SCIENCE CURRICULUM MAP
YEAR 9

HALF TERM 1:

OEOO8 – Magnetism

1. Magnetic poles, attraction and repulsion
2. Magnetic fields by plotting with compass, representation by field lines
3. Earth magnetism, compass and navigation
4. the magnetic effect of a current, electromagnets, DC motors (principles only)
5. Forces between magnets and forces die to static electricity

IOL13 – Interdependence

1. The interdependence of organisms in an ecosystem, including food webs and insect pollinated crops
2. The importance of plant reproduction through insect pollination in human food security
3. How organisms affect, and are affected by, their environment, including the accumulation of toxic materials
4. Add classification and organisms
5. Pyramids of biomass.

Supporting texts or wider reading

OEOO8 – The spinning magnet
IOL13 – Interdependence

Opportunities for extended writing

Extended writing task on 'what would the be like without plants'
Writing up a mathod for the magnetism practical.

Speak like an expert

Group discussions on how food chains and webs are affected when species go extinct/ organisms die out from an ecosystem.

Links to careers, personal development and other subject areas.

Technology – how magnets are made.
Careers focus – Toxicologist.
Maths – Collecting data using a quadrat

HALF TERM 2:

OEOO9 – Gas Pressure

1. Atmospheric pressure decreases with increase of height as weight of air above decreases with height.
2. Pressure in liquids, increasing with depth, up thrust effects, floating and sinking.
3. Pressure measured by ratio force over area - acting normal to any surface.
4. Forces: associated; resistance to motion of air and water

BBL5 – Inheritance and Evolution

1. Heredity as the process by which genetic information is transmitted from one generation to the next
2. A simple model of chromosomes, genes and DNA in heredity, including the part played by Watson, Crick, Wilkins and Franklin in the development of the DNA model
3. Differences between species
4. The variation between species being continuous of discontinuous, to include measurement and graphical representation of variation
5. The variation between species and between individuals of the same species means some organisms compete more successfully, which can drive natural selection
6. Changes in the environment may leave individuals within a species, and some entire species, less well adapted to compete successfully and reproduce, which in turn may lead to extinction

Supporting texts or wider reading

OEOO9 – Gas Pressure
BBL5 – inheritance and Evolution

Opportunities for extended writing

Describing the differences of inherited characteristcs and environmental characteristics.
How planes cope with gas pressure.

Speak like an expert

Using key terminology to describe the development of the DNA model.

Links to careers, personal development and other subject areas.

Maths- Calculating surfacing area
Maths – Continous and discontinous data
Maths – How to display data
PSHE – Reproduction

SCIENCE CURRICULUM MAP YEAR 9

<table>
<tr><td>7. The importance of maintaining biodiversity and the use of gene banks to preserve hereditary material</td><td></td><td></td></tr>
<tr><td rowspan="4">HALF TERM 3:

<u>BOE14 – Light Waves</u>

1. The similarities and difference between light waves in matter
2. Light waves travelling through a vacuum; speed of light
3. The mechanism radiation within the particle model.
4. The transmission of light through materials; absorption, diffuse scattering and specular reflection at a surface
5. Use of ray models to explain imaging in mirrors, the pinhole camera, the refraction of light and action of convex lens in focusing (qualitative); the human eye
6. Light transferring energy from source to absorber leading to chemical and electrical effects; photo-sensitive material in the retina and in cameras
7. Colours and the different frequencies of light, white light and prisms (qualitative only) differential colour effect in absorption and diffuse
8. Changes with the temperature in motion and spacing of particles
9. internal energy stored in materials

<u>BE5 – Looking outwards</u>
1. Observing the night sky; The use of telescopes for personal use, Astronomy Clubs and National Observatories
2. Gravity and Force; The craters on the moon and what caused them
3. The search for a second Earth; how International and Space telescopes are used to find habitable planets
4. The search for life; human transmissions into the cosmos and the search for incoming signals
5. Humans in space; weightlessness and surviving in space.</td><td>  </td><td>Supporting texts or wider reading

BOE14 – Light Waves
BE5- Looking outwards</td></tr>
<tr><td>  </td><td>Opportunities for extended writing

Describing how shadows are formed.

Explaining how International and Space telescopes are used to find habitable planets</td></tr>
<tr><td>  </td><td>Speak like an expert

What causes gravity and why is there no gravity in space.
Discussing what it would be like to go to space.
What is a solar eclipse and how does it link to light waves.</td></tr>
<tr><td>  </td><td>Links to careers, personal development and other subject areas.

Maths- Distance in space
Maths – Standard form
Maths – Gravity and force equations
Careers – Astronomy</td></tr>
<tr><td rowspan="2">HALF TERM 4:

<u>OEOO10 – Static electricity</u>
1. forces between magnets and forces due to static electricity
2. Relationship between an electron and an atom.
3. Separation of positive or negative charges when objects are rubbed together, transfer of electrons, forces between charged objects.</td><td>  </td><td>Supporting texts or wider reading

OEOO10 – Static electricity
CR5 – The reactivity of metals.</td></tr>
<tr><td>  </td><td>Opportunities for extended writing

How magnets work – how electrons can be transferred when objects are rubbed together.</td></tr>
</table>

SCIENCE CURRICULUM MAP YEAR 9

<table>
<tr>
<td>

4. The idea of electric field, forces acting across the space between objects not in contact

CR5 – The reactivity of metals

1. The order of metals and carbon in the reactivity series
2. the use of carbon in obtaining metals from metal oxides
3. Properties of ceramics, polymers and composites (qualitative)
4. What catalysts do
5. Symbol equations

