BROOK 6TH FORM
& ACADEMY
A UNIVERSITY TECHNOLOGY COLLEGE

Physics **SOW** & **Required Practical** (2024-2025): **Y11**

AQA GCSE: 8463

QAN code: 601/8751/7

Year 10:

1. *Energy*
2. *Electricity*
3. *Particle model of matter*
4. *Atomic structure*

Year 11: *(green=covered)*

5. **Forces…**
6. **Waves**
7. **Magnetism and electromagnetism**
8. **Space physics**

SEPTEMBER 2024

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OCTOBER 2024

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NOVEMBER 2024

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JANUARY 2025

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FEBRUARY 2025

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MARCH 2025

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APRIL 2025

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MAY 2025

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JUNE 2025

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JULY 2025

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AUGUST 2025

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Week	Date	Spec ref	Topics/Required Practical (2 lessons/week)	Lesson Objectives (Bold = key learning objective in the SOW)	Skill development	Cross-curricular	Additional notes
5. Forces Spec_ref: 4.5.1.1 to 4.5.7.3							
(a) Forces, moments, resultant forces and resolution of forces							
W1	02-09-23	4.5.1.1/ 4.5.1.2	• N/A • 8.1 Vectors and scalars/8.2 Forces between objects	• **State what are scalar and vectors?** • **Explain what we mean by displacement?** • **State what is force, types of forces & unit of force** ○ Explain what happens to forces being exerted when two objects interact	Describe the difference between scalar and vector quantities and give examples Gives examples of contact and non-contact forces. Describe the effects of forces in terms of changing the shape and/or motion of objects. *Investigate contact and non-contact forces. This can include magnets, friction along a surface eg when a shoe is pulled along a surface*		**Monday (4th) INSET day** Scalars and Vectors **Q: Why is direction important when looking at forces?**
W2	09-09-23	4.5.1.4	8.3 Resultant forces	• **State what is a resultant force** • **Describe what happens when the resultant force on an object is :**	*Draw force diagrams to represent forces acting parallel to each other, both in the same direction or in opposite directions.*		BBC Bitesize – Zero resultant force Video clip: The Effects of Forces Q: **Are there any situations where only one force acts on an object?**

		4.5.4	• 8.4 Moments at work	**-zero and non zero** • **Able to calculate the resultant force** • **State what is moment and how it is calculated** • Explain what is lever and why it is a force multiplier	*Calculate the resultant of a number of forces acting parallel to each other* *State the equation used to find the moment of a force that is used to rotate an object.* *Calculate:* *The moment of a force when given the force applied and the perpendicular distance from the pivot that the force is applied to.* *Rearrange this equation to find any unknown quantity.* The clockwise and anticlockwise moments to determine if an object is balanced. Describe how simple gears work. Describe simple gear systems as force multipliers.		[BBC Bitesize –Moments Revision](#) [Moments and turning forces – the revision website](#)
W3	16-09-23	4.5.1.3	• 8.6 Centre of mass	• **To state what is the centre of mass of an object?** **and determine centre of mass using concept of symmetry for a symmetrical object**	Describe what is meant by 'centre of mass'. Investigate and determine the centre of mass: of regular shapes 2D shapes,		[BBC Bitesize –Weight and mass](#) You tube clip: https://www.youtube.com/watch?v=vDqcEldhJ_8

				• **Be able to model and determine the centre of mass of non symmetrical objects using the concept of equilibrium line**	and irregular 2D shapes using a plumb line and a bob.		Q: Where are turning forces needed?
		4.5.4	• 8.7 Moments and equilibrium	• **State the principle of moment** • **Be able to use principle of moments to calculate the equilibrium of a system**	*State the equation used to find the moment of a force that is used to rotate an object.* *Calculate:* *The moment of a force when given the force applied and the perpendicular distance from the pivot that the force is applied to.* *Rearrange this equation to find any unknown quantity.* *The clockwise and anticlockwise moments to determine if an object is balanced.* *Balancing experiment using lever (wide piece of timber or ruler), pivot, coins or masses.* Describe how simple gears work. Describe simple gear systems as force multipliers.		BBC Bitesize –Moments Revision

