Curriculum Map Modular Year 10 - Physics

Topic Name	Term	Content / skills developed with link to NC / exam board subject content (if applicable)	Reflection on previous learning	Progress to future learning	Global Citizenship links	Qatar National Identity links
Topic 1: Forces and motion *a) Units* *c) Forces, movement, shape, and momentum*	1	Identify different types of force such as gravitational or electrostatic. Understand how vector quantities differ from scalar quantities. Understand that force is a vector quantity. Know that friction is a force that opposes motion. Know and use the relationship between weight, mass, and gravitational field strength: $$\boldsymbol{weight = mass \times gravitational\ field\ strength}$$	Grade 9 Forces and Motion	Classify different forces into vectors or scalars. Classify different forces as gravitational or electrostatic. Rearrange formulae and convert different units, e.g. m/s to km/h. Carry out calculations associated with wmg.	Prepare for future challenges with open-mindedness and respect. **PRIDE** **Independence and Dedication**	**Sustainability**: responsibility and creativity. **Conscious thinking** about my **Actions**
Resultant forces	1	Demonstrate an understanding of Newton's third law.		Identify pair of forces acting on a range of objects. Draw and label force diagrams.	Prepare for future challenges with open-mindedness and respect. **PRIDE** **Independence and Dedication**	**Sustainability**: responsibility and creativity. **Conscious thinking** about my **Actions**
Distance – time graphs	1	Plot and interpret distance–time graphs.		Simple motion experiments with a datalogger.		

		Know and use the relationship between average speed, distance moved and time: $$\boldsymbol{average\ speed = \frac{distance\ moved}{time\ taken}}$$				
Velocity-time graphs	1	$$\boldsymbol{acceleration = \frac{Change\ in\ velocity}{time\ taken}}$$ $$\boldsymbol{a = \frac{(v-u)}{t}}$$ Plot and interpret velocity–time graphs.		Velocity-time graphs with a ticker-timer	prepare for future challenges with open-mindedness and respect. **PRIDE** **Independence and Dedication**	**Sustainability**: responsibility and creativity. **Conscious thinking** about my **Actions**
Calculations using velocity-time graphs	1	Determine acceleration from the gradient of a velocity–time graph. Determine the distance travelled from the area between a velocity–time graph and the time axis.		Draw gradients and calculate acceleration from a range of graphs.	prepare for future challenges with open-mindedness and respect. **PRIDE** **Independence and Dedication**	**Sustainability**: responsibility and creativity. **Conscious thinking** about my **Actions**
Resultant forces and acceleration	1	Know and use the relationship between unbalanced force, mass, and acceleration:		Carry out a range of calculations, including rearranging formulae and converting units.	prepare for future challenges with open-mindedness and respect.	**Sustainability**: responsibility and creativity.

		$$force = mass \times acceleration$$ $$F = m \times a$$ Describe the forces acting on falling objects and explain why falling objects reach a terminal velocity.			**PRIDE** **Independence and Dedication**	**Conscious thinking** about my **Actions**
The suvat equations	1	Know and use the relationship between acceleration, velocity, and time: $$acceleration = \frac{Change\ in\ velocity}{time\ taken}$$ $$a = \frac{(v - u)}{t}$$ Use the relationship between final speed, initial speed, acceleration, and distance moved: final speed^2 =(initial speed)^2 + (2 x acceleration x distance moved)		Rearrange calculation to determine missing values e.g. distance moved using the suvat equation.	prepare for future challenges with open-mindedness and respect. **PRIDE** **Independence and Dedication**	**Sustainability**: responsibility and creativity. **Conscious thinking** about my **Actions**

		$v^2 = u^2 + (2 \times a \times s)$				
Momentum		Know and use the relationship between momentum, mass, and velocity: $momentum = mass \times velocity$ $p = m \times v$ Use the conservation of momentum to calculate the mass, velocity, or momentum of objects.			prepare for future challenges with open-mindedness and respect. **PRIDE** **Independence and Dedication**	**Sustainability**: responsibility and creativity. **Conscious thinking** about my **Actions**
Road and sports safety		Know that the stopping distance of a vehicle is made up of the sum of the thinking distance and the braking distance. Carry out a range of calculations. Describe the factors affecting vehicle stopping distance. Use the idea of momentum to explain safety features. Use the relationship: $force = \frac{change\ in\ momentum}{time\ taken}$				