</td>
<td>  </td>
<td>Speak like an expert

Using scientific terminology to discuss what happens to the alkali metals in group 1 of the periodic table.
How atoms are charged, how this effects the transfer of electrons</td>
</tr>
<tr>
<td rowspan="4">HALF TERM 5:
<u>Fundamentals of Biology</u>
1. Describe the structure of eukaryotic and prokaryotic cells.
2. Explore how structural differences between types of cells enables them to perform specific functions within the organism.
3. Explain the importance of cell differentiation.
4. Understand how microscopy techniques have developed over time.
6. Rearrange the equation to calculate image size or magnification.
$$real\ size = \frac{image\ size}{magnification}$$
7. Understand the three overall stages of the cell cycle.
8. Describe what a chromosome is and where chromosomes are found in the cell.
9. Describe how cells must divide by mitosis producing two new identical cells.
10. Define the terms diffusion and active transport.
11. Explain how temperature, concentration gradient and surface area affect the rate of diffusion.
12. Describe and explain how an exchange surface is made more effective.
13. Describe where stem cells can be found in animals and plants.
14. Describe how stem cells could be used to help treat some medical conditions.
15. Evaluate risks and benefits, as well as the social and ethical issues concerning the use of stem cells from embryos in medical research and treatments.

<u>Fundamentals of Chemistry</u>
1.Use the names and symbols of the first 20 elements in the periodic table.
2.Write word equations and balanced chemical equations for the reactions.
3.Suggest suitable separation and purification techniques for mixtures.
4.Describe how and why the atomic model has changed over time.
5.Describe the structure of the atom- identify the charge and mass on each subatomic particle.</td>
<td></td>
<td>Links to careers, personal development and other subject areas.

Art – materials like ceramics and polymers.
Engineering – Designing structures.
Maths – Using equations to calculate PEN.</td>
</tr>
<tr>
<td>  </td>
<td>Supporting texts or wider reading

Read articles about current stem cell uses and potential uses.
Europe’s stem cell hub – Stem cell videos and films
Daily News Articles - stem cells | The Scientist Magazine®</td>
</tr>
<tr>
<td>  </td>
<td>Opportunities for extended writing
Practical write up: Use a light microscope to observe. Draw and label a selection of plant and animal cells.</td>
</tr>
<tr>
<td>  </td>
<td>Speak like an expert
Present arguments in favour of or against the use of embryonic stem cells (doctor, person with diabetes, human rights activist).</td>
</tr>
<tr>
<td>  </td>
<td>Links to careers, personal development and other subject areas.

Understanding the ethical issues arising from the use of stem cells.

Maths- scale and size of cells and be able to make order of magnitude calculations, including the use of standard form. Rearranging and balancing equations.
Convert values for the units: cm, mm, µm and nm. Calculate and compare surface area: volume ratios. Use SI units and the prefix nano.</td>
</tr>
</table>

SCIENCE CURRICULUM MAP
YEAR 9

6.Calculate the numbers of protons, neutrons and electrons in an atom or ion, given its atomic number and mass number for the first 20 elements. 7.Describe why atoms have no overall charge. 8.Calculate the relative atomic mass of an element given the percentage abundance of its isotopes. 9.Represent the electronic structures of the first twenty elements of the periodic table in both forms.		
HALF TERM 6: <u>Fundamentals of Physics</u> 1. Describe, for common situations, the changes involved in the way energy is stored when a system changes. 2. Calculate how energy is redistributed in a system when it changes. 3.Work is done when charge flows in a circuit. Work done = Force x Distance 4. Calculate the kinetic energy of a moving object, stored by a stretched spring and an object raised above ground level. $K.E. = 0.5\ x\ mass\ x\ (speed)^2$ 5. The amount of elastic potential energy stored in a stretched spring can be calculated using the equation: $Elastic\ potential\ energy\ =$ $0.5\ x\ spring\ constant\ x\ (extension)^2$ 6. The amount of gravitational potential energy gained by an object raised above the ground level can be calculated using the equation: $g.p.e\ =\ mass\ x\ gravitational\ field\ strength\ x\ height$ 7. Energy can be transferred usefully, stored or dissipated, but cannot be created or destroyed. 8. Whenever there are energy transfers in a system only part of the energy is usefully transferred. The rest of the energy is dissipated so that it is stored in less useful ways. This energy is often described as being wasted. 9. Unwanted energy transfers can be reduced in several ways, for example, through lubrication and the use of thermal insulation. 10. The rate of cooling of a building is affected by the thickness and thermal conductivity of its walls. 11. The energy efficiency for any energy transfer can be calculated using the equation: $efficiency\ =\ \frac{useful\ output\ energy\ transfer}{total\ input\ energy\ transfer}$		**Supporting texts or wider reading** Article to read – energy costs and the cost of living
		**Opportunities for extended writing** Practical activity write up: an investigation to determine the specific heat capacity of a materials. Link the decrease of one energy store (or work done) to the increase in temperature and subsequent increase in thermal energy stored.
		**Speak like an expert** Discuss energy wasted by the machines and ways to reduce it. Why does the temperature of a pan of oil increase faster than a pan of water? Investigate ways of reducing the wasted energy transfer in a rollercoaster.
		**Links to careers, personal development and other subject areas.** Political, social, ethical and economic considerations that may arise from the use of different energy resources.