W4	23-09-23	4.5.1.4	• 8.8 Parallelogram of forces • Summary and review	• **Able to determine resultant forces using parallelogram** • **Able to resolve of forces using parallelogram (into 2 components)**	Draw force diagrams to represent forces acting parallel to each other, both in the same direction or in opposite directions. Calculate the resultant of a number of forces acting parallel to each other. Present pupils with a variety of situations and ask them to identify all of the forces acting on an object eg a car travelling along a road, a book resting on a desk, a sailing boat, a falling object. Discuss the reasons for the use of free body diagrams to model a situation and the limitations of these diagrams in complex situations. Draw force diagrams to show how a single force can be resolved into two components. Calculate the horizontal and vertical component of a single force that acts on an object.		BBC Bitesize – Zero resultant force Video clip: The Effects of Forces Q: Are there any situations where only one force acts on an object? Mechanics Tutorial 1 – Vectors and Scalars **Q: Why would splitting one force into two separate forces simplify a problem?**
			(b) Motion: displacement, velocity and acceleration				
			• Buffer				

W5	30-09-24	4.5.6.1.4	• 9.1 Speed and distance-time graph	• **Able to use D-t graph to establish if an object is stationary or moving** • **Able to calculate the gradient of D-t graph to determine the speed** • **Able to calculate the speed of an object that moves at constant speed**	Draw and interpret distance – time graphs. Calculate the speed of an object from a distance – time graph. State that the steeper the line on a distance – time graph, the faster the object is travelling.		**Q:** What do the gradients of different lines on a distance-time graph represent? Displacement – Time Graphs
W6	07-10-24	4.5.6.1.5 4.5.6.1.5	• 9.2 Velocity and acceleration • 9.3 Velocity and acceleration II	• **State the difference between speed and velocity** • **Able to calculate the acceleration of an object** ○ Explain the difference between acceleration and deceleration • **Able to draw distance-time graph** • **Able to draw velocity time graph and calculate accelerate and distance from the graph**	Draw and interpret velocity – time graphs. Explain how the acceleration of an object can be found from a velocity – time graph. Compare the acceleration of a vehicle at different points of a velocity – time graph from the gradients of the lines. Calculate the distance travelled using the area under the line on a velocity – time graph. Why can't we find the distance travelled by an object using speed x time if it is accelerating? Draw a velocity – time graph for your journey into school. Compare this with a distance – time graph for the same journey. What are the		Blended learning: Friday 13th YouTube: Speed –time graphs and acceleration Velocity – Time Graphs BBC Bitesize –Speed, velocity and acceleration BBC Bitesize –Speed, velocity and acceleration

					differences in the line shapes? For velocity-time graphs that show non-uniform acceleration, measure the area under the line by counting squares. HT only		
W7	14-10-24		• Buffer • Summary and review/ EOU Test				**End of the Unit test**
W8	21-10-24		• FD and review • Buffer				
W9	HT (28-10-23)						
W10	HT (04-10-23)						
(c) Forces & motion: weight, momentum and impact forces							
W11	11-11-24	4.5.6.2.2 4.5.1.3 4.5.6.1.5	• 10.1 Forces and acceleration • 10.2 Weight and terminal velocity	• **Describe how acceleration of an object depends of the resultant force Newton's 2nd law: know the definition and eq, and carry-out calculation** • **Explain how the mass of an object effects the acceleration** • **Able to explain what is mass, weight and weightless**	*Define Newton's Second Law.* *Calculate the resultant force acting on an object using the equation* *Define inertial mass.* *Explain why it is difficult to get a heavy moving object to change speed and/or direction but not a light one.* *Define weight and mass and explain the*	**GCSE Engineering** Aerodynamics: 3.4.3 Student learn **lift**, **drag** & **thrust** in Physics and Engineering	Q: What determines how quickly a vehicle accelerates? Inertia and Mass Q: Why do motorcycles have a greater acceleration than cars? BBC Bitesize –Weight and mass Questions on weight and mass

