

NC Purpose of Study

A high-quality science education provides the foundations for understanding the world through the specific disciplines of biology, chemistry and physics. Science has changed our lives and is vital to the world's future prosperity, and all pupils should be taught essential aspects of the knowledge, methods, processes and uses of science. Through building up a body of key foundational knowledge and concepts, pupils should be encouraged to recognise the power of rational explanation and develop a sense of excitement and curiosity about natural phenomena. They should be encouraged to understand how science can be used to explain what is occurring, predict how things will behave, and analyse causes.

Intent	Implementation	Impact
At Broadway Junior School we believe that a high quality science education provides the foundations for understanding the world through the specific disciplines of biology, chemistry and physics. Science has changed our lives and is vital to the world's future prosperity, and all pupils should be taught essential aspects of the knowledge, methods, processes and uses of science. Through building up a body of key foundational 'Big Ideas', pupils should be encouraged to recognise the power of rational explanation and develop a sense of excitement and curiosity about natural phenomena. They should be encouraged to understand how science can be used to explain what is occurring, predict how things will behave, and analyse causes. Science in our school is about developing children's ideas and ways of working that enable them to make sense of the world in which they live through investigation, as well as using and applying process skills. The staff here ensure that all children are exposed to high quality teaching and learning experiences, which allow children to explore their outdoor environment and locality, thus developing their scientific enquiry and investigative skills. They are immersed in scientific vocabulary, which aids children's knowledge and understanding not only of the topic they are studying, but of the world around them. We intend to provide all children regardless of ethnic origin, gender, class, aptitude or disability, with a broad and balanced science curriculum.	Teachers create a positive attitude to science learning within their classrooms and reinforce an expectation that all children are capable of achieving high standards in science. Our whole school approach to the teaching and learning of science involves the following: Science will be taught in planned and arranged blocks by the class teacher, to have a subject specific approach. This is a strategy to enable the achievement of a greater depth of knowledge. Through our planning, we involve problem solving opportunities that allow children to find out for themselves. Children are encouraged to ask their own questions and be given opportunities to use their scientific skills and research to discover the answers. This curiosity is celebrated within the classroom. Planning involves teachers creating engaging lessons, often involving high-quality resources to aid understanding of conceptual knowledge. Teachers use precise questioning in class to test conceptual knowledge and skills, and assess children regularly to identify those children with gaps in learning, so that all children keep up Teachers build upon the learning and skill development of the previous years. As the children's knowledge and understanding increases, and they become more proficient in selecting, using scientific equipment, collating and interpreting results, they become increasingly confident in their growing ability to come to conclusions based on real evidence. Working Scientifically skills are embedded into lessons to ensure these skills are being developed throughout the children's school career and new vocabulary and challenging concepts are introduced through direct teaching. This is developed through the years, in-keeping with the topics.	The impact and measure of this is to ensure children not only acquire the appropriate age related knowledge linked to the science curriculum, but also skills which equip them to progress from their starting points, and within their everyday lives. All children will have: - A wider variety of skills linked to both scientific knowledge and understanding, and scientific enquiry/investigative skills - A richer vocabulary which will enable to articulate their understanding of taught concepts - High aspirations, which will see them through to further study, work and a successful adult life.

Key Vocabulary

Circulatory system Heart Blood Blood vessels Arteries Veins Capillaries Oxygen Nutrients Carbon dioxide Organs Lungs Pulse Heart rate Exercise Diet Lifestyle Healthy Unhealthy Respiration Energy Red blood cells White blood cells Platelets Plasma

Knowledge	Skills
- Know that the human body has a circulatory system made up of the heart, blood and blood vessels. - Understand the role of blood in transporting oxygen, nutrients and waste products around the body. - Know the different types of blood vessels and their functions. - Understand that the heart is a muscular organ that pumps blood around the body. - Know the pathway of blood through the heart and the body. - Understand how diet and lifestyle choices can affect health. - Recognise the importance of exercise in maintaining a healthy body. - Understand that exercise affects heart rate because muscles need more oxygen and energy. - Know that scientific investigations can be used to measure changes in the human body.	- Identify and label parts of the circulatory system. - Use models to explain how the heart and blood vessels work. - Make predictions and plan scientific investigations. - Measure pulse rate accurately. - Record and analyse data using tables and graphs. - Identify patterns and relationships between exercise and heart rate. - Evaluate the reliability of results. - Use evidence to explain scientific ideas.

Enrichment Opportunities

- Invite a healthcare professional to discuss heart health.
- Create healthy lifestyle campaigns.
- Make blood using a range of different materials

Learning Objectives/End Points

Pupils will be able to:

- Explain the purpose of the circulatory system.
- Describe how blood moves around the body.
- Identify the function of the heart, blood and blood vessels.
- Explain how diet, exercise and lifestyle choices affect health.
- Describe how exercise changes heart rate.
- Plan and carry out a fair test involving heart rate.
- Use scientific evidence to explain the importance of a healthy lifestyle.