Stretching materials	1	P*ractical: investigate how extension varies with applied force for helical springs, metal wires and rubber bands.* Know that the initial linear region of a force-extension graph is associated with Hooke's law. Describe elastic behaviour as the ability of a material to recover its original shape after the forces causing deformation have been removed.	Grade 9 Forces	Draw a plot a graph of results from their own investigation	prepare for future challenges.	**Conscious thinking** about my **Actions**
Balancing and advanced moments	1	Use the principle of moments for a simple system of Parallel forces acting in one plane.		Carry out a range of calculations, including rearranging formulae and converting units.		
Current, voltage and resistance	1	Describe the qualitative effect of changing resistance on the current in a circuit. Know and use the relationship between voltage, current and resistance: $$\boldsymbol{voltage = currrent \times resistance}$$ $$\boldsymbol{V = I \times R}$$ Describe how current varies with voltage in wires, resistors, metal filament lamps and diodes, and how this can be investigated experimentally.	KS3 Electricity	Problem solving Interpretation of Graph of I & V for Metal wire, bulb, and Diode	Developing skills for the future.	**Sustainability:** self-esteem and participation

Thermistors and light-dependent resistors	1	Describe the qualitative variation of resistance of light-dependent resistors (LDRs) with illumination and of thermistors with temperature.	KS3 Effect of Temperature on Resistance	Reasoning and Interpretation of graphs of Electric Components.	prepare for future challenges. **PRIDE** **Independence and Dedication**	**Sustainability**: responsibility and creativity **Conscious thinking** about my **Actions**
Changing resistance and alternating current	1	Know the difference between mains electricity being alternating current (a.c.) and direct current (d.c.) being supplied by a cell or battery.		Using a CRO to show an AC waveform. Ohms law with alternating current	prepare for future challenges. **PRIDE:** **Responsibility** **and Engagement**	Participation & creativity
Series circuits Parallel circuit and energy transfer	1	Explain why a series or parallel circuit is more appropriate for applications, including domestic lighting. Understand why current is conserved at a junction in a circuit. Know and use the relationship between energy transferred, charge and voltage: $\boldsymbol{Energy\ transferred = charge \times voltage}$	KS3 Series and Parallel	Problem solving**, Analysis** Reasoning**, Interpretation** & Decision making of Electric circuits.	prepare for future challenges with open-mindedness and respect. **Pride** **Responsibility & Independence.**	**Conscious thinking** about my **Actions**

		$\boldsymbol{E = Q \times V}$				
Mains electrical safety & calculations	1	Understand why a current in a resistor result in the electrical transfer of energy and an increase in temperature, and how this can be used in a variety of domestic contexts. Know and use the relationship: $$\boldsymbol{power = current \times voltage}$$ $$\boldsymbol{P = I \times V}$$ and apply the relationship to the selection of appropriate fuses. Use the relationship between energy transferred, current, voltage and time: *Energy* $\boldsymbol{transferred = current \times voltage \times time}$ $$\boldsymbol{E = I \times V \times t}$$	KS3 Electricity Power and Energy	Critical thinking, Problem solving, Analysis**,** Reasoning **and** Decision making of Fuse to be used in a circuit.	Prepare for future challenges with open-mindedness and respect. **Pride:** **Responsibility & Independence**	**Conscious thinking** about my **Actions,** my **Family and** my **Environment**

Static charges	1	Know that there are forces of attraction between unlike charges and forces of repulsion between like charges. Explain electrostatic phenomena in terms of the movement of electrons. Explain the potential dangers of electrostatic charges, e.g., when fuelling aircraft and tankers. **E**xplain some uses of electrostatic charges, e.g., in photocopiers and inkjet printers.	KS3 Fields and forces	Research into dangers of electrostatic charges, e.g. when refuelling aircraft and tankers.	Developing skills for the future. **Pride** **Responsibility**	**Conscious thinking** about my **Actions** and my future
Topic 3: Energy resources and energy transfers Energy stores and pathways *Energy transfers* Conservation of energy and efficiency	1	Describe energy transfers involving energy stores: • energy stores: chemical, kinetic, gravitational, elastic, thermal, magnetic, electrostatic, nuclear • energy transfers: mechanically, electrically, by heating, by radiation (light and sound) Use the principle of conservation of energy. Know and use the relationship: $$\boldsymbol{efficiency} = \left\{\frac{\boldsymbol{useful\ energy\ output}}{\boldsymbol{total\ energy\ input}}\right\} \times \mathbf{100}\%$$	KS 3 Energy	Draw Sankey diagrams for various household devices. Carry out a range of calculations, including rearranging formulae and converting units.	prepare for future challenges with open-mindedness	**Sustainability**: responsibility and creativity **Conscious thinking** about my **Actions** and my future and my family
Lesson title: Conduction	1	describe how energy transfer may take place by conduction, convection, and radiation. explain ways of reducing energy transfer, such as insulation.	KS3 Energy	*practical: investigate thermal energy transfer by conduction, convection, and radiation.*	prepare for future challenges**.** **PRIDE:**	**Conscious thinking** about my **Actions** and my future