				• **Define terminal velocity** and describe the motion of object in free-fall	*difference between them.* *Calculate the weight of an object on Earth using $W = mg$. Rearrange this equation to find any unknown quantity.* *Give the correct units of weight and mass.* *Convert quantities into SI units eg grams into kilograms.* Describe and explain factors that affect the terminal velocity.		
W12	18-11-23	4.5.6.3.1 4.5.6.3.2 4.5.6.3.3 4.5.6.3.4	• 10.3 Forces and breaking	• **State what is stopping distance, what does it depends on and describe factors affecting stopping distance** ○ Able to estimate the braking force of a vehicle	*Define:* • *thinking distance* • *braking distance* • *stopping distance.* *State that the overall stopping distance of a vehicle is made up of the thinking distance plus the braking distance.* *Describe and explain how the speed of a vehicle affects the stopping distance, for a given braking force.* Describe/discuss how the reaction time of a person can be affected by various factors including:		BBC Bitesize –Thinking, braking and stopping distance Video clip: Stopping distances Friction, Reducing friction, Uses of friction, Stopping Distance

					• drugs (use caffeinated drinks) • distractions and • tiredness Describe factors that will affect the braking distance of a vehicle. Describe and explain the energy transfers involved in stopping a vehicle. *Define momentum and recall it is a vector quantity.* *State the equation that links momentum, mass and velocity.* *Calculate the momentum of an object. Rearrange the equation to find any unknown quantity.* *State the units of momentum.*		
		4.5.7.1	• 10.4 Momentum	• **State what is momentum,** • **Able to calculate momentum** ○ State what is principle of momentum and use it to calculate mass or velocity for closed system			Q: **Why is it easier to stop a tennis ball than a football travelling at the same speed?** Video clip: Momentum
		4.5.7.2	• 10.5 Using conservation of momentum	• **Explain why momentum is a vector** ○ Applying conservation of momentum when objects collide or explode to calculate	Explain what is meant by conservation of momentum. Carry out conservation of momentum calculations for systems involving two objects, including		BBC Bitesize –Conservation of momentum Conservation of Momentum

W13	25-11-23	4.5.7.3	• 10.6 Impact forces/10.7 Safety first	velocity of mass • **Describe what affect the force of impact when two vehicle collide** • **Explain how/why impact force depends on impact time** / • **Describe the safety features in cars: crumble zones seat bets and air bags** ○ Explain the safety features of helmets and how it protects the driver	collisions and explosions. *State that the force acting on an object is equal to the rate of change of momentum.* *Use the equation* $F = \frac{m \Delta v}{\Delta t}$ *to calculate the force that acts on an object when the momentum of that object changes, eg calculate the braking force when a car of mass 800 kg slows from 30 m/s to 10 m/s in 2 s.* *Name common safety features found on road transport and around the home/school.* *Describe and explain how safety features such as air bags and crumple zones reduce injuries in a collision, with reference to the rate of change of momentum.* *Describe and explain why motorcyclists are at*		BBC Bitesize –Force and momentum Q: **Why do people bend their knees when they jump off a wall and not land straight legged?** Q: **Why was the wearing of cycle helmets made compulsory in in many countries?**

					greater risk in collisions than car drivers.		
W14	02-12-24	4.5.3	• 10.8 Forces and elasticity • Buffer	○ **State what is meant by elastic and inelastic deformation** **Describe Hooke's law and able to calculate Hooke's constant from F-x graph** ○ Explain what is limit of proportionality and the extension curve of different materials	*Define elastic deformation.* *Sketch and describe the force and extension curve of an elastic material (eg elastic band or spring) when not stretched beyond its limit of proportionality.* *Find the spring constant of a spring by experiment.* *Calculate the force acting on a spring when given the spring constant and the extension of the spring.* *Rearrange the equation to find any missing quantity.*		Elasticity Q: Why shouldn't I stretch springs too much? Hooke's Law BBC Bitesize –Hooke's Law Practical: Hooke's Law – Stretching Springs
(d) Pressure on solids, liquid and gases/atmospheric pressure							
		4.5.5.1.1	• 11.1 Pressure and surfaces/	• **State what is meant by pressure and what are the units of pressure.** • **Apply the concept of pressure on the surfaces (of a solid) and explain how the area of contact affects the pressure.** • **Describe how pressure in a liquid increase with depth.**	*The pressure calculated using the equation:* *pressure = force (normal to a surface)/ area (of that surface)* $[p = \frac{F}{A}]$ *pressure, p, in pascals, Pa,* *force, F, in newtons, N* *area, A, in metres squared,* m^2		Blended learning: Friday 15th BBC Bitesize –Density and Pressure BBC Bitesize –Density and Pressure Forces and Pressure – the revision website

