

**Emerging**

- Recognise hazard symbols found in the lab.
- Identify potential hazards during practical work.
- Understand basic lab safety guidelines.

**Developing**

- Name different lab equipment and their uses.
- Safely light Bunsen burners and understand the difference between blue and yellow flames.
- Safely heat water using appropriate equipment.

**Securing**

- Define and identify three types of variables in an experiment.
- Safely burn metals (magnesium, copper, and zinc) using a Bunsen burner and tongs.
- Complete a risk assessment for a practical experiment.
- Record observations during experiments.

**Mastery**

- Safely carry out a practical involving acids.
- Complete a risk assessment for an experiment involving universal indicator.
- Test for Oxygen, Carbon Dioxide, and Hydrogen.
- Identify unknown gases based on test results.

Next Topics / Links

Future required practical activities in all three sciences

Previous Knowledge / Links  
Year 6 induction day- work with Bunsen BurnersKey Words

Laboratory, Hazard, goggles, risk assessment, equipment, Bunsen, safely mat, tripod, beaker, test tube, boiling tube, test tube rack, Clamp, tongs, gauze, beaker, splint, conical flask

### Emerging

- Identify basic components of a microscope.
- recognise that living organisms are made of cells.
- List some substances that move into and out of cells.

### Developing

- Describe the function of each part of a microscope.
- Compare plant and animal cells.
- Explain the process of diffusion.
- Name some specialised cells.

### Securing

- Use a microscope to observe a prepared slide.
- Explain the functions of cell components.
- Prepare and observe cells on a microscope slide safely.
- Link the structure of specialised cells to their function.
- Describe the structure and function of unicellular organisms, such as amoeba and euglena.

### Mastery

- Calculate a range of magnifications when using a microscope.
- Analyse the similarities and differences between plant and animal cells in detail.
- Explain the structure-function relationship in specialised cells.
- Provide a detailed explanation of the process of diffusion and its importance in cells.

### Key Words

Cell membrane, Cell wall, Cytoplasm, Nucleus, Mitochondria, Ribosomes, Chloroplast, Chlorophyll, Vacuole, Specialised, Diffusion, Osmosis, Tissue, Organ, Prokaryote, Eukaryote, Adaptation, Palisade, Muscle, Concentration, Magnification, Differentiation

Knowledge | Comprehension | Application | Analysis | Evaluation | Creation

### Emerging

- Define tissues, organs, and organ systems with examples.
- Understand the basic structure of the gas exchange system.
- Recognise the role of the ribcage and diaphragm in breathing.
- Identify the relationship between bones and joints in the skeletal system.

### Developing

- Explain the hierarchy of organization in multicellular organisms using examples.
- Describe the gas exchange system and the adaptation of its parts.
- Explain how the ribcage and diaphragm lead to inhaling and exhaling.
- Understand the link between structure and function in the musculoskeletal system.
- Explain the function of joints and how they enable movement.

### Secure

- Explain how different tissues in an organ and different organs in an organ system function together.
- Interpret data to explain the difference in the composition of inhaled and exhaled air.
- Compare the bell jar model to the human breathing system.
- Predict the consequences of damage to a bone.
- Explain the relationship between forces required to move different masses.
- Carry out an experiment to record measurements of forces in newtons using the correct units.

### Mastery

- Interpret information to explain the functions of several organ systems.
- Use appropriately calibrated apparatus to obtain lung volume.
- Explain how muscle groups interact with other tissues to cause movement.
- Interpret observations in a chicken wing to explain how muscles work together to cause movement.
- Explain the necessity of having muscles in antagonistic pairs to cause movement.

Next Topics / Links

Year 8: Health and lifestyle, adaptations and inheritance and GCSE Biology.

Year 7 Cells.

Previous Knowledge / Links

### Key Words

Tissues, Organs, Organ systems, Hierarchy of organization, Multicellular organisms, Gas exchange system, Inhaled air, Exhaled air, Ribcage, Diaphragm, Inhaling, Exhaling, Lung volume, Bell jar model, Breathing system, Bones, Joints, Skeletal system, Musculoskeletal system, Structure, Function, Joint function, Forces, Newtons, Experiment, Muscle groups, Antagonistic pairs, Movement, Adaptation.

Knowledge | Comprehension | Application | Analysis | Evaluation | Creation

### Emerging

- Understand the concept of particles and their role in determining the properties of substances.
- Recognise the three states of matter: solid, liquid, and gas.
- Describe basic observations of melting, freezing, boiling, and evaporation.
- Identify examples of diffusion.

### Developing

- Explain why different substances have different properties in terms of particles.
- Compare the properties of a substance in its three states based on the arrangement and movement of particles.
- Explain melting and freezing in terms of changes to the energy of particles.
- Describe examples of diffusion and provide evidence for it.

### Secure

- Use models to investigate the relationship between the properties of a material and the arrangement of its particles.
- Explain the properties of solids, liquids, and gases based on the arrangement and movement of their particles.
- Draw annotated before and after diagrams of particles to explain observations about boiling and gas pressure.
- Explain differences between evaporation, sublimation, and boiling based on the arrangement and movement of particles.
- Control variables in an evaporation and diffusion investigation to provide evidence for a conclusion.

