AJS Science Learning Journeys

Ashley Junior School

Intent

At Ashley Junior School, we intend that all children will develop the ability to work scientifically through a range of investigations that include practical experiments, hypothesising using existing knowledge and drawing conclusions from their observations. They will leave our school with excellent scientific knowledge and understanding in Primary Biology, Chemistry and Physics ready for their Secondary Education.

It is our aim that all children will:

- Have a passion for science and recognise its application in past, present and future technologies.
- Develop confidence and competence in various practical skills by taking the initiative in planning and carrying out scientific investigations.
- Solve challenging problems and report scientific findings through written, verbal and visual explanations.
- Through a range of activities, develop their skills in observation, identification, classification, interpretation of data, hypothesising, drawing conclusions and communicating scientifically.

Implementation

Our Science Curriculum follows the statutory requirements of the National Curriculum (2014). Each year group will study 4 or 5 Science topics as stated in our long-term planning (see appendix one).

The teaching content for Science follows the Hampshire Learning Journey model (see appendix two). In some instances, Science is the principle focus of a topic (e.g. Year 5: Earth and Space) whilst on other occasions being incorporated into a more cross-curricular topic such as the New Forest in Year 4.

To enable long-term retention of knowledge, when studying a similar topic in a later year group, teachers will provide the chance for children to activate their prior knowledge (see non-negotiables – appendix three). Working scientifically skills are taught through three main types npshire Guidance (shown below).

Age related expectations

ARE	Planning experiments	Conclusions	Using ideas to predict and hypothesise
Year 2	Change and measure	Accurately describes relationships between cause and effect	Uses ideas from the learning journey of that phase to accurately to predict and hypothesise, even if their prediction or hypothesis is 'known' to be incorrect.
Year 4	Change, measure and same	Accurately describes relationships between cause and effect in relationships between continuous variables	
Year 6	Change, measure and same and recognise when error makes conclusions unreliable and seeks ways to overcome error.	Accurately describes relationship between cause and effect in relationships between continuous variables and is able to use the data gathered to evaluate how sure they are about the relationship.	

As we have a resourced provision for children with moderate learning difficulties, some children in the school are working below KS2 expectations so the Year 2 requirements are applicable to them so included in the guidance for teachers.

Implementation (ctd)

Science is an important part of our cross-curricular learning with links to Mathematics, English, History, Geography, Music and Design and Technology. Children have the opportunity to:

- Represent data in graphs and use these to draw conclusions
- Research information using existing data from secondary sources
- Analyse existing data from secondary sources to hypothesise, predict and draw conclusions
- Create non-chronological reports to celebrate their knowledge gained at the end of a topics – e.g. Earth and Space report (Year 5)
- 'Write like a Scientist' using subject-specific vocabulary
- Study some 'great' scientists of the past such as Thomas Edison (Year 4 Sound) and Charles Darwin (Year 6 Evolution)

Implementation (ctd)

- Study landmark moments in Science from the past like the Moon Landings (Year 5 Earth and Space)
- Look at technological advancements in Science from the past (Year 3 Stone Age to Iron Age and Year 5 Ancient Civilisations (Shadoof – Ancient Egypt))
- Link Science to the local and wider environment (Year 4 New Forest and Year 6 Evolution) studying the human and physical geography and the human impact on the environment and habitats of wildlife
- Understand the Science of Music through the study of how sound is created
- Demonstrate their scientific understanding through projects in Design and Technology (Healthy Eating (Year 3) – prepare a sandwich / simple meal, which would provide the consumer with the main food groups; Sound (Year 4) – make a musical instrument using knowledge of sound).

Implementation (ctd)

In addition to their curriculum time, children will have the opportunity to engage in Science outside the classroom through the following provisions:

- Pupil Voice Environment Team: looking at our school's impact on the wider environment
- Forest Schools: the chance to engage with the local habitats of various wildlife
- Planting and Growing in the Quad Area: each class has a flower bed (or section of a flower bed if 3-form)
- Living Rainforest visit to Marwell Zoo
- Visiting Planetarium hosted at school
- New Forest visit incorporating research into the habitat of local wild animals linked to history and geography of the area.