W15	09-12-24	4.5.5.1.1 4.5.5.1.2 4.5.5.2 4.5.5.1.2	• 11.2 Pressure in liquid • 11.3 Atmospheric Pressure/ 11.4 Up thrust and flotation	• **You must able to explain why pressure increases with depth** ○ Explain what factors the pressure of a liquid depends and how to calculate the pressure of a liquid ○ **Explain why atmosphere exert a pressure and how this pressure changes with altitude** ○ Explain how density changes with altitude using simple models and how to calculate force on flat object due to pressure difference • **State what is meant by upthrust and displacement** • **Describe the factors that determines whether an object float or sinks** ○ Explain what causes upthrust and what the pressure in a fluid depends	*Describe fluids as being either liquids or gases.* *Define pressure.* *Calculate the pressure at the surface of a fluid when given the applied force and the surface area that the force is applied to. Rearrange the equation to find the two other unknowns.* *Give the SI units for pressure, force and area. Convert units to SI units where applicable.* Use the equation $p = h\,\rho\,g$ to explain why the pressure in a liquid increases with depth and density of liquid. **What pressure would a submarine be exposed to at a depth of 11, 000 m (the deepest part of the Mariana Trench)?** *Describe how the density of the atmosphere varies as the height increases.* *Describe and explain how atmospheric pressure changes with height.*		Q: Why do balloons inflate when air is put into them but diving cylinders do not? Q: Estimate the force acting on the wall of a balloon and the wall of a diving cylinder Video clip: Pressure in fluids Q: Pupils' explanations to the demonstrations and how straws/*rubber suckers work*. BBC Bitesize –Density and Pressure: Revision Upthrust and Archimedes principle Floating and sinking

					demonstrations: *Collapsing can* *Describe what upthrust is.* *Explain upthrust as being the difference in the force acting on an object at its top and at its bottom, due to the different depths of liquid at the top and bottom of the object.*		
W16	16-12-24		• Summary and review • EOU test • RP6 Investigating the relationship between the force and extension of a spring				**End of the Unit test**
W17	HT (23-12-24)						***School breaks on Thursday 21st:***
W18	HT (30-12-24)						**Winter break:** BANK holiday Monday 25th and Tuesday 26th
W19	06-01-25		• FD and gap analysis • *RP7 Investigation between force and acceleration*				BANK holiday Monday 1st

6. Waves Spec_ref: 4.6.1.1 to 4.6.2.6							
(a) Waves, properties of waves and their uses							

W20	13-01-25	4.6.1.1
		4.6.1.2
		
		4.6.1.3
			• 12.1 The nature of waves/12.2 The properties of waves	• Define what is wave and able to state its uses
				• Define transverse wave and describe its characteristics
				• Define longitudinal waves, its characteristics and compare its properties to transverse waves
				  • State what is amplitude, frequency, wavelength & period of a wave
				  • Describe the relationship between frequency and period
				  • Calculating speed of a wave
				• State what happens to waves at boundary
				• Define what is reflection and using ray diagram to explain the law of reflection
					Draw diagrams to show the features of transverse and longitudinal waves.
					
					Give examples of both transverse and longitudinal waves.
					
					Describe the propagation of both transverse and longitudinal waves.
					
					Explain the changes in air pressure caused by longitudinal waves in regions of compression and rarefaction.
					Demonstrate how waves travel using a slinky spring.
					