### Mastery

- Explain properties, such as density, based on the arrangement and mass of particles.
- Explain why there is a period of constant temperature during melting and freezing based on the arrangements and movement of particles and energy transfers.
- Explain unfamiliar observations about gas pressure in terms of particles.
- Predict what will happen to gas pressure as conditions are changed in terms of particles and their energy.
- Collect, analyse, and draw a conclusion from primary data providing evidence for gas pressure.

Next Topics / Links

Year 8 Chemical reactions, separation techniques and all three GCSE Sciences.

KS2: States of matter and Year 7 Lab Safety.

Previous Knowledge / Links

### Key Words

Particles, Properties, Materials, Arrangement, Mass, Density, States of matter, Solids, Liquids, Gases, Melting, Freezing, Boiling, Evaporation, Condensation, Sublimation, Energy transfers, Constant temperature, Diffusion, Gas pressure, Particle diagrams, Annotated diagrams, Primary data, Observations, Conclusions, Variables, Control, Investigation.

**Emerging**

- Describe what forces do.
- Identify contact and non-contact forces.
- Recognise familiar situations of balanced and unbalanced forces.
- State an example of a force deforming an object.
- Identify examples of drag forces and friction.

**Developing**

- Describe what interaction pairs mean and identify them in simple situations.
- Recognise an equilibrium and describe situations that are in equilibrium.
- Draw a force diagram for a problem involving gravity.
- Recognise a 'normal' force.
- Use Hooke's law to predict the extension of a spring.
- Explain why drag forces and friction arise.

**Secure**

- Identify interaction pairs in complex situations.
- Calculate resultant forces and describe the link between resultant force and the motion of objects.
- Present data in a graph and identify a quantitative relationship in the pattern.
- Describe what is happening to a moving object when the resultant force is zero.
- Plan and carry out an experiment to investigate friction, selecting suitable equipment.
- State the law of moments and calculate the moment of a force.

**Mastery**

- Make predictions about pairs of forces acting in unfamiliar situations.
- Explain why the speed or direction of motion of objects can change using force arrows.
- Apply the concept of moments to everyday situations.
- Use calculations to explain situations involving moments.

**Key Words**

Forces, Contact forces, Non-contact forces, Interaction pairs, Balanced forces, Unbalanced forces, Equilibrium, Gravity, Force diagrams, Resultant forces, Motion, Speed, Direction, Deformation, Normal force, Hooke's law, Spring extension, Drag forces, Friction, Moving objects, Moments, Law of moments, Calculations, Experiments, Predictions, Quantitative relationships, Force arrows.

**Emerging**

- Describe how sound is produced and travels.
- Define amplitude, frequency, and wavelength.
- Define auditory range and state the auditory range in humans.
- Name some parts of the ear and describe how the ear works.
- Define frequency, amplitude, and ultrasonic.

**Developing**

- Compare and contrast the speed of sound and light.
- Describe the link between amplitude and loudness using diagrams.
- Describe the link between frequency and pitch.
- Describe how your hearing can be damaged.
- Describe how an echo is created.

**Secure**

- Explain observations where sound is transmitted by different media.
- Explain what happens when sound goes through matter or hits a boundary.
- Describe how to find the amplitude and frequency of a wave from an oscilloscope trace.
- Using data, predict how sounds will be differently heard by animals.
- Explain, in detail, risks of hearing damage linked to sound level and time of exposure.
- Explain using a diagram why a person might hear an echo.

**Mastery**

- Compare the time for sound to travel in different materials using data given.
- Explain what is meant by supersonic travel and whether sound waves from the Sun can reach the Earth.
- Compare and contrast waves of different frequency using diagrams.
- Explain in terms of frequency why we use ultrasound for cleaning, physiotherapy, and imaging.

**Key Words**

Sound, Sound production, Sound waves, Amplitude, Frequency, Wavelength, Speed of sound, Speed of light, Auditory range, Human hearing, Ear, Hearing damage, Ultrasound, Oscilloscope trace, Supersonic travel, Echo, Pitch, Loudness, Sound transmission, Sound levels, Exposure time, Boundaries, Different media, Animals, Diagrams, Risks, Comparisons, Contrasts, Predictions, Cleaning, Physiotherapy, Imaging.

### Emerging

- Define adolescence, puberty, and basic terms related to human reproduction.
- Identify the primary male and female reproductive organs.
- Understand the concepts of fertilization, infertility, and gestation.
- recognise the basic structure of a flower and its role in plant reproduction.

### Developing

- Describe the main changes during puberty in males and females.
- Explain the functions of the main structures in the male and female reproductive systems.
- Describe the process of fertilization and the formation of an embryo.
- Understand the effects of external substances on a developing fetus.
- Identify key events in the menstrual cycle and their relation to pregnancy.
- Describe the process of pollination and differences between wind and insect pollinated plants.
- Explain seed germination and the formation of seeds and fruits in plants.

