**KS3 Science Curriculum Plan**

**Year 7**

**Autumn Term**

1. **Introduction to Science**
   * **Key Topics**:
     + The role of science in everyday life
     + The nature of scientific enquiry
     + Scientific method: hypothesis, experimentation, observation, conclusion
     + Safety in the laboratory and appropriate use of equipment
     + Introduction to data analysis (tables, graphs, and interpreting results)
   * **Practical Activities**:
     + Conducting simple experiments (e.g., measuring temperature changes, creating a simple graph)
     + Safety demonstration and creating a lab safety poster
     + Experimenting with variables (e.g., testing the effect of light on plant growth)
2. **Biology: Cells and Organisation**
   * **Key Topics**:
     + Structure and function of plant and animal cells (nucleus, cytoplasm, cell membrane, mitochondria, chloroplasts)
     + Microscopes and preparing slides
     + Differences between unicellular and multicellular organisms
     + Introduction to tissues, organs, and organ systems (e.g., digestive, respiratory)
     + Basic introduction to stem cells
   * **Practical Activities**:
     + Using microscopes to observe animal and plant cells
     + Preparing slides of onion skin, cheek cells, or leaf cells
     + Identifying different types of cells and organelles under the microscope
     + Creating 3D models of plant and animal cells
3. **Chemistry: Particles and States of Matter**
   * **Key Topics**:
     + The particle model of matter (solid, liquid, gas)
     + Properties of solids, liquids, and gases
     + Changes of state: melting, freezing, boiling, condensation
     + Introduction to diffusion and how particles move
     + Temperature and how it affects the movement of particles
   * **Practical Activities**:
     + Observing the change of state of water (melting, freezing, and boiling)
     + Measuring the time, it takes for different substances to diffuse (e.g., using food colouring in water)
     + Investigating the effects of temperature on the rate of diffusion

**Spring Term**

1. **Physics: Forces and Motion**
   * **Key Topics**:
     + Types of forces: gravitational, frictional, air resistance, upthrust
     + Contact and non-contact forces
     + Force and motion: speed, velocity, and acceleration
     + Calculating speed (distance/time)
     + Balanced vs unbalanced forces and their effect on motion
   * **Practical Activities**:
     + Measuring the force of gravity using a spring balance
     + Investigating the effects of friction on different surfaces
     + Speed calculations using toy cars and ramps (distance/time)
     + Using force meters to measure forces in tug-of-war experiments
2. **Biology: Animal Nutrition and Digestion**
   * **Key Topics**:
     + The structure of the human digestive system (mouth, esophagus, stomach, small intestine, large intestine)
     + Functions of enzymes in digestion (amylase, lipase, protease)
     + The process of digestion: mechanical and chemical digestion
     + The importance of a balanced diet (carbohydrates, fats, proteins, vitamins, minerals)
     + Common food tests (e.g., Benedict’s test, iodine test, Biuret test, emulsion test)
   * **Practical Activities**:
     + Conducting food tests on different foods (testing for starch, sugar, proteins, and fats)
     + Investigating the role of enzymes in digestion by simulating enzymatic action (e.g., breaking down starch with amylase)
     + Observing the effects of digestion in a model digestive system (using plastic bottles, tubing, and food samples)

**Summer Term**

1. **Chemistry: Acids and Alkalis**
   * **Key Topics**:
     + Properties of acids and alkalis
     + The pH scale and universal indicator
     + Neutralisation reactions
     + Common acids and alkalis (e.g., hydrochloric acid, sulfuric acid, sodium hydroxide, ammonia)
     + Practical applications of acids and alkalis in everyday life (e.g., cleaning, digestion)
   * **Practical Activities**:
     + Testing the pH of various substances using universal indicator
     + Performing neutralization reactions (e.g., mixing an acid with an alkali to form salt and water)
     + Investigating the effect of acids on different materials (e.g., marble chips and hydrochloric acid)
2. **Physics: Light and Sound**
   * **Key Topics**:
     + Properties of light: reflection, refraction, and absorption
     + The behaviour of light through lenses and mirrors (concave and convex)
     + The human eye and how it perceives light
     + Sound waves: how sound travels through different mediums
     + The speed of sound and frequency (pitch and volume)
   * **Practical Activities**:
     + Investigating reflection using mirrors
     + Creating a simple periscope and discussing how light travels
     + Experimenting with sound using tuning forks and measuring the pitch
     + Investigating how sound travels through different materials (e.g., air, water, solids)

**Year 8**

**Autumn Term**

1. **Biology: Reproduction**
   * **Key Topics**:
     + The male and female reproductive organs in humans
     + Menstrual cycle and puberty
     + Sexual vs asexual reproduction in animals and plants
     + Fertilization and early development (embryo, foetus)
     + Flowering plants and pollination
   * **Practical Activities**:
     + Studying the human reproductive system (using models or diagrams)
     + Investigating plant reproduction (pollination, fertilization, seed dispersal)
     + Growing and observing plants from seed to flowering
2. **Chemistry: Elements, Atoms, and Compounds**
   * **Key Topics**:
     + Structure of an atom (protons, neutrons, electrons)
     + The periodic table and element groups (metals, non-metals, noble gases)
     + Introduction to isotopes
     + Chemical bonding: ionic bonds, covalent bonds
     + Formation of compounds (e.g., sodium chloride, carbon dioxide)
   * **Practical Activities**:
     + Building atomic models using coloured balls (representing protons, neutrons, electrons)
     + Investigating simple chemical reactions (e.g., salt formation)
     + Using periodic tables to identify element groups and trends