					Define:
					• *wavelength*
					• *amplitude*
					• *frequency*
					• *peak*
					• *trough*
					• *period.*
					
					Calculate the wavelength of a wave from a labelled diagram of a wave.
					Calculate the speed of a wave. Rearrange the equation to find any unknown given the other two values.
							BBC Bitesize: General properties of waves
							
							Anatomy of a wave
							The frequency and period of a wave

			• 12.3 Reflection and refraction	• Define refraction and explain how wave refract at boundaries	*Construct labelled ray diagrams to illustrate the reflection of a wave at a surface.* *State the law of reflection* *Explain why at night refraction of sound leads to sounds being heard from further afield than during daytime.*		
W21	20-01-24	4.6.1.4 4.6.1.4/ 4.6.1.5	• 12.4 Sound waves • 12.5 The use of ultrasound/ 12.6 Seismic waves	• State what is a sound wave? • Describe how sound waves is induced and what affects loudness and pitch of a musical note • Explain how sound waves is detected by ear • Define what is ultrasound and describe different applications of ultrasound • Describe the advantages of using ultrasound(US) and why is it safer to image body organs using US than using x-rays • Explain how ultrasound are used in industries	*State the range of human hearing.* *Interpret data on the speed of sound to draw conclusions about the type of material that the wave is travelling through.* *Describe how sound waves travel from a source to the ear and the effect that this has inside the ear.* *Describe sound waves in terms of pitch and frequency.* *State uses of ultrasound waves.* *Describe and explain how ultrasound waves are used to build up a picture of the inside of a human body.*		How do we hear? BBC Bitesize: Human hearing and the speed of sound How the ear works Ultrasound scans: BBC Bitesize: Ultrasound

				and medicine to measure distances • Define what are seismic waves and describe how seismic waves are produced • Explain what are primary and secondary seismic waves are • Explain what information seismic waves gives about the structure of the earth	*Give advantages and disadvantages of using ultrasound waves for diagnosis.* *Perform calculations on ultrasound scans using the equation: distance = speed x time* *State that P-waves and S-waves are types of seismic wave.* *Describe the properties of P-waves and S-waves.* *Describe and explain how P-waves and S-waves travel through the Earth's interior, and how this allows us to build up a picture of the Earth's interior.* *Explain how earthquakes are detected and the scale that they are measured on.*		S waves How a blind boy uses echolocation
(b) Electromagnetic waves							
		4.6.2.1	• Summary and review • 13.1 The electromagnetic spectrum	• Define electromagnetic waves and state different part of the EM spectrum	*Describe the properties common to all electromagnetic waves.* *State that electromagnetic waves transfer energy from one place to an absorber of that energy.*		**Q:** How do the electromagnetic waves differ from each other? **Research** the parts of the electromagnetic spectrum seen by animals, eg cats, bees, snakes.:

W22	27-01-25			• State the wavelength of each part of the spectrum and describe their uses • Describe how energy of the spectrum changes as wavelength/frequency changes and calculate the frequency/wavelength of EM waves	*Name the seven types of electromagnetic wave, in the correct order from longest to shortest wavelength.* *State the range of wavelengths is approximately $10^{-15}m – 10^{4}m$* *State that the only part of the electromagnetic spectrum that our eyes can detect is visible light*		Waves in the spectrum
W23	03-02-25		• 13.2 Light, IR, MW and RW • 13.3 Communications	• State the nature of white light • State what IR, MW & RW are used for and describe the devices that uses these radiations • Explain the danger of IR, MW and RW • Explain why different bands of radio frequencies are used and describe the different bands that are used for different applications • Describe what is fibre optics & its use in communication • Describe how RW are transmitted and received in communication and		**GCSE Biology** The eye: 4.5.2.3	In Physics, students learn how eye detect visible light though cone and rods, but very briefly. This learning is extended in Bilogy

