Year 10 Physics Learning Journey

Molecules and Matter

Autumn Term 1

Core knowledge
1. Describe the arrangement of particles in a solid, a liquid, and a gas.
2. Explain why the mass of a substance that changes state stays the same.
3. Write down what the melting point of and the boiling point of a substance mean.
4. Describe the different changes of states.
5. Use a temperature-time graph to find the melting point or the boiling point of a substance.
6. Explain the different properties of a solid, a liquid, and a gas.
7. Describe how increasing the temperate of a substance affects its internal energy.
8. Describe how a gas exerts pressure on a surface.
9. Describe and explain how changing the temperature of a gas in a sealed container affects the pressure of the gas.
10. Define density.
11. Use the density equation to calculate the mass or the volume of an object or a sample.
12. **Required Practical**: Measure the mass and volume of objects and liquids and calculate their densities using the density equation.
13. Define specific heat capacity.
14. Use and manipulate the specific heat capacity equation to calculate energy/mass/temperature change/specific heat capacity given the others.
15. **Required Practical**: Determine the SHC of a metal block of known mass by measuring the energy transferred to the block and its temperature rise.
16. Define the terms specific latent heat, latent heat of fusion, latent heat of vaporisation.
17. Use the equation E=mL to calculate mass, specific latent heat or energy.
18. Describe and explain how energy is transferred by conduction in materials.
19. Describe ways to reduce unwanted energy transfers.

Learning Checkpoints

Learning Checkpoint Title	Attempt 1		Attempt 2/ Extend	
	Mark	RAG	Mark	RAG

Key Vocabulary:
Tier 2 – particle, model, properties, thermal, calculate, describe, investigate, energy
Tier 3 – sublimation, pressure, bonds, specific heat, latent heat, conduction

Year 10 Physics Learning Journey

Radioactivity

Autumn Term 2

Core knowledge
1. Name the three types of nuclear radiation.
2. Name the three sub-atomic particles found in an atom
3. Describe some safety precautions used when dealing with radioactive materials.
4. Describe how a Geiger counter can be used to detect radiation.
5. Identify natural and man-made sources of background radiation.
6. Compare the plum pudding model and the nuclear model of the atom.
7. Describe the evidence provided by the Rutherford scattering experiment.
8. Describe the properties of protons, neutrons, and electrons.
9. Identify the mass and atomic number by using nuclear notation.
10. Calculate the number of neutrons in an isotope by using nuclear notation.
11. Describe the differences between isotopes.
12. Identify the type of decay taking place from a nuclear equation.
13. Complete decay equations for alpha and beta decay.
14. Rank the three types of nuclear radiation in order of their penetrating power and range in air.
15. Describe how the penetrating powers of radiation can be measured.
16. Describe the path of radiation types through a magnetic field.
17. Describe the process of ionisation.
18. Define half-life.
19. Find the ratio of a sample remaining after a given number of half-lives.
20. Plot a graph showing the decay of a sample and use it to determine half-life.

Learning Checkpoints

Learning Checkpoint Title	Attempt 1		Attempt 2/ Extend	
	Mark	RAG	Mark	RAG

Key Vocabulary:
Tier 2 – define, mass, compare, plot, calculate, describe, investigate, penetrate
Tier 3 – nucleus, radiation, alpha, beta, gamma, ionising, half-life, activity, count rate, decay

Year 10 Physics Learning Journey

Changes in energy

Spring Term 1

Core knowledge
1. Describe a wide range of energy stores in different contexts.
2. Describe changes in energy stores in terms of the process that causes the change.
3. Use quantitative descriptions of changes in energy stores.
4. State and apply the law of conservation of energy in straightforward situations.
5. State the factors that affect the change in the gravitational potential energy store of a system.
6. Calculate the gravitational potential energy store of a system using the mass gravitational field strength, and height.
7. State the factors that affect the size of a kinetic energy store of an object.
8. Calculate the kinetic energy store of an object.
9. State the factors that affect the elastic potential energy store of a spring.
10. Calculate the elastic potential energy store of a stretched spring.
11. Describe energy transfers involving elastic potential energy and kinetic energy stores.

Learning Checkpoints

Learning Checkpoint Title	Attempt 1		Attempt 2/ Extend	
	Mark	RAG	Mark	RAG

Key Vocabulary:
Tier 2 – apply, state, calculate, dissipation, rank, store, conserve
Tier 3 – gravity, thermal, nuclear, electrostatic, magnetic, energy conservation, kinetic, compression, extension, elastic potential energy,

