Year 5/6 Science: Physics – Earth and Space **Autumn Term Year A**

Working Scientifically:

Is there a pattern between the size of a planet and the time it takes to travel around the sun? **(pattern spotting)**

Researching evidence of life in space or Apollo missions **(researching using secondary sources)**

Enrichment:

Film: Hidden Figures (2016)

Prior Learning:

Observe changes across the four seasons.
Observe and describe weather associated with the seasons and how day length varies.
Forces and understanding the pulling force of gravity

Key Essential Skills and sticky knowledge:

- Planets are celestial objects that orbit a star like our solar system's Sun.
- Our solar system is currently believed to include eight planets: Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus and Neptune. In 2006 Pluto was reclassified as a 'dwarf planet'.
- The Sun is a hot ball of gas which is classified as a star. The Sun is placed at the centre of our solar system and makes life possible on Earth.
- The Moon is a celestial body which orbits the Earth. One orbit takes approximately a month (almost 28 days).
- We only see the part of the Moon that is lit by the sun which is why it appears to be different shapes at different times of the month.
- The moon is described as waxing as it gets larger from new moon to full moon. As the moon gets smaller from full moon to new moon it is described as waning.
- The Earth rotates on its axis, which stands on a 23.5˚ angle.
- The sun's rays hit the side of the Earth which faces the sun. This causes day and night. It takes the Earth 24 hours to make one complete spin on its axis.
- The Earth orbits the Sun. One orbit takes 365 days (a year)
- Gravity keeps the planets and moons in orbit

Topic Vocabulary:

orbit, solar system, astronomy, planet, rotation, spherical, crescent moon, gibbous moon, eclipse, lunar, heliocentric, waxing, waning, rotation, Mercury, Venus, Earth, Mars, Jupiter, Saturn , Uranus, Neptune

Sequence:

What do we know about our planet?
How do we know that the Earth is spherical?
How do we know that the Earth is spinning?
Why do we get day and night? Do the sun and stars really move across the sky?
Explain why the moon looks different each night.
Compare the size and movement of Earth with the other planets in our solar system.

Thinking Deeper:

Do you think there is, or ever has been, other life within space?
What do you think this life could realistically look like?
What do you think the future of humans in space might look like?

Books/Resources:

- Cosmic – Frank Cottrell Boyce
- Balloon to the Moon - Gill Arbuthnott

Links:

- Subject Specific links – Maths – data; History – space exploration
- Personal Development – working co-operatively within a team
- SMSC – to be able to discuss ideas and respect those of others
- Cultural Capital – to understand that countries are united in creating the space station and our country's participation sending astronauts
- Careers – jobs within NASA
- British Values – law – Can anyone travel to space? What laws are there to protect people?
- Equality – different people in space (men and women with different nationalities)
- Independence – Independent work
- Outdoor learning – Forest School

Year 5/6 Science: Physics - Forces: gravity, resistance, mechanisms **Autumn Term Year A**

Working Scientifically:

- Creating parachutes and investigating "How does the surface area of a parachute affect the time it takes to fall? **(fair test)**
- Do all objects fall through water in the same way? **(pattern seeking)**
- How does the surface area of a container affect the time it takes to sink? **(fair test)**

Enrichment:
Visitor: Science Bus (Malton Secondary School)

Prior Learning:
Compare how things move on different surfaces.
Notice that some forces need contact between two objects, but magnetic forces can act at a distance.
Observe how magnets attract or repel each other and attract some materials and not others.
Compare and group together a variety of everyday materials on the basis of whether they are attracted to a magnet, and identify some magnetic materials.
Describe magnets as having two poles.
Predict whether two magnets will attract or repel each other, depending on which poles are facing.