Key Questions/Learning Objectives/End Points

What is blood and what does it do? Identify the components of blood and explain their roles. Explain how blood transports substances around the body.	How does the heart work? Understand that the heart is a muscular pump. Explain how the heart moves blood around the body.	How does the circulatory system work? Describe the journey of blood through the heart, lungs and body. Explain the role of arteries, veins and capillaries.	How does diet and lifestyle affect the human body? Explore how choices such as diet, smoking, alcohol and sleep affect health. Explain why maintaining a healthy lifestyle is important.	How does exercise affect the body? Investigate changes to heart rate during and after exercise. Explain why the heart beats faster during physical activity.	How can we investigate the effect of exercise on heart rate? (TAPS Focused Assessment) Plan and carry out a fair test measuring heart rate after exercise. Use data to identify patterns and explain conclusions.
Blood and Blood Vessels – Explore the components of blood and the role of blood vessels. Use models and diagrams to investigate blood components. Children create explanations showing how blood transports oxygen and nutrients around the body.	The Heart – Understand the structure and function of the heart as a pump. Investigate a model of the heart and investigate how the chambers and valves help move blood in one direction.	The Human Circulatory System – Explore how the heart, blood and blood vessels work together. Trace the journey of blood through the body using diagrams. Label the circulatory system and explain its function.	Impact of Diet and Lifestyle – Explore how choices affect the circulatory system and overall health. Investigate healthy and unhealthy lifestyle choices. Create advice for maintaining a healthy heart.	Impact of Exercise – Explore how physical activity affects heart rate and the body. Measure pulse before and after different activities. Identify patterns and discuss why heart rate changes.	TAPS Focused Assessment – Heart Rate Investigation Children plan and carry out a scientific investigation into “How does exercise affect heart rate?” They choose an appropriate method, identify variables, measure pulse rate, record results, analyse patterns and evaluate the reliability of their findings.

Substantive Knowledge

- Humans have a circulatory system that transports substances around the body.
- The circulatory system is made up of the heart, blood and blood vessels.
- Blood transports oxygen, nutrients and water to cells and carries waste products such as carbon dioxide away.
- Blood is made up of red blood cells, white blood cells, platelets and plasma, each with different functions.

- Red blood cells carry oxygen around the body.
- White blood cells help fight infections.
- Platelets help blood clot and repair wounds.
- Plasma carries blood cells and dissolved substances around the body.
- The heart is a muscular organ that pumps blood around the body.
- The heart pumps blood to the lungs to collect oxygen and around the body to deliver oxygen and nutrients.
- Arteries carry blood away from the heart.
- Veins carry blood back towards the heart.
- Capillaries allow substances to move between blood and body tissues.

Careers

Linking Curriculum Learning to Careers

Discuss how the skills developed in this unit are used in a range of careers, including:

- Doctor
- Nurse
- Paramedic
- Cardiologist
- Physiotherapist
- Biomedical scientist
- Dietitian
- Sports scientist
- Healthcare assistant
- Pharmacist
- Medical Laboratory Technician
- Blood Science Technician
- Microbiologist
- Immunologist
- Pathologist
- Clinical Scientist
- Sports Scientist
- Exercise Physiologist
- Sports Therapist
- Strength and Conditioning Coach

Transferable skills such as Curiosity Observation Investigation Problem solving Teamwork Communication Research Organisation Attention to detail Classification Data handling Critical thinking Decision making Creativity Resilience Responsibility Confidence

Learning from Career and Labour Market Information

- Introduce pupils to the wide range of careers involved in understanding, monitoring and improving human health, including doctors, nurses, cardiologists, paramedics, physiotherapists, biomedical scientists, nutritionists and sports scientists.

Addressing the Needs of Each Pupil

- Provide varied opportunities through practical investigations, models, data collection, research, discussion, role play and health campaigns. Highlight that different strengths are valuable, including caring, communication, scientific thinking, practical skills, data analysis and teamwork.

Linking Curriculum Learning to Careers

- Connect the heart and circulatory system to cardiologists, cardiac nurses and surgeons; blood to biomedical scientists and haematologists; exercise and heart rate to sports scientists and physiotherapists; and diet and lifestyle to dietitians, nutritionists and public health professionals.

Encounters with Employers and Employees

- Invite a healthcare professional, nurse, paramedic, physiotherapist, sports scientist, dietitian or biomedical scientist to explain how they use knowledge of the human body in their work

Experiences of Workplaces

- Explore hospitals, GP surgeries, laboratories, sports science facilities, rehabilitation centres, pharmacies, universities and health centres through visits, photographs or virtual workplace tours.

Encounters with further and higher education

- Show how Science, Maths and English provide foundations for future study and training in medicine, nursing, biomedical science, physiotherapy, nutrition and sports science. Introduce university, college, apprenticeship and specialist training routes.