Implementation (ctd)

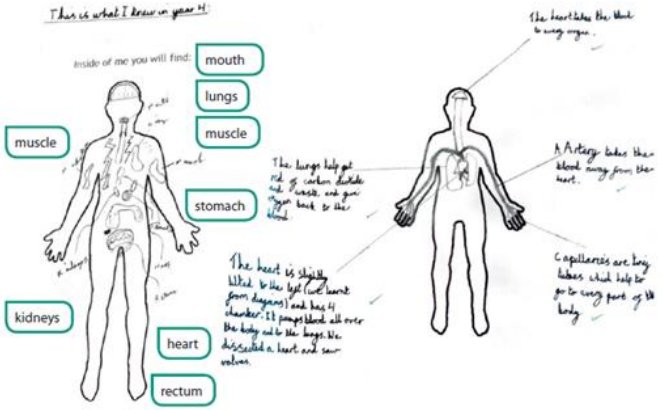
Teachers will be expected to provide opportunities for pupils to record their Science in a variety of ways choosing a method appropriate to the task. The focus should be on simpler ways of recording the Science so that writing does not become a barrier to lower-attaining writers engaging with scientific ideas, knowledge and processes. Example methods of recording could be: annotated diagrams, pictures, flow-charts, sentence frames, photographs of pupils work / experiments, sorting diagrams.

What follows are examples from the National Exemplification of Standards published by the DfE in 2018.

Understanding of the systems of the body:

Left – Lower KS2 - I can label parts of the digestive and skeletal systems.

Right – Upper KS2 – I can label parts of the circulatory system.

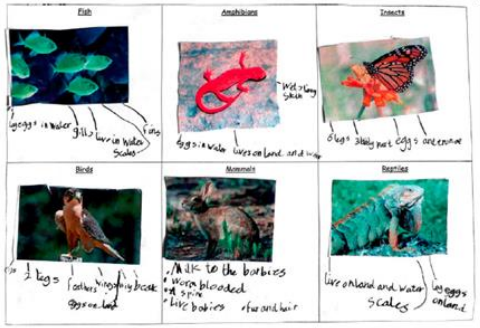


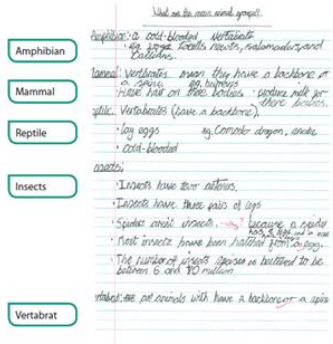
Implementation (ctd)

Year 6 – I can describe the effects of diet on the body. Here the impact of the food groups is described as well as what foods these can be found in, building on knowledge gained in Year 3. *Another column should be added to describe the effect of not having enough of these foods.*

Food Group	What does it do for the body?	Where to find it
Carbohydrates	They give you energy.	Pizza, Pasta, Potatoes and Parsnip
Proteins	They help repair the body.	Egg, Poultry, Fish and Beans
Fats	They give you energy.	Butter, Cream, Cheese and Milk
Fibre	They help you digest your food.	Brown rice, Apples, Barley and Oats
Vitamins	They are good for your skin, bones and teeth.	Oranges, Grapes, Apples and Lemon
Minerals	Magnesium is good for your nerves. Iron is good for blood. Calcium is good for your bones.	Magnesium= Banana and Okra Iron= Apricots and nuts Calcium= Spinach and Oyster

This is from Year 6 classifying animal groups. The facts are recorded in two different ways but still deemed representative of ARE.

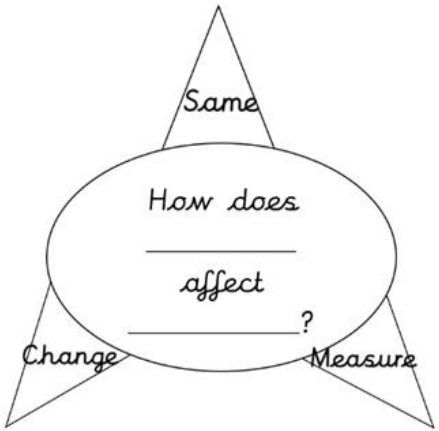




This is an example to show sufficient understanding of a key idea from the Year 6 Light topic around light travelling in straight lines and how humans see objects.