Key Essential Skills and sticky knowledge:

- Forces are pushes and pulls. These forces change the motion of an object.
- Gravity is the force that pulls objects to the centre of the Earth.
- Friction is a force between two surfaces. The greater the friction, the harder it is for the object to move. The less the friction, the easier the object will move.
- Air resistance pushes up on a parachute, opposing the force of gravity . This makes a parachute land more slowly.
- Water resistance is the friction that is created between water and an object that is moving through it.
- Some objects can move through water with less resistance if they are streamlined.
- A forcemeter measures force in Newtons (n)
- Mass is a measure of how much matter there is in an object, while weight is a measure of the size of the pull of gravity on the object
- Explain the findings of Sir Isaac Newton
- Levers, pulleys and gears allow a smaller force to have a greater effect

Topic Vocabulary: friction, gravity, air resistance, water resistance, levers, pulleys, gears, parachute, Isaac Newton, streamlined, upthrust, forcemeter

Sequence:
What is a force?
Theories of gravity
Why does an unsupported object fall towards Earth? Use an arrow model to show the direction of gravity and resistance forces. Identify whether forces are balanced or unbalanced
What affects the speed at which objects fall to Earth? Explain the difference between weight and mass
The effects of air and water resistance
How can a force be measured?

Thinking Deeper:
How would our world look and work if the strength of the Earth's gravitation pull changed?

Books/Resources:

- The Man Who Walked Between The Towers – Mordicai Gerstein

- A Sailing Boat in the Sky - Quentin Blake

Links:

- Subject Specific links – Maths – shape, measures; DT – gears, pulleys, levers
- Personal Development – Work cooperatively in a team; Problem solving
- SMSC – Social: ability to discuss and debate predictions, findings, methods
- Cultural Capital – Develop an understanding of how things work and move and an appreciation of the significance of when parachutes were used in WW11
- Careers – Designers of vehicles (boats, aeroplanes, cars etc), Engineer
- British Values – Laws linked to moving objects/speed etc
- Equality – linked to careers- equal opportunities of people working in design and engineering roles
- Independence – Independent working
- Outdoor learning – Forest School

Year 5/6 Science: Physics - Electricity **Spring Term Year A**

Working Scientifically:

- Systematically identifying the effect of changing one component at a time in a circuit **(fair testing)**
- How would you group electrical components and appliances based on what electricity makes them do? **(identifying, grouping and classifying)**

Enrichment:
STEM Fair

Prior Learning:
Identify common appliances that run on electricity
Construct a simple series electrical circuit, identifying and naming its basic parts, including cells, wires, bulbs, switches, and buzzers.
Identify whether or not a lamp will light in a simple series circuit, based on whether or not the lamp is part of a complete loop with a battery.
Recognise that a switch opens and closes a circuit and associate this with whether or not a lamp lights in a simple series circuit
Recognise some common conductors and insulators, and associate metals with being good conductors.

Key Essential Skills and sticky knowledge:

- We use scientific symbols to represent the components (parts) of a circuit.
- The brightness of a bulb or the loudness of a buzzer is affected by: the number of cells in a circuit, the voltage of the cells and the length of the wire
- The number of components in a circuit can affect how they function.
- The arrangement of components in a circuit can affect how they function (series/parallel).
- Makes and uses a simple switch to use in a series circuit and explains how the switch works, using the terms open switch and closed switch and that a switch can be placed anywhere in the circuit

Topic Vocabulary: socket, parallel circuit, series circuit, volts, current, voltage, motor, circuit diagram

Sequence:
What is in a circuit?
Draw circuit symbols and as a diagram
Investigate what affects a circuit
Make switches to conduct the electricity
Electricity dangers

Thinking Deeper: Children who have investigated the same components or similar questions compare their results. Are your findings similar? Is there a consensus that can be reached based on your results?

Books/Resources:

- Carrie's War - Nina Bawden
- Harry Potter - J.K Rowling

Links:

- Subject Specific links – Maths - measuring and collecting data; DT - making an electronic game
- Personal Development – electricity safety, not touching bare wires, wet hands, climbing pylons etc.