				explain the danger of using MW radiation in mobile phone communication			
W24	10-02-25		• 13.4 UV, X-rays and gamma rays • RP8 Investigating plane wave in a ripple tank • 13.5 X-rays in medicine	• State what is UV, x-rays and γ-rays? • Describe how x-rays and γ-rays are produced and their uses. • Define ionizing radiation and explain why ultraviolet (UV), X-rays, and gamma (γ) rays pose health hazards. • State what is x-rays and describe how it is used in medicine? • Explain the health risks associated with X-rays and describe the medical purposes of X-ray therapy		**GCSE Biology** Cancer: 4.2.2.7	**INSET day Thursday 8th and Friday 9th** ***RP8 would be done in W26, Some apparatus parts are broken, should get them by the end of the half term*** How ionization radiation destroys cells and leads to mutation, this understanding is further extended in Biology
Half term break:				**8. Space** Spec_ref: 4.8.1.1 to 4.8.2 (LGH: 4.2h)			
W25	**HT (17-02-24)**	4.8.1.1	• *16.1 Formation of solar system*	• State what is a protostar and describe how solar system is formed • State what is a MS star and describe why sun is stable	*What is a solar system?* *Where do stars come from?* *Describe how a star forms from a cloud of dust and gas called a nebula.*		• Students will be asked to-re-read materials that were given by the end of the Y10 summer holiday • Students will also be given some new material to read and prepare for some revision lessons that will take place during this break over

		4.8.1.2/ 4.8.1.3	• *16.2 The life history of a star/ 16.3 Planets, satellite and orbits*	• State what is protostar and a MS star • Describe how an average star evolves and how a massive star evolve • State what is supernova, describe how heavy elements are formed and explain what will eventually happen to sun • State what force keep planets and satellites in orbits and the direction of the force on orbiting objects • Explain why satellites move in a circular path and how the velocity & period changes as the radii changes • Explain what is geostationary orbits and their uses	*State the name of the element that makes up most of the mass of a star.* *Explain how the star starts to fuse hydrogen atoms together in a process called nuclear fusion when the temperature of the protostar becomes high enough.* *Describe the different objects in our solar system and their location within our solar system.* *How long does a star shine for?* *What determines the length of a star's lifecycle?* *Describe the similarities and differences between the lifecycles of small and large stars.* *Explain how the length of a star's life cycle is affected by the size of the star.* Explain what is happening when hydrogen atoms fuse together and		two days (of 2h each) to complete the SPACE chapter. Pass My Exams – The Solar System Video clip YouTube: A Tour through our Solar system YouTube: Stephen Hawking – Formation of the Solar System BBC Bitesize – Formation of a star BBC Bitesize – Formation of a Star BBC Bitesize – Formation of a Star Pass My Exams – Life Cycle of Stars

					complete an equation to show hydrogen nuclei fusing together to make helium nuclei and other light elements. Describe how the conditions in a supernova allow heavy elements to be formed. *Explain why satellites stay in orbit in terms of the force of gravity.* *Explain how the speed of an artificial satellite is linked to the height of the satellite above the Earth.* *What are artificial satellites used for?* *Give uses of artificial satellites including communications and monitoring the weather.* *Draw a diagram to show the forces acting on a satellite in orbit around the Earth.*		
		4.8.2	• *16.4 The expanding universe/ 16.5 The beginning and the future of the universe*	• State what is meant by Doppler effect and reds-shift. • Describe how red-shift depends on speed and how it is used to deduce distance galaxies are moving away from Earth • Explain why red-shift suggest that universe is expanding • State what is meant by Steady state and the Big Bang theories of the universe.			BBC Bitesize – Red-shift Video clips Pass My Exams – Red Shift and the Expanding Universe BBC Universe | The Big Bang BBC Universe | Hubble Space Telescope