Implementation (ctd)

Recording of Science Experiments should be done using the Planning Mind-Map, with more formal scientific write-ups kept to a minimum in Upper School (Years 5 and 6).



The results of any experiments should be communicated through the subheadings:

- What did we observe?
- Why do we think this happened?
- How does this link to our scientific knowledge?

The degree of certainty regarding any possible relationships should be communicated using the language: certain, almost certain, not

Implementation (ctd)

During the Academic Year 2021-2022, a thorough review of the Science Curriculum at Ashley Junior School was carried out.

As part of this, new learning journeys were created for each topic to be studied. These ensure coverage of all the statutory content of the National Curriculum and must be followed by all teachers to ensure the children of Ashley Junior School receive they Science education they require to be successful in their education and when they move on to Secondary School.

Some of the WALTs are highlighted in pink and they represent lessons that must be taught whilst others are highlighted in green which represent lessons that could be used to demonstrate understanding at the end of the topic. It has been assumed that a half-term consists of six weeks on average so each topic has been planned for six lesson to fit an average half-term. It would be expected that if there is a longer half-term then the demonstration of understanding lessons (Green WALTs) would be incorporated into the learning journeys. This should also be the case if teachers decide a particular unit can be taught over two half-terms. In contrast, if there was to be shorter half-term, teachers must make carefully considered decisions about how to teach the topic but any WALTs highlighted pink must be taught as whole lessons. Other WALTs could be combined to make shorter inputs on each in this situation.

In line with other subjects at Ashley Junior School, teacher should bookend their units of study by asking pupils to complete the written sections on their learning journeys.

What follows are the Learning Journeys for each topic in full, in the form for pupils to write on and Year Group learning journeys for Working Scientifically to ensure the skills-based elements of the curriculum are covered as well.

Impact

By the end of their time at Ashley Junior School, children will be able to:

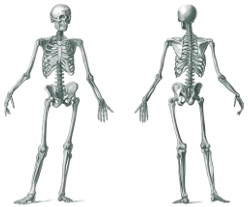
- Demonstrate a deeper understanding of a range of scientific ideas
- Ask meaningful questions about scientific phenomena and begin to answer them by exploring ideas and analysing relationships
- Use ideas and knowledge to predict how the world works and understand that scientific ideas have, and will, change over time
- Choose appropriate types of scientific enquiry from various options to answer a range of scientific questions
- Carry out a fair test
- Draw conclusions based on data, observations and a range of secondary sources supporting their ideas with evidence
- Read, spell, pronounce and use scientific vocabulary accurately

Animals Including Humans
Skeletons and Nutrition

3

Key Vocabulary

Nutrients
Carbohydrates
Proteins
Fats
Vitamins Minerals
Dairy
Balanced Diet
Vertebrates
Invertebrates
Joints
Muscles
Bones



WALT: demonstrate our knowledge of skeletons

WALT: explain how skeletons support movement

WALT: investigate how skeletons support weight

WALT: identify the vital organs protected by the skeletons of different animals

WALT: explore ways of humans getting the nutrients they need

WALT: identify the nutrients humans need to survive

WALT: recognise different animals need different foods to survive

Light

3

Key Vocabulary

Light
Dark
Opaque
Transparent
Translucent
Light Source

WALT: demonstrate our knowledge of light

WALT: investigate how the distance between the light source and the object affects the length of a shadow

WALT: explain how shadows are formed

WALT: choose the best material to block out light

WALT: classify objects that are opaque, translucent and transparent

WALT: identify different light sources

WALT: explain what light is and what is meant by darkness

Forces
Magnets

3

Key Vocabulary

Repel
Attract
North Pole
South Pole
Metal
Non-contact Force
Magnetic Strength

WALT: demonstrate our knowledge of how magnets work

WALT: identify factors which affect the strength of a magnet

WALT: investigate the strength of different magnets

WALT: describe the interaction between different types of magnet

WALT: explain the ideas of magnetic attraction and repulsion

WALT: observe how a magnet exerts its force on objects

WALT: identify magnetic materials

Plants

3

Key Vocabulary

Seed
Root
Stem
Leaves
Petal
Stamen
Stigma
Pollen
Seed Dispersal
Carbon Dioxide
Sugar
Energy