### Secure

- Interpret observations to categorize and explain physical and emotional changes during adolescence.
- Extract information from text to explain structures and functions of reproductive systems in a table.
- Use diagrams to show the main steps from the production of sex cells to the formation of an embryo.
- Explain whether substances are passed from the mother to the fetus and predict their effects.
- Present information about the menstrual cycle in a graphical way.
- Link the structure of flowers to their functions.
- Make and record observations in a table, calculating percentage germination.

### Mastery

- Discuss causes of infertility and their treatments.
- Explain why pregnancy is more or less likely at certain stages of the menstrual cycle.
- Suggest how plant breeders use knowledge of pollination for selective breeding.
- Explain how the adaptations of seeds aid in their dispersal.
- Develop an argument for how a particular plant structure increases the likelihood of successful offspring production.
- Plan and design an experiment to test a hypothesis about seed dispersal, explaining all variables involved

### Key Words

Adolescence, Puberty, Male reproductive system, Female reproductive system, Gametes, Fertilization, Infertility, Embryo, Gestation, Pregnancy, Menstrual cycle, Pollination, Wind pollination, Insect pollination, Flower, Stamen, Pistil, Petal, Sepal, Ovary, Ovule, Anther, Filament, Style, Stigma, Seed, Fruit, Germination. Seed dispersal, Adaptations, Selective breeding, External substances. Cigarette, Alcohol, Drugs, Experiment, Hypothesis, Variables.

Knowledge | Comprehension | Application | Analysis | Evaluation | Creation

**Emerging**

- State what an element is and provide examples.
- Define an atom and illustrate it using particle diagrams.
- Define a compound and differentiate it from elements.
- recognise simple compounds using their chemical formulae.
- Understand what a polymer is and identify some common uses.

**Developing**

- Write down the chemical symbols of 16 chemical elements and match them with their names.
- Represent elements, mixtures, and compounds using particle diagrams.
- Name simple compounds using their chemical formulae and deduce patterns in similar compounds.
- Describe the structure of a polymer and explain how its properties make it suitable for specific uses.

**Secure**

- Discuss the advantages of using the same chemical symbols in all languages.
- Compare the properties of an atom of an element to the properties of many atoms together (bulk properties) and estimate the number of atoms in a sample.
- Compare the properties of a compound to the properties of the elements whose atoms it contains and explain the differences between elements and compounds.
- Given the relative masses of atoms, find the element whose atoms contribute the greatest mass to the compound.
- Explain how polymer properties depend on their molecular structure and compare the properties of different polymers.

**Mastery**

- Use particle diagrams to represent elements, mixtures, and compounds in various scenarios.
- Suggest formulae for unfamiliar compounds based on patterns observed in similar compounds.
- Analyse the properties of polymers and relate them to their specific uses, as well as compare and contrast the properties of different polymers.
- Apply knowledge of elements, compounds, and polymers to solve problems and make predictions in unfamiliar situations.

**Next Topics / Links**Year 8: Chemical reactions, Separating substances and Acids and Alkalis.  
GCSE Chemistry and Physics

Year 7: Particles and their behaviour

**Previous Knowledge / Links****Key Words**

Elements, atoms, compounds, chemical symbols, particle diagrams, mixtures, bulk properties, chemical formulae, polymers, polymer structure, molecular structure, polymer properties, relative masses, patterns.



**Emerging**

- Describe what happens when light interacts with materials.
- State the speed of light.
- Explain how images are formed in a plane mirror using a ray diagram.
- Describe what happens when light is refracted.
- Name some parts of the eye.
- State what happens to light when it passes through a prism.

**Developing**

- Explain how ray diagrams can explain the formation of shadows.
- Explain the difference between specular and diffuse reflection.
- State a difference between what happens to light when it goes through a convex lens and a concave lens.
- Name the lens to correct short sight and the lens used to correct long sight.
- State the difference between colours of light in terms of frequency.

**Secure**

- Use ray diagrams to describe what observers see during an eclipse.
- Use appropriate equipment to take readings safely (without help).
- Use ray diagrams to show what happens when light travels through a transparent block.
- Describe how lenses correct short-sight and long-sight.
- Explain what happens to light when it passes through a prism.
- Explain how filters and coloured materials subtract light.

**Mastery**

- Use ray diagrams to show what happens when light travels through a convex or concave lens.
- Record observations using labeled diagrams and apply this to other situations.
- Predict how coloured objects will appear given different coloured lights and filters.
- Explain the formation of secondary colours and predict the colours of objects in lights of secondary colours, giving a reason for the prediction.

**Key Words**

Light, Interaction, Materials, Speed of light, Ray diagrams, Shadows, Eclipse, Plane mirror, Image formation, Specular reflection, Diffuse reflection, Refraction, Convex lens, Concave lens, Transparent block, Eye, Short-sight, Long-sight, Prism, Colours, Frequency, Filters, Coloured materials, Secondary colours, Predictions, Observations, Labelled diagrams.