging their own understandings as they work scientifically.

Rationale
Science Education enables the learner to be better able to:
- make informed decisions about their personal lives and sustainability of the environment;
- be open-minded to all evidence and develop ability to critically evaluate results;
- contribute individual ideas to public debates with confidence;
- accept that the world is ever changing and evolving;
- understand and appreciate cultural diversity;
- develop skills in working scientifically i.e. questioning, exploring, hypothesizing, interpreting, and communicating.

Aims
The Science Learning Area aims to develop in all students the capacity to use, develop and apply scientific knowledge by:
- investigating, explaining and predicting events, and devising solutions in their everyday endeavours in their physical, social and biological worlds;
- communicating scientifically to different audiences for a range of purposes;
- using Science to link with, and across, other Learning areas, with lifelong learning, word and community contexts.

The understanding that Science is a social construction by:
- acknowledging that aspects of scientific thinking are carried out by all people as part of their everyday lives in ways that contribute to their personal and social wellbeing and identities in a range of contexts, including cultural, environmental and economic;
- appreciating the evolutionary nature of Science and scientific knowledge as a human endeavour with its own histories and ways of contributing to society;
- recognising that diverse cultures and groups may have different Science systems and that this influences how scientific knowledge develops and is used;
- contributing to public debate and decision-making about Science.
Positive attitudes, values and dispositions related to Science, which involve:

- being open to new ideas, being intellectually honest and rigorous, showing commitment to scientific reasoning and striving for objectivity, and pursuing and respecting evidence to confirm or challenge current interpretations;
- being confident and optimistic about their knowledge, skills and abilities to satisfy their own questions about the physical, biological and human-constructed worlds;
- recognising and valuing diverse cultural perspectives in and through Science;
- thinking, planning and making decisions that include ethical consideration about the impact of the processes and products of Science on people, future generations and physical and social environments;
- considering careers, paid / unpaid work further education and training in Science.

Scope

The science Learning Area, whose foundation is the SACSA Science Framework, is organised into four conceptual strands, each with its characteristic knowledge and ideas.

The strands are:

1. Earth and Space;
2. Energy systems;
3. Life systems;

Which are based on Earth and Space Science, Physics, Biology and Chemistry respectively.

Each Science strand is characterised by two scientific ideas. These scientific ideas form the basis for the Key Ideas in each strand at each level of schooling. There are also 2 related Student Outcomes for each Key Idea.

Methodology

The processes of Working Scientifically are interwoven into each of the conceptual strands and are the essence of science.

The theoretical basis for the conception of learning in the SACSA Framework is constructivism. By utilising this theoretical basis, science teaching and learning engages learners by acknowledging their prior knowledge and providing opportunities for investigations of science in real world contexts, thereby supporting learners to construct their own understandings.

Teachers are encouraged to develop an understanding of constructivism, for which examples of effective pedagogy are:

- open-ended questioning that elicits a learners’ understanding of a concept or idea;
- empowering learners to develop the capacity to design their own learning and assessment tasks;
- enabling learners to make the connections between the science being taught in the classroom and the science that is practised in the broader community.
Effective constructivist teaching and learning in Science

- **Taking account of students’ views.**
  
  Learning starts from and values the beliefs, concepts and skills of students. These personal ideas and theories are the students starting point for science lessons. They analyse and test their ideas, respond to other interpretations and build more adequate understandings of the world around them.

- **Recognising that students construct their own understandings.**
  
  Learning activities should encourage students to clarify, evaluate and reconsider their own understanding of the physical and biological world. Students’ learning experiences should challenge their ideas, encouraging them to reflect on these in the light of accepted scientific knowledge and interpretations and to consider how their own ideas have changed over time.

- **Providing a supportive learning environment.**
  
  Good Science teaching requires teachers with scientific knowledge, confidence, enthusiasm and vision. The Science learning environment should also be safe and secure, free from harassment and should support all students. Students should be able to ask questions, take risks in learning and design and plan their learning activities in the confidences that their ideas and values will be respected.

- **Learning in practice.**
  
  Science learning occurs in many ways – talking, listening, reading, drawing, making, enacting, experimenting, modelling, and handling animals, rocks, and tools, using equipment. Practical investigations are especially important because they enable students to work back and forth between theoretical ideas and direct experience. Experiences such as tinkering, fieldwork and experimentations in familiar and interesting environments extend and challenge students’ own understandings.

- **Engaging in relevant and useful activities.**
  
  For students as individuals and for society as a whole, the relevance of Science lies partly in its contribution to our search for meaning and understanding and partly in the practical use we make of scientific ideas and processes. The curriculum should emphasise the practicality, relevance and usefulness of scientific concepts and processes to students’ lives, encouraging learners to construct their own learning from meaningful connections.