WALT: demonstrate our knowledge of how plants live and survive

WALT: explain how plants get their food

WALT: investigate the growth rate of different plants from their seeds

WALT: identify and explain the different ways plants disperse their seeds

WALT: explain the reasons behind similarities and differences between different plants

WALT: identify the parts of the plant involved in reproduction and explain their role

WALT: identify the different parts of a flowering plant

Rocks and Soils

3

Key Vocabulary

Sedimentary
Metamorphic
Igneous
Natural
Human-Made
Fossil

WALT: demonstrate our knowledge of how plants live and survive

WALT: use simple scientific equipment to observe the properties of soil

WALT: model how soil is formed

WALT: recognise how scientific discoveries change people's ideas

WALT: describe how fossils are formed

WALT: classify rocks by their features and properties

WALT: identify the features of the main three types of rock

Year 3

Rocks and Soils

An opportunity to reflect on the Working Scientifically objectives completed so far.

Plants

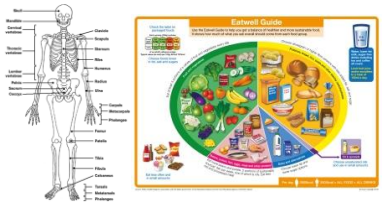
- Use results to draw simple conclusions, make predictions and raise further questions
- Report on findings from enquiries in various ways

Magnets

- Set up simple scientific enquiries, comparative and fair tests
- Gather, record, classify and present data in various ways

Light

- Recording findings using simple scientific language, diagrams and charts
- Make systematic and careful observations and where appropriate take accurate measurements



Animals Including Humans

- Identify differences, similarities or changes related to simple scientific ideas.
- Using straightforward scientific evidence to answer questions or support findings

- asking relevant questions and using different types of scientific enquiries to answer them

Science: Sound

4

Learning journey

WALT: explore ways to change the volume of sound.

WALT: explore ways to change pitch of sound.

WALT: determine means of absorbing sound waves.

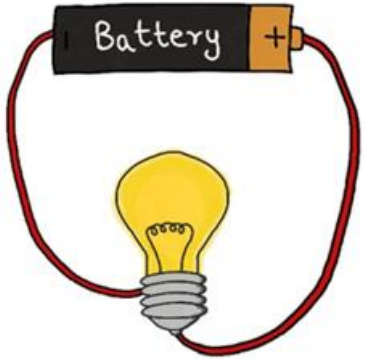
WALT: define sound waves and observe their changes over distances.

WALT: recognise how we hear sound.

WALT: Identify sounds.

Key Vocabulary

Sound Waves
Pitch
Volume
Vibration
Inner Ear
Outer Ear
Middle Ear
Cochlea



Science: Electricity

4

Learning Journey

WALT: identify objects which need electricity to work and how they use it

WALT: identify the role of the battery in a circuit

WALT: interpret why circuits work and don't work

WALT: observe the effect of running a battery over time on the effectiveness of a circuit