				• Describe what evidence are there that the universe is created in a big bag • Explain why the universe is expanding ,the significant of CMBR and the fate of the future of the universe	*Describe the absorption or emission spectrum of light from the Sun.* *Explain how the absorption or emission spectrum of light from a similar star to the Sun differs from that of the Sun.* *What is red-shift and what does it show?* *Why does the pitch of a fire engine siren change as the fire engine comes towards you then moves away from you?* *How does red-shift provide evidence of the Big Bang?* *Explain how the red-shift of distant stars and galaxies shows that they are moving away from us. This is evidence of the universe starting off from a small point in space and expanding outwards.* How did the universe begin? Describe how efforts to measure red-shift		

					have advanced through the use of space telescopes and telescopes that are ground-based. That there is still much about the universe that is not understood, for example dark mass and dark energy.		
(c) Light and lenses (of Waves)							
W26	24-02-24	4.6.2.2 (& 4.6.1.3) 4.6.2.6	• 14.1 Reflection and refraction of light • 14.2 Light and colour	• Able to state what is specular and diffuse reflection, the law of reflection, and able to draw & explain how image is formed by a plane mirror. • State what is refraction, describe and draw ray diagram of refraction of light across the boundary of air and glass. • Describe how the wavelength of light changes across the spectrum	*Draw rays diagrams to illustrate specular reflection by a smooth surface and scattering of light by a rough surface.* *Use a ripple tank you to demonstrate refraction as waves go into different depths of water,* Construct ray diagrams to *illustrate the refraction of a wave at the boundary between two different media.* *Explain how the colour an object looks depends on the absorption,*		**INSET (20-02-23 Friday)** **Refer back to** 4.6.1.3 (Topic 12.3) BBC Bitesize: Refraction and diffraction Reflection, refraction and diffraction video on Ripple tank reflection Reflection of light from smooth and rough surfaces: Specular vs. diffuse reflection

				• Explain the factors that determines the colour of a surface • State what is translucent and explain the difference between translucent and transparent objects	*transmission and reflection of different wavelengths of light.* *Investigate the colours that make up white light using a triangular prism. Make a Newtons wheel and then spin it very fast by putting it on the end of a drill. Demonstrate how the colour white can be made up from the three primary colours. This can be done with a spinning top with coloured card attached and spun quickly.* *Define transparent and translucent.*		
W27	03-02-24	4.6.2.5	• 14.3 lens/ 14.4 uses of lens • RP9 Investigation of refraction and reflection	• Describe how the wavelength of light changes across the spectrum • Explain the factors that determines the colour of a surface • State what is translucent and explain the difference between translucent and transparent objects • / • Describe how to find the nature and position of an image formed by a convex lens	*Construct ray diagrams to show how light travels through concave and convex lenses.* Describe the key features of a ray diagram where light passes through a lens. Students should be able to identify the: • Principal axis • Principal focus • Focal length. *Explain the difference between real and virtual images.*		**INSET day Friday 8th** Convex and concave lenses Ray diagrams with lenses: BBC Bitesize: Investigating lenses

				• Describe the application of convex lens: camera and magnifying glass • Describe how to find the nature and position of an image formed by a concave lens	*Construct ray diagrams for a camera, a projector and a magnifying glass using a convex lens.* *Calculate the magnification of a lens using the magnification equation.*		
W28	10-03-24		• Summary and review • EOU test				**End of Unit test**
7. Magnetism and electromagnetism **(Spec_ref:** 4.7.1 to 4.7.3.4)							
W29	17-03-24	4.7.1.1 4.7.1.2	• 15.1 Magnetic fields /15.2 Magnetic fields and electric currents	• Define what is magnetic field able to draw magnetic field lines around a magnetic with directions • State what materials are used to make magnets and most should able to describe why a mixture of metals are used to make permanent magnets • Explain the difference between permanent magnet and induced magnet	*What is the shape of the Earth's magnetic field?* *Explain what is meant by a permanent magnet and give examples of materials that can become magnetised.* *Name three magnetic materials.* *Describe why steel is magnetic.* *Explain what is meant by the magnetic field of a magnet.*	**GCSE Engineering** Electrical systems: 3.3.2 Electrical systems such as power supplies (mains and batteries), input control devices (for example relays and switches),	Video clip: [BBC Bitesize – Laws of magnetism]