- SMSC – understanding consequences of actions and behaviours regarding operating electrical items irresponsibly or putting self or others in danger. Safe disposal of batteries
- Cultural Capital – visit to STEM Fair to see technology used and the variety of roles within.
- Careers – Electrician, manufacturers of electrical goods, designer of electrical goods.
- British Values – Respecting the environment and thinking of more green ways of producing electricity
- Equality – Sharing a sense of cohesion within the class by sharing and comparing results to inform their own.
- Independence – Independent working
- Outdoor learning – Forest School

Year 5/6 Science: Biology – Animals, including humans **Summer Term Year A**

Working Scientifically:

- Researching the gestation periods of other animals **(researching using secondary sources)**
- Recording the length and mass of a baby as it grows **(researching using secondary sources)**
- *Is there a link between a mammal's size and the length of its gestation period?* **(pattern seeking)**
- Investigating and measuring pulse rate during exercise **(pattern seeking)**
- Conducting research about diet and drugs **(researching using secondary sources)**
- Investigating a Pig's heart **(researching using secondary sources)**

Enrichment:

Science Bus (Malton Secondary School) and STEM Fair

Prior Learning:

Describe the importance for humans of exercise, eating the right amounts of different types of food, and hygiene

Identify that animals, including humans, need the right types and amount of nutrition, and that they cannot make their own food; they get nutrition from what they eat

Describe the simple functions of the basic parts of the digestive system in humans.

Identify the different types of teeth in humans and their simple functions.

Key Essential Skills and sticky knowledge:

- The main stages in the human life cycle are new born, infancy, childhood, early adulthood, middle adulthood, and late adulthood.
- Gestation period is the process in which babies grow inside their mother's body before they are born. and gestation periods differ between species.
- Puberty is the change that happens in late childhood and adolescence where the body starts to change because of hormones: Some changes include growth in height, more sweat, hair growth on arms and legs, under the armpits and on genitals, and growth in parts of the body such as male genitals and breasts.
- The circulatory system is made up of the heart, lungs and blood vessels and transports oxygen around the body
- Arteries carry oxygenated blood from the heart to the rest of the body.
- Veins carry deoxygenated blood from the body to the heart.
- Nutrients, water and waste are carried round the body in the circulatory system and exchanged via capillaries.
- The heart is composed of four chambers; the right atrium, the right ventricle, the left atrium and the left ventricle.
- Exercise helps to improve health by: removing fatty deposits from the body, toning muscles and reducing fat, and increasing fitness (ability to do high intensity activities for longer).
- When we exercise out pulse rate increases because our muscles are working hard and need more oxygen.
- Substances such as tobacco and alcohol can cause short-term and long-term effects

Topic Vocabulary:

foetus, infancy, adolescence, growth, gestation, hormones, life cycle, puberty, reproduction, circulatory system, veins, arteries, capillaries, heart rate, pulse, blood vessels, red blood cells, white blood cells, platelets, calories, birth, breeding, larva, marsupial, aorta, atrium, clinical trial, deoxygenated blood, rickets, scurvy, vena cava, ventricle

Sequence:

Lists and orders the changes as humans develop from birth to old age, e.g. baby, child, teenager, adult, elderly adult
Describes the differences in humans as they develop, relating to the following characteristics - height and weight, movement, speech, teeth, nutrition, excretion
Describes the changes experienced during puberty, e.g. change in body structure (i.e. broadening of the hips/shoulders, deepening of the voice, facial and pubic hair, development of the reproductive organs and the menstrual cycle) and change in emotions
What is the function of the circulatory system?
How are water and nutrients transported around the body?
What constitutes to having a healthy lifestyle?
What happens when we exercise?
What impact can drug, and alcohol have on the body?

Thinking Deeper:
Children deliver a poster presentation about the composition of blood and the function of the different blood cells.

Books/Resources:

- The Nowhere Emporium (link to human lifecycles)- Ross Mackenzie
- The 1000-Year-Old Boy - Ross Welford
- The Last Wild - Piers Torday
- Tarka the Otter - Henry Williamson
- Pig Heart Boy - Malorie Blackman
- Fastest Boy in the World - Elizabeth Laird

Links:

- Subject Specific links – Maths - measuring time and finding averages, display results in a table
- Personal Development – to encourage children to have a healthy lifestyle with a balanced diet and exercise.
- SMSC – discussing the need to give blood for our blood banks and how it can be used for those in need
- Cultural Capital – developing confidence to speak to peers delivering presentations
- Careers – nurses, cardiologists, engineers developing medical equipment, medical research
- British Values – rules of law regarding the drinking of alcohol, smoking and other substance use
- Equality – fostering a respect for the differences between the children and how all may not be as active/sporty as each other but engage in what each enjoys
- Independence – Independent working
- Outdoor learning – Forest School