- **Complementing learning in other areas.**
  
  The curriculum should be planned to be coherent, consistent and coordinated across learning areas and year levels within the school. Scientific theories and knowledge are applied in the technology learning area; Mathematics is used extensively in scientific analysis and modelling; language competence is inseparable from scientific competence and a full appreciation of Science depends on understanding the historical, cultural, social and human contents of Science.

- **Using scientific language appropriately.**
  
  Use of technical scientific language, specialised writing forms, drawing and graphs should be regarded as a means of developing a greater understanding of and a more precise way of communicating about science. A range of forms of communication such as poems, scripts, stories, drawing, drama and role playing are all enjoyable ways in which students can explore science and demonstrate their understanding, helping them to speculate, take risks and clarify their thinking.
Assessment and Reporting

An integral part of the Science curriculum is the assessment and reporting of children’s attitudes, participation, skills, knowledge and understanding. These are outcomes based and will be reported to parents (refer to St Albert’s Catholic School’s Assessment and Reporting Policy).

Possible sources of information for assessment purposes include the following:

- age appropriate checklists;
- self assessment;
- teacher observation;
- teacher evaluation and comparison with benchmark levels;
- written reports;
- testing;
- teacher-student discussions;
- oral reporting;
- results of experiments.

Reporting

Reporting is the process of providing information, both formally and informally, about the process of student achievement. At St Albert’s Catholic School we report twice a year.

The principles listed underpin effective reporting:

- reporting students’ achievement has a number of purposes for a variety of audiences such as students, parents/caregivers, teachers, the school and the wider community;
- reporting should provide a diagnosis of areas of strength and need, including those in which the students might be given additional support;
- reporting information needs to be clear and appropriate to the audience.

Formal reporting to parents on students' attainment of learning outcomes in Science will be included in written reports at the end of Term 2 and Term 4.

Evaluation

Evaluation is an ongoing process. Information for use in evaluation may be gathered through: student assessment; teachers’ own reflection on their teaching practices; written records such as questionnaires, logs and diaries, submissions or records of meetings; and discussion with general staff members, teaching staff (including any specialist teachers involved), parents and other community members.

Teachers need to gather, organise and interpret information in order to make judgments about the effectiveness and appropriateness of:

- curriculum overviews and plans;
- teaching programmes;
- teaching strategies;
- assessment strategies;
- resources;
- staff development programmes.
**Time Allocation**

Science is often integrated across curriculum areas. Science is expected to be taught for 1 hr a week.

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<tr>
<th>Signed:</th>
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<tr>
<td>Chairperson School Board: Justine Fogden……………..</td>
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<td>Principal: Jason Mittiga…………………..</td>
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<tr>
<td>Date: September 2011  Review Date: September 2014</td>
</tr>
<tr>
<td>Strand</td>
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<tr>
<td>Earth and Space</td>
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<td>Energy Systems</td>
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<thead>
<tr>
<th>Strand</th>
<th>At Standard 2, towards the end of Year 4, the student:</th>
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<tbody>
<tr>
<td>Earth and Space</td>
<td>2.1 Expresses ideas about changes that occur in their local environment, and considers implications for sustainable environments. [F] [In] [KC1] [KC2]</td>
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<td></td>
<td>2.2 Explores the apparent motion of the sun in relation to the earth and develops models of their understanding. [In] [T] [C] [KC6]</td>
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<tr>
<td>Energy Systems</td>
<td>2.3 Identifies, plans and acts on ways in which they can better use energy in their lives. [F] [In] [C] [KC1] [KC2]</td>
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<td></td>
<td>2.4 Identifies, observes and describes energy transfer, such as light, sound, heat or movement, through common objects. [T] [C] [KC1] [KC2]</td>
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<tr>
<td>Life Systems</td>
<td>2.5 Explores relationships between living things by posing investigable questions about features and functions. [In] [T] [KC6]</td>
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<td></td>
<td>2.6 Communicates understandings of life cycles and the importance of diversity for the future. [F] [T] [C] [KC2]</td>
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<tr>
<td>Matter</td>
<td>2.7 Designs an investigation to explore properties of common materials, explaining why they have particular uses. [T] [C] [KC2] [KC3] [KC6]</td>
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<tr>
<td></td>
<td>2.8 Predicts, investigates and describes changes in common materials when acted upon in various ways. [F] [C] [KC6]</td>
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<tr>
<th>Strand</th>
<th>At Standard 3, towards the end of Year 6, the student:</th>
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<tbody>
<tr>
<td>Earth and Space</td>
<td>3.1 Describes the characteristics that sustain life on the earth, changes to these characteristics and their impact over time. [F] [In] [T] [KC2]</td>
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<tr>
<td></td>
<td>3.2 Describes various components of the solar system and the effects of these on our everyday lives. [F] [In] [C] [KC2]</td>
</tr>
<tr>
<td>Energy Systems</td>
<td>3.3</td>
</tr>
<tr>
<td>Matter</td>
<td>3.4</td>
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</tbody>
</table>