**Spring Term**

1. **Physics: Energy**
   * **Key Topics**:
     + Types of energy: kinetic, potential, thermal, chemical, electrical
     + Energy transfer: conduction, convection, and radiation
     + Conservation of energy (energy cannot be created or destroyed, only transformed)
     + Energy efficiency and energy resources (renewable and non-renewable)
   * **Practical Activities**:
     + Measuring energy transfer in different materials (thermal conductivity)
     + Calculating energy efficiency using practical experiments (e.g., heating a container of water)
     + Using simple machines (levers, pulleys) to demonstrate energy transfer
2. **Biology: Ecosystems and Adaptation**
   * **Key Topics**:
     + Ecosystems and biomes: forest, desert, ocean, tundra
     + Food chains and food webs
     + Adaptations in plants and animals (structural, behavioural, functional)
     + The role of decomposers in ecosystems
     + Human impact on ecosystems: pollution, deforestation, climate change
   * **Practical Activities**:
     + Constructing food chains and webs
     + Examining local ecosystems (school grounds, parks) and identifying biotic and abiotic factors
     + Studying adaptations in animals (e.g., camouflage in insects)

**Summer Term**

1. **Chemistry: Chemical Reactions**
   * **Key Topics**:
     + Types of reactions: combustion, neutralization, displacement, and decomposition
     + Conservation of mass in reactions
     + Reactivity series and how to predict reactivity
     + Endothermic and exothermic reactions
   * **Practical Activities**:
     + Investigating the reaction between metals and acids
     + Measuring temperature changes in reactions (endothermic vs exothermic)
     + Decomposition reactions (e.g., heating copper carbonate)
2. **Physics: Electricity and Magnetism**
   * **Key Topics**:
     + Electric circuits: components, circuits in series and parallel, current and voltage
     + Resistance and Ohm’s Law
     + Magnetism and magnetic fields
     + Electromagnetic fields and their applications (e.g., motors, electromagnets)
   * **Practical Activities**:
     + Constructing and analysing electrical circuits (series and parallel)
     + Investigating the effect of resistance in a circuit (using different resistors)
     + Building simple electromagnets and testing their strength

**Year 9**

**Autumn Term**

1. **Biology: Genetics and Evolution**
   * **Key Topics**:
     + DNA structure and genetic inheritance
     + Genes, alleles, chromosomes, dominant and recessive traits
     + Mutation and variation
     + Evolution and natural selection (Darwin’s theory)
     + Genetic engineering and cloning
   * **Practical Activities**:
     + Investigating inherited traits in pea plants
     + Creating family trees to trace genetic traits
     + Studying the impact of mutations using model organisms (e.g., fruit flies)
2. **Chemistry: The Periodic Table and Group Chemistry**
   * **Key Topics**:
     + Detailed study of the periodic table (groups, periods, trends in reactivity)
     + Properties of alkali metals, halogens, and noble gases
     + Transition metals and their properties
     + Chemical reactions within groups (e.g., alkali metals with water)
   * **Practical Activities**:
     + Investigating the reactivity of alkali metals with water
     + Demonstrating displacement reactions in halogens

**Spring Term**

1. **Physics: Forces and Energy (Advanced)**
   * **Key Topics**:
     + Newton’s Laws of Motion
     + Calculating work and energy (work = force × distance)
     + Kinetic and potential energy calculations
     + Energy conservation and transfer (potential energy, mechanical advantage)
   * **Practical Activities**:
     + Investigating how forces affect motion using toy cars and ramps
     + Measuring work done in lifting objects
     + Exploring energy conversions in simple machines (e.g., pulleys)
2. **Biology: Health and Disease**
   * **Key Topics**:
     + Pathogens: bacteria, viruses, fungi, and parasites
     + The immune system and vaccination
     + Antibiotics and resistance
     + The impact of lifestyle choices (e.g., diet, exercise, smoking)
     + Non-communicable diseases (e.g., cancer, heart disease)
   * **Practical Activities**:
     + Investigating the effect of antibiotics on bacterial growth (agar plate experiments)
     + Studying the human circulatory system with diagrams or models
     + Simulating disease transmission using models (e.g., spreading “germs” using water or dye)

**Summer Term**

1. **Chemistry: Materials and Their Properties**
   * **Key Topics**:
     + Physical and chemical properties of materials
     + Materials and their uses: metals, plastics, ceramics, and composites
     + Properties related to strength, conductivity, and flexibility
   * **Practical Activities**:
     + Investigating the conductivity of different materials
     + Testing the strength of materials (tensile testing)
     + Exploring the properties of polymers and plastics
2. **Physics: Space and Astronomy**
   * **Key Topics**:
     + The solar system and beyond (planets, stars, moons, comets)
     + Gravity and planetary motion
     + The life cycle of stars (formation, main sequence, supernova, black holes)
     + Space exploration technologies and history
   * **Practical Activities**:
     + Model of the solar system
     + Investigating the effects of gravity using falling objects
     + Creating a timeline of key space missions

**Assessment**

* **Formative assessments**:
  + Regular quizzes, quick-fire tests, group discussions, peer assessments, and practical investigations.
* **Summative assessments**:
  + End-of-topic tests, practical assessments, and an end-of-year exam.
* **Practical Skills Assessments**:
  + Evaluations of students’ ability to conduct experiments, follow safety protocols, and report findings.

This curriculum plan ensures thorough coverage of all required topics, fosters scientific inquiry, and balances both theoretical knowledge with hands-on experience. The progression of content prepares students for future learning in science, and the use of practical experiments helps reinforce key scientific concepts.