WALT: investigate how the number of batteries affects the brightness of a bulb

WALT: investigate which materials conduct electricity

Key Vocabulary

Battery / Cell
Bulb
Buzzer
Motor
Push
Current
Resistance

Science: States of Matter

4

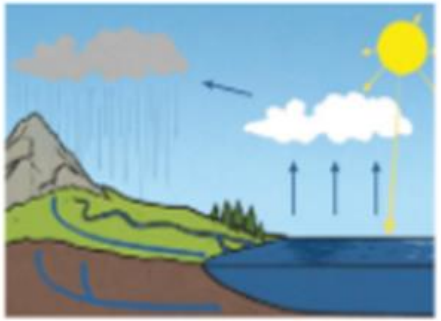
Key Vocabulary

Solid, Liquid, Gas
Melting
Freezing
Boiling
Condesation
Evaporation

WALT: identify and describe sta
of the water cycle

WALT: investigate how water evaporates

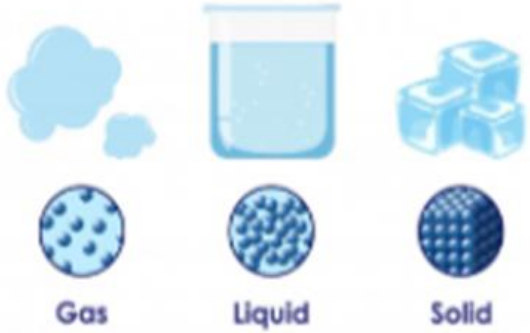
WALT: explore how water changes state



WALT: investigate materials as they change state

WALT: investigate gases and explain their properties

WALT: sort and describe
materials using states of matter



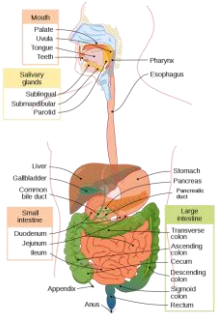
Key Vocabulary

Incisor
Canine
Molar
Wisdom Tooth
Oesophagus
Stomach
Intestine
Anus
Bloodstream
Nutrients
Balanced Diet
Variation

Animals Including Humans

Teeth and Digestion

4



WALT: demonstrate our knowledge of the human digestive system

WALT: model and explain how the human digestive system works

WALT: observe the effects of different liquids on materials and explain how they might affect our teeth

WALT: hypothesise about what different animal might eat based on their teeth

WALT: identify the different teeth humans have and their specific jobs

WALT: explain the importance of a balanced diet and discuss some reasons for variation

WALT: identify the different food groups and the nutrients they provide

Key Vocabulary

Habitat
Producer
Consumer
Food Chain
Seasons
Minibeast
Organism
Reptile
Amphibian
Mammal
Bird
Insect

Animals Including Humans
Living Things & Their Habitats

4

WALT: demonstrate our knowledge of how animals interact with their environment

WALT: consider the ways in which humans can impact the habitats of the local environment (links to PSHE)

WALT: hypothesise about what different changes to the habitat might do to the animal life within it

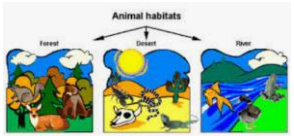
WALT: construct possible food chains based on our observations of the habitat

WALT: classify the different organisms that live in our local habitat

WALT: observe the different types of creatures in the school's habitat

WALT: identify the different features of a habitat in the school grounds

Year 4



Living Things and their Habitats

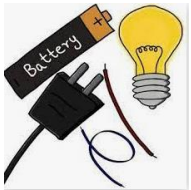
- An opportunity to reflect on the Working Scientifically objectives completed so far.

States of Matter

- Use results to draw simple conclusions, make predictions and raise further questions
- Report on findings from enquiries in various ways

Animals including Humans

- Identify differences, similarities or changes related to simple scientific ideas.
- Using straightforward scientific evidence to answer questions or support findings



Electricity

- Set up simple scientific enquiries, comparative and fair tests
- Gather, record, classify and present data in various ways

Sound

- Recording findings using simple scientific language, diagrams and charts
- Make systematic and careful observations and where appropriate take accurate measurements

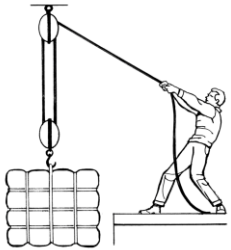
asking relevant questions and using different types of scientific enquiries to answer them

Pulleys and Levers

5

Key Vocabulary

Pulley
Lever
Fulcrum
Effort
Load



WALT: evaluate the success of my product (DT)

WALT: make a product that uses a pulley system (DT)

WALT: design a product that uses a pulley system (DT)

WALT: identify ancient levers (History) / identify different types of levers and pulley (DT)

WALT: observe how the position of the fulcrum changes the effort on a load (Science)

WALT: investigate / explore how a pulley and a lever work (Science)

WALT: investigate / explore why we use pulleys and levers (Science)

Forces
Forces and Movement

5

Key Vocabulary

Air Resistance
Water Resistance
Friction
Push and Pull
Visible and Invisible forces