| Matter | 3.7 | Describes the structure of some common materials, explains how materials are used for different purposes, and understands their impact on the environment. [F] [In] [T] [C] [KC1] [KC2] |
| Matter | 3.8 | Uses the changes in properties and uses of materials in product life cycles. [T] [C] [KC1] |

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<tr>
<th>Strand</th>
<th>At Standard 4, towards the end of Year 8, the student:</th>
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<tbody>
<tr>
<td><strong>Earth and Space</strong></td>
<td><strong>4.1</strong> Identifies and investigates changes, both natural and human-induced, on the earth and suggests ideas which encourage the preservation of the natural environment for all living things. [F] [In] [T] [KC1] [KC6]</td>
</tr>
<tr>
<td><strong>Energy Systems</strong></td>
<td><strong>4.2</strong> Investigates and analyses astronomical features and changes as seen from the earth and debates the ways scientists examine and explain these. [F] [In] [C] [KC2]</td>
</tr>
<tr>
<td><strong>Energy Systems</strong></td>
<td><strong>4.3</strong> Investigates ways of obtaining, transferring and using energy (including from sustainable energy sources and from fossil fuels) for particular purposes. [F] [C] [KC6]</td>
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<tr>
<td>Energy Systems</td>
<td><strong>4.4</strong> Plans and evaluates investigations that focus on the transfer and transformation of energy. [In] [T] [KC3]</td>
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<tr>
<td><strong>Life Systems</strong></td>
<td><strong>4.5</strong> Investigates and explains the functioning of living systems from the microscopic to the macroscopic. [F] [In] [KC1] [KC2]</td>
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<tr>
<td><strong>Life Systems</strong></td>
<td><strong>4.6</strong> Explores how living things have changed over geological time and debates the value of species diversity and the ethics of human intervention. [F] [T] [C] [KC2] [KC6]</td>
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<td>Matter</td>
<td><strong>4.7</strong> Compares properties of materials before and after physical or chemical change by planning, conducting, evaluating and communicating an investigation. [In] [T] [C] [KC1] [KC2] [KC3]</td>
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<tr>
<td>Matter</td>
<td><strong>4.8</strong> Recognises and describes conditions that influence reactions or change in materials. [T] [C] [KC1] [KC2]</td>
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</table>
Band: Early Years

**Strand: Earth and Space**

Apparent movement of the Sun: The way it appears on Earth that the Sun is moving across the sky.

Climate: The atmospheric conditions for a long period of time, and generally refers to the normal or mean course of the weather.

Nocturnal: Being primarily active at night.

Weather: Day-to-day variation in atmospheric conditions.

**Strand: Energy systems**

Domino effect: Where one change ripples through an entire system. Chain reaction.

Energy: The ability of an object to do work.

Force: A push or pull.

Machine: Simple machines make life easier. Simple machines include the lever, the screw, the wheel and axle, the inclined plane, the pulley, and the wedge.

Complex machines use two or more moving parts.

**Strand: Life systems**

Environment: The physical surroundings of an organism that include the living and non-living components that could affect its life, development and survival.

Interdependence: The relationships between or among organisms necessary for their survival.

**Strand: Matter**

Liquid: The state in which a substance flows and takes up the shape of its container.

Magnetism: The field of force produced by a magnet or an electric current.

Solid: A form of matter that has shape and hardness.

Solution: A mixture of a solute (the substance that is dissolved) in a solvent (the substance that dissolves the solute). A saturated solution is a solution in which no more solute will dissolve.

Variable: Part of the experiment that changes in some way. Ideally, the factor being compared is the only variable that will be changed.

**Strand: Earth and Space**

Climate: The atmospheric conditions for a long period of time. Generally refers to the normal or mean course of the weather.

Composting system: A mixture of decaying organic matter, used to improve soil structure and provide nutrients.

Equinox: The point at which the ecliptic intersects the celestial equator. Days and nights are most nearly equal in duration.

King tide: A high tide well above average height.

Meteor: A meteoroid that has entered the Earth’s atmosphere, usually making a fiery trail as it falls. It is sometimes called a shooting star. Most burn up before hitting the Earth.