Convection currents Radiation Reducing unwanted energy transfer					**Responsibility** **and Engagement**	
Lesson title: Work and energy transfer. Kinetic energy	1	know and use the relationship between work, force and distance moved in the direction of the force: $$\boldsymbol{work\ done\ =\ force\ x\ distance\ moved}$$ $$\boldsymbol{W\ =\ F\ x\ d}$$ know that work done is equal to energy transferred. know and use the relationship: $$\boldsymbol{gravitational\ potential\ energy = mass \times gravitational\ field\ strength\ x\ height}$$	KS3 Energy	Calculate work done in lifting masses and show that this is equivalent to GPE gained. Complete calculations for KE = ½ x m x v^2, including rearranging formulae and converting units. For a range of scenarios, identify which objects have more kinetic energy and justify.	prepare for future challenges**.** **Pride** **Independence and** **Dedication**	**Sustainability**: responsibility and creativity

		$$\boldsymbol{GPE = m \times g \times h}$$ Know and use the relationship: $$\boldsymbol{kinetic\ energy = \frac{1}{2} \times mass \times speed^2}$$ $$\boldsymbol{KE = \frac{1}{2} \times m \times v^2}$$				
Energy resources	1	Describe the energy transfers involved in generating electricity using: • wind • water • geothermal resources • solar heating systems • solar cells • fossil fuels • nuclear power Describe the advantages and disadvantages of methods of large-scale electricity production from various renewable and non-renewable resources.	KS 3 Energy	Energy transfers; advantages and disadvantages – students to research.	prepare for future challenges with open-mindedness PRIDE **Responsibility**	**Conscious thinking** about me **Family and Country**
Topic 4: Solids, liquids, and gases:	2	Know and use the relationship between density, mass, and volume:	KS3 Solid, liquid and gas	Carry out a range of calculations for p = m/v and P=f/a, including rearranging formulae and converting units.	Prepare for future challenges with open-mindedness.	**Sustainability:** self-esteem and

		$$density = \frac{mass}{volume}$$ $$\rho = \frac{m}{v}$$ *Practical: investigate density using direct measurements of mass and volume.* Know and use the relationship between pressure, force, and area: $$pressure = \frac{force}{area}$$ $$p = \frac{F}{A}$$		Critical thinking Problem solving Analysis Reasoning Decision making	**PRIDE: Dedication and Engagement**	participation. **Conscious thinking** about my **Actions**
The particle model**.** Changing state		Describe the arrangement and motion of particles in solids, liquids, and gases. Describe the changes that occur when a solid melts to form a liquid, and when a liquid evaporates or boils to form a gas. *Practical: obtain a temperature-time graph to show the constant temperature during changes of state*	KS3 Particle model	Explain what will happen to melting/freezing/boiling point if the liquid is impure. Analysis Reasoning	Prepare for future challenges. **Pride:** **Perseverance** **and Independence**	**Sustainability**: responsibility and creativity
Pressure in fluids.	2	Understand that the pressure at a point in a gas or liquid which is at rest acts equally in all directions. Know and use the relationship for pressure difference:				

		$$\boldsymbol{pressure\ difference} = \boldsymbol{height} \times \boldsymbol{density} \times \boldsymbol{gravitational\ field\ strength}$$ $$\boldsymbol{p = h \times \rho \times g}$$				
Lesson title: Specific heat capacity	2	Know that specific heat capacity is the energy required to change the temperature of an object by one degree Celsius per kilogram of mass (J/kg °C) **** $$\boldsymbol{change\ in\ thermal\ energy = mass \times specific\ heat\ capacity \times change\ in\ temperature}$$ $$\boldsymbol{\Delta Q = m \times c \times \Delta T}$$ $$\boldsymbol{\Delta Q = m \times c \times \Delta T}$$ *Practical: investigate the specific heat capacity of materials including water and some solids.*	KS 3 Heat and Temperature	Discuss non-linear shape of temperature- time graph. Evaluate the use of concrete in storage heaters, including why is concrete used and What are the problems associated with the use of concrete. Critical thinking Problem solving Analysis Reasoning	prepare for future challenges. **Pride:** **Independence** **and Engagement**	**Sustainability**: responsibility and creativity