Year 10 Physics Learning Journey

Electrical Circuits

Spring 1 and 2

Core knowledge
1. Label the constituents on an atom (proton, neutron, and electron) on a diagram.
2. Describe how objects become charged in terms of electron transfer.
3. Identify circuit components from their symbols.
4. Construct a simple electrical circuit.
5. Describe the operation of a variable resistor and a diode and their effects on current.
6. Perform a range of calculations, including rearrangement of the equation $Q=It$.
7. Measure the current in a circuit accurately and use it to calculate the rate of flow of electrons.
8. Define resistance.
9. State Ohm's law and describe its conditions.
10. Calculate the resistance of a component.
11. **Required Practical**: Measure the effect of changing the length of a wire on its resistance in a controlled experiment.
12. Describe the resistance characteristics of a filament lamp.
13. Determine the resistance of a component based on information extracted from an I–V graph.
14. Compare the characteristics of a variety of electrical components, describing how the components can be used.
15. Find the potential difference across a component in a circuit by using the p.d. rule.
16. Calculate the current in a series circuit containing more than one resistor.
17. Measure the p.d. across parallel circuits and explain any discrepancies.
18. Describe the effect on the resistance in a circuit of adding a resistor in parallel.
19. **Required Practical**: Investigate the effect of adding resistors in series and parallel on the size of the current in a circuit.

Learning Checkpoints

Learning Checkpoint Title	Attempt 1		Attempt 2/ Extend	
	Mark	RAG	Mark	RAG

Key Vocabulary:
Tier 2 – constituents, discrepancies, calculate, describe, investigate
Tier 3 – current, potential difference, resistance, charge, component, series circuit, parallel circuit

Year 10 Physics Learning Journey

Electricity in the home

Summer 1

Core knowledge
1. Define ‘power’.
2. Calculate the power of systems.
3. Calculate the power of electrical devices.
4. Select an appropriate fuse for a device.
5. Describe how electricity is generated in a power station.
6. Identify the main components of the National grid.
7. Explain the role of the ‘step-up’ and ‘step-down’ transformers.
8. Describe the characteristics of the UK mains supply.
9. State simple differences between a.c. and d.c. sources.
10. Compare a.c. traces in terms of period and amplitude (voltage).
11. Identify the live, neutral, and earth wires in a three-pin plug.
12. Discuss the choices of materials used in cables and plugs in terms of their physical and electrical properties.
13. Identify a variety of electrical hazards associated with plugs and sockets.
14. Calculate the charge transferred by a current in a given time.
15. Calculate the energy transferred by a charge passing through a p.d.
16. State and apply the law of conservation of energy in a circuit.
17. Calculate energy transfer in kilowatt-hours.
18. Convert between efficiencies stated in percentages and those stated in decimal forms.
19. Calculate the power rating of a device from the energy transferred and the time of operation.
20. Calculate the charge transferred by a current in a given time.

Learning Checkpoints

Learning Checkpoint Title	Attempt 1		Attempt 2/ Extend	
	Mark	RAG	Mark	RAG

Key Vocabulary:
Tier 2 – define, appropriate, efficiency, calculate, transfer, convert
Tier 3 – direct current, alternating current, transformer, power, live wire, neutral wire, earth wire

Year 10 Physics Learning Journey

Forces and motion

Summer Term 1+2

Core knowledge
1. Define 'scalar' and 'vector' quantities.
2. Differentiate between distance and displacement.
3. Identify forces as contact and non-contact.
4. State the difference between the mass of an object and its weight.
5. Calculate the weight of objects using their mass and the gravitational field strength.
6. Apply the equation $w=mg$
7. State what the centre of mass of an object is.
8. Find the centre of mass of an object suspended from a fixed point.
9. Find the centre of mass of a symmetrical object.
10. State Newton's Third Law of motion.
11. Apply Newton's Third Law to examples of equilibrium situations.
12. State Newton's First Law of motion.
13. Apply Newton's First Law to explain the motion of objects moving with a uniform velocity and objects where the speed and/or direction changes.
14. Define acceleration.
15. Calculate the acceleration of an object using $a = \Delta v / t$
16. Calculate the resultant force when an object is acted by two forces acting along the same line.
17. State what a parallelogram of forces is.
18. State what a parallelogram of forces is used for.
19. Write down what is needed to draw a scale diagram of a parallelogram of forces.
20. Use a parallelogram of forces to find the resultant of two forces.
21. Describe how the acceleration of an object depends on the size of the resultant force acting upon it.
22. Describe the effect that the mass of an object has on its acceleration.
23. Describe how to calculate the resultant force on an object from its acceleration and its mass.
24. State what the inertia of an object means.
25. State what elastic means.
26. Describe how to measure the extension of an object when it is stretched.
27. Describe how the extension of a spring changes with the force applied to it.
28. **Required Practical**: Forces and extension.

Learning Checkpoints

Learning Checkpoint Title	Attempt 1		Attempt 2/ Extend	
	Mark	RAG	Mark	RAG

Key Vocabulary:
Tier 2 – define, calculate, equation, initial, interpret
Tier 3 – scalar, vector, mass, resultant, acceleration, displacement, deceleration, initial, final, extension, inertia