Meteorite: A meteor that has fallen to Earth.

Meteoroids: Tiny stones or pieces of metal that travel through Space.
Rock type: (Igneous): rocks are formed by the solidification from a molten or liquid state (eg quartz crystals, pumice).

Rock type: (Metamorphic): rocks have been changed by heat and pressure (eg slate).

Rock type: (Sedimentary): rocks are produced by the compaction and cementing of sediments (eg sandstone, limestone).

Revolution: When an object moves in orbit around another object.

Rotation: Spin of the Earth on its axis.

Seasons: Spring, Summer, Autumn and Winter. The seasons are caused by the tilt of the Earth’s axis.

Solstice: Either of the two times of the year when the Sun is at its greatest distance from the celestial equator (Winter solstice is the shortest day length of the year).

Weather: Day-to-day variation in atmospheric conditions.
ST. ALBERT’S CATHOLIC SCHOOL
SCIENCE POLICY
GLOSSARY OF SCIENTIFIC TERMS

Band: Primary Years

**Strand: Energy systems**

**Conductor:** A substance that transmits heat, electricity, light or sound.

**Energy:** The ability of an object to do work.

**Energy forms:** Include sound, light, heat, electrical, kinetic (the energy of motion), mechanical (the total amount of kinetic and potential energy in a system) and stored or potential energy (the object currently isn’t doing any work, but could).

**Energy, non-renewable:** Built up or evolved over a geological time span and cannot be used without depleting the stock and raising questions of ultimate exhaustibility, since the rate of formation is so slow as to be meaningless in terms of the human lifespan.

**Energy, patterns of use:** Use of energy varies over a day (eg need for lighting in evening), and over the year (air conditioning in summer).

**Energy receiver:** The object that receives the energy (eg a light globe receives electrical energy).

**Energy, renewable:** Replenished continuously or replaced after use through natural means. Includes solar energy, wind energy, geothermal power and hydropower.

**Energy source:** Where the energy comes from (eg the Sun).

**Force:** A push or pull between two objects.

**Friction:** The resistive force acting between bodies that tends to oppose and damp out motion.

**Machine:** (Simple): machines have few, if any, moving parts. Simple machines include the lever, the screw, the wheel and axle, the inclined plane, the pulley, and the wedge.

**Machine:** (Complex): machines have two or more moving parts.

**Pendulum period:** The one complete swing. The bob is the mass.

**Thrust:** A reaction force described quantitatively by Newton’s Second Law when a system expels or accelerates mass in one direction to propel an object in the opposite direction.

**Strand: Life systems**

**Biodiversity:** The number and variety of species.

**Ecosystem:** The dynamic and interrelating complex of plant and animal communities and their associated non-living environment.

**Endangered:** Having so few individual survivors that the species could soon become extinct in all or part of its range.

**Extinction:** Complete disappearance of a species because of its inability to adapt to change.

**Feral animal:** Living in a wild, self-maintaining state after having escaped, or been released, from captivity or domestication.

**Food chain:** A series of links between plants and animals expressed as feeding relationships in linear form.

**Food web:** All the interconnecting food chains in a community.

**Interdependence:** The relationships between or among organisms necessary for their survival.

**Interrelatedness:** Mutual or reciprocal relationship.

**Parasite:** An organism that grows, feeds and is sheltered on or in a different organism while contributing nothing to the survival of its host.

**Salinity:** Measure of the concentration of dissolved salts in water.

**Scavenger:** Any animal that feeds on refuse and other decaying organic matter.
**Strand: Matter**

**Chemical change:** A change that can’t easily be reversed.

**Filtration:** A separation technique that uses a filter to separate objects of different sizes in a mixture.

**Irreversible change:** Change that cannot be changed back to return matter to its original state (e.g., cooked food). Chemical change.

**Physical change:** A change that can be reversed.

**Reversible change:** Change that can be changed back to return matter to its original state (e.g., ice to water). Physical change.

**Saturated solution:** A solution in which no more solute will dissolve.

**Soluble:** A substance that will dissolve.

**Solute:** The substance that is dissolved.

**Solution:** A mixture of a solute in a solvent.

**Solvent:** A liquid that does the dissolving.
Band: Middle Years

**Strand: Earth and Space**

**Atmosphere:** The layer of gas surrounding the Earth or other planets. The upper atmosphere is the region of Earth’s atmosphere above the troposphere (which extends to about 20km). Regions of the upper atmosphere are the stratosphere, mesosphere and thermosphere.

**Climate:** The atmospheric conditions for a long period of time. Generally refers to the normal or mean course of the weather.