WALT: compare the effects of air and water resistance

WALT: explain the effects of air resistance on an object

WALT: investigate the effects of air resistance on an object

WALT: explain the effects of water resistance on an object

WALT: investigate the effects of water resistance on an object

WALT: explain the effects of friction on an object

WALT: investigate the effects of friction on an object

Earth and Space

5

Key Vocabulary

Day and Night
Universe
Solar System
Planet
Satellite (Moon)
Stars

WALT: demonstrate our understanding of Planet Earth and the surrounding solar system

WALT: model and explain the effects of gravity in our solar system

WALT: describe the movement of the moon

WALT: explain the effects of earth's movement in space

WALT: predict facts and information about the planets of our solar system based on their position in the solar system

WALT: name and describe the features of the planets in our solar system

WALT: identify the 3 main types of planet in our solar system

Properties of Materials

5

Key Vocabulary

Mixture
Solution
Dissolve
Dissolution
Evaporation
Magnetism
Floating
Filtration

WALT: demonstrate our understanding of the different properties of mixtures

WALT: create our own simple systems for separating mixtures

WALT: separate mixtures

WALT: identify ways to separate mixtures

WALT: investigate the rate of dissolution of substances in water

WALT: identify substances that will dissolve in water

WALT: explain what is meant by the term mixture

Animals Including Humans
Life Cycles and the
Stages of Human Development

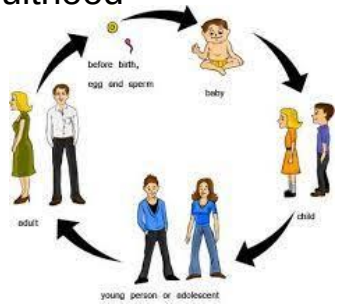
5

Key Vocabulary

Adult
Child / young
Puberty
Adolescent
Larva / larvae
Life cycle
Reproduction
Mammal
Insect
Bird

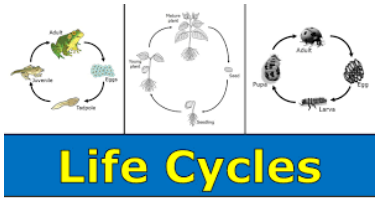
WALT: compare the human life cycle to other known life cycles

WALT: describe the changes in humans from childhood to adulthood



WALT: compare the similarities and differences between the stages of human development

WALT: identify the stages of human development from birth to old age



WALT: compare the stages of the cycle of an insect and an amphibian to that of a mammal

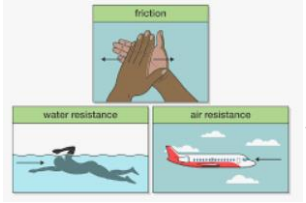
WALT: identify the stages of the life cycle of a mammal

WALT: identify the stages of the life cycle of a plant

Year 5

Life Cycles

An opportunity to reflect on the Working Scientifically objectives completed so far.



Materials: Reversible / Irreversible Changes

- Plan different types of scientific enquiry to answer questions including identifying variables
- Take measurements using a range of equipment repeating readings where necessary

Forces: Managing Forces

- Plan different types of scientific enquiry to answer questions including identifying variables
- Record data and results using a range of diagrams, charts and graphs
- Use test results to set up further comparative and fair tests

Earth and Space

- Identify scientific ideas that have been used to refute ideas or arguments
- Create scientific models to explain ideas

Forces: Pulleys

- Report and present findings from enquiries including written and oral presentation
- Explain causal relationships

Light

6

Key Vocabulary

Opaque
Translucent
Transparent
Complete Darkness
Light Lines
Image
Reflection
Refraction