**Greenhouse gases:** Present in relatively small quantities in the atmosphere and strongly absorb infrared radiation or ‘heat’ emitted by the Earth. The primary greenhouse gases are water vapour, carbon dioxide, methane, nitrous oxide, ozone, and some of the chlorofluorocarbons. Concentrations of several greenhouse gases are increasing, primarily as a result of human activities.

**Ionosphere:** The region of Earth’s atmosphere that extends about 50–600kms above the surface of the planet.

**Ozone depletion:** Ozone is continually being formed and destroyed by chemical reactions occurring in the stratosphere. There are large natural changes in ozone concentration in the stratosphere; for example, between summer and winter there is a change of about 25% at mid-latitudes. Ozone depletion occurs if the rate of ozone destruction is increased due to human activities.

**Revolution:** When an object moves in orbit around another object.

**Rock type:** (Igneous): rocks are formed by the solidification from a molten or liquid state (eg granite, pumice).

**Rock type:** (Metamorphic): rocks have been changed by pressure and heat (eg slate).

**Rock type:** (Sedimentary): rocks are produced by compaction and cementing of sediments (eg sandstone).

**Troposphere:** The first layer of the atmosphere, lying below 10km altitude.

**Weather:** Day-to-day variation in atmospheric conditions.

**Strand: Energy systems**

**Conductor:** A substance that transmits heat, electricity, light, sound or other form of energy.

**Energy:** The ability of an object to do work.

**Energy forms:** Include sound, light, heat, electrical, kinetic (the energy of motion), and stored or potential energy.

**Energy, non-renewable:** Built up or evolved over a large time span and cannot be used without depleting the stock and raising questions of ultimate exhaustibility, since the rate of formation is so slow as to be meaningless in terms of the human life span.

**Energy, patterns of use:** Varies over a day (eg need for lighting in evening) and over the year (air conditioning in summer).

**Energy receiver:** The object that receives the energy (eg a light globe receives electrical energy).

**Energy, renewable:** Replenished continuously or replaced after use through natural means. Includes solar energy, wind energy, geothermal power and hydropower.

**Energy source:** Where the energy comes from (eg the Sun).

**Force:** A push or pull.

**Friction:** The resistive force acting between bodies that tends to oppose and damp out motion.

**Hydraulics:** The science of fluids in motion.
**Machine: (Simple):** machines have few, if any, moving parts. Simple machines include the lever, the screw, the wheel and axle, the inclined plane, the pulley, and the wedge.

**Machine: (Complex):** machines have two or more moving parts.

**Pendulum period:** The time for one complete swing. The **bob** is the mass.

**Thrust:** A force that accelerates an object.

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**Strand: Life systems**

**Biotechnology:** Technique that uses living organisms (or parts of organisms) to make or modify products or to change or develop organisms for specific use.

**Carbon cycle:** The cyclic movement of carbon through an ecosystem.

**Endoskeleton:** The bony and cartilaginous structure that is inside the body.

**Exoskeleton:** The hard structure developed on the outside of, and giving support to, a body, such as the chitinous covering of an insect.

**Gene technology:** Branch of modern biotechnology. Range of techniques used by scientists in an attempt to control or modify genes or, most significantly, move them between two unrelated species (called recombinant DNA technology).

**Genetic modification:** The addition, deletion, substitution, rearrangement or recombination of heritable genetic material.

**Mineralisation:** The conversion of an element through the action of microbes from an organic to an inorganic state.

**Oxygen cycle:** Cyclic movement of oxygen in different chemical forms from the environment to organisms, and then back to the environment.

**Parasite:** An organism that grows, feeds and is sheltered on or in a different organism while contributing nothing to the survival of its host.

**Salinity:** Measure of the concentration of dissolved salts in water.

**Scavenger:** Any animal that feeds on refuse and other decaying organic matter.

**Selective breeding:** The selection of certain seeds or animals for reproduction in order to influence the traits inherited by the next generation.

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**Strand: Matter**

**Chromatography:** A separation technique that separates small traces of substances using differences in solubility (eg can separate colours).

**Decanting:** The process of removing the sediment from a liquid.

**Filtration:** A technique that separates insoluble substances from a liquid.

**Irreversible change:** Change that cannot be changed back to return the matter to its original state (eg cooked food). Chemical change.

**Reversible change:** Change that can be changed back to return the matter to its original state (eg ice to water). Physical change.

**Solute:** The substance that is dissolved.

**Solvent:** The substance that dissolves the solute.

**Solution:** A mixture of a solute in a solvent. A saturated solution is a solution in which no more solute will dissolve.