WALT: demonstrate our knowledge of how light travels and helps us to see

WALT: investigate the opaqueness and translucence of different materials

WALT: explain how mirrors reflect light

WALT: investigate / explore how a prism changes a ray of light

WALT: describe refraction

WALT: identify objects light can and can't travel through

WALT: explain that light travels in straight lines

Electricity

6

Key Vocabulary

Current
Circuit Diagram
Voltage
Resistance
Power Supply
Device

WALT: demonstrate our understanding of electrical circuits

WALT: explain the effects of the flow of electric current

WALT: investigate the effect on a component when current flows

WALT: investigate how changing the voltage affects the current in a circuit

WALT: measure the voltage in a circuit

WALT: make a working circuit and draw a circuit diagram

Living Things and their Habitats

6

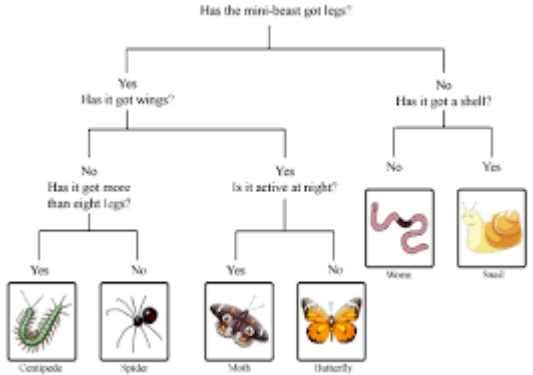
Key Vocabulary

Mammal
Amphibian
Bird
Insect
Reptile
Fish
Carnivore
Herbivore
Omnivore
Vertebrate
Invertebrate

WALT: design our own methods of classifying animals

WALT: recognise how new ideas in scientific research impact our understanding

WALT: create scientific models to explain ideas



WALT: describe different ways of classifying plants and animals using classification keys

Evolution

6

Key Vocabulary

Species
Genus
Natural Selection
Survival of the Fittest
Organism
Sexual / Asexual reproduction
Inheritance
Fossil

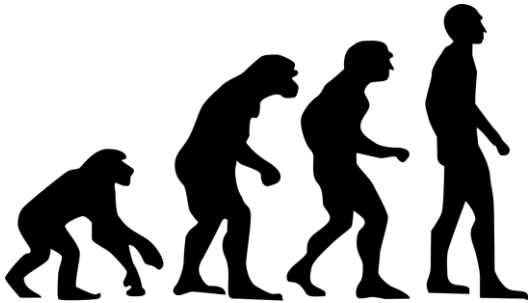
WALT: explain how animals and plants have adapted to the environment they live in

WALT: explain the differences between various life cycles

WALT: use the work of Charles Darwin to explain how evolution happens

WALT: explain how fossils show changes in species of animals over time

WALT: recognise how living things have changed over time



Animals Including Humans
Systems of the Human Body

6

Key Vocabulary

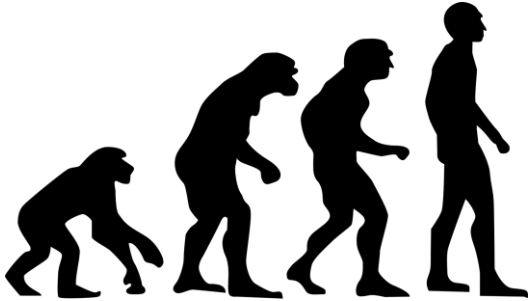
Heart
Artery
Vein
Capillary
Oxygen
Respiration
Muscles
Sugar

WALT: predict the effects of certain drugs or a bad diet on the human body (links to PSHE)

WALT: use the model of the human circulatory system to predict how other animals circulation might work

WALT: investigate the impact of exercise on our pulse rate

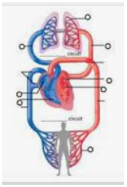
WALT: investigate how the size of persons affects their lung capacity



WALT: explain how the body uses oxygen

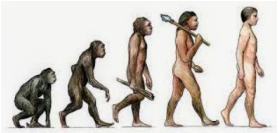
WALT: identify the different parts of the human circulatory system and describe their functions

Year 6



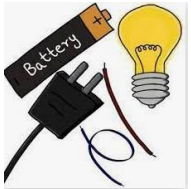
Body Systems

- Plan different types of scientific enquiry to answer questions including identifying variables
- Record data and results using a range of diagrams, charts and graphs
- Use test results to set up further comparative and fair tests



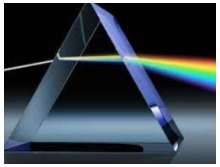
Evolution

- Identify scientific ideas that have been used to refute ideas or arguments
- Create scientific models to explain ideas



Electricity

- Plan different types of scientific enquiry to answer questions including identifying variables
- Take measurements using a range of equipment repeating readings where necessary



Light

- Report and present findings from enquiries including written and oral presentation
- Explain causal relationships