		4.7.2.1	• 15.3 Electromagnets in devices	• Able to **describe** magnetic field near a current-carrying wire • **Define** what is a solenoid and **describe** what parameters affects the magnetic field in a solenoid • **State** what is an electromagnet and **describe** the operation of an electromagnet • State what is electromagnet and describe where electromagnets can be used • Identify practical applications of electromagnets and analyse how these devices utilize the principles of electromagnetism in their operation.	*Draw the magnetic field pattern of a bar magnet and describe how to plot the magnetic field pattern using a compass.* *Explain how the behaviour of a magnetic compass is related to evidence that the core of the Earth must be magnetic.* *Describe how the magnetic effect of a current can be demonstrated.* *Use the 'right hand thumb rule' to draw the magnetic field pattern of a wire carrying an electric current.* *Draw the magnetic field pattern for a straight wire carrying a current and for a solenoid.* *Describe the effect on the magnetic field of changing the direction of the electric current.* *Describe ways of increasing the magnetic field strength of a solenoid.* *Explain how an electromagnet can be made from a solenoid.*	output devices (motors, buzzers, bells, lamps and solenoids).	
		4.7.2.2 4.7.2.3	• 15.4 The motor effect	• Describe what happens to a conductor (carrying			BANK holiday Friday 29th

W30	24-03-24	4.7.2.4 4.7.3.1 4.7.3.2	 • 15.5 the generator effect	a current) when a magnetic field is applied? • Calculate the size & direction of the force on a conductor using Fleming's left-hand rule and the formula • Explain what is motor effect and examples of its use. • State what is electromagnetic induction and generator effect • Explain how a potential difference (Pd) is induced and what affects the magnitude of the induced Pd • Explain how to deduce the direction of induced current	Explain what is meant by the motor effect. *Explain why changing the polarity of the permanent magnets in the electric motor will change the direction of rotation.* *Describe how the size and direction of the force on a conductor in a magnetic field can be changed.* *Recall and use Fleming's left-hand rule.* *Use and apply the equation :* $F = B\ I\ L$ *to calculate any missing value when given other values.* *Explain how rotation is caused in an electric motor.* *Explain how a moving-coil loudspeaker and headphones work* *Describe what a generator does.* *Describe and explain:* • *how a generator induces a potential difference across the ends of a conductor* • *if the conductor is part of a complete circuit a current will also be induced.*		[BBC Bitesize – Electric motors] [Pass My Exams – Electric Motors & Generators] Video clip [YouTube: GCSE Physics P3 Revision: Motor and generator effect]

			• RP 10 investigating IR		*Describe ways of increasing the size of the induced potential difference of a generator.* *Describe the effect on the induced potential difference, and induced current, of reversing the direction of motion of the conductor in a magnetic field.*		
W31	01-04-24	4.7.3.2 4.7.3.3 4.7.3.4	• 15.6 The alternating-current generator • 15.7 Transformers and uses of transformers	• State what is an ac generator and describe how an ac generator operates • Explain how the induced Pd varies with time • State what is a dynamo and describe how a dynamo operates • Define transformers and describe their primary uses. • Differentiate between step-up and step-down transformers, explaining their specific functions. • Explain why transformers operate only with alternating current (ac) and identify the materials commonly used in their construction	*Explain how an alternator generates a.c. and a dynamo generates d.c.* *Draw/interpret graphs of potential difference generated in the coil against time.* *Explain how a moving-coil microphone works.* *What are transformers?* *Where are transformers used?* *Draw a labelled diagram of a transformer. Students should be able to label the primary coil, secondary coil and the iron core.*		Hyperphysics – Microphones BBC Bitesize – Dynamos and transformers **Model** the National Grid showing the step-up transformer at the power station, the power cables and the step-down transformer before it reaches the consumer.

					How do transformers change the potential difference? Where are step-down transformers located? Describe the role of transformers in sending electrical energy through the National Grid. Perform calculations to determine the potential difference on the primary or secondary coil or the number of turns on the primary or secondary coil when given the other values. Students should be able to use simple ratios or the equation: $\frac{V_p}{V_s} = \frac{n_p}{n_s}$ to calculate any unknown value.		Transformers – Higher Tier
W32	HT (08-04-24)						**Easter break:**
W33	HT (15-04-24)						
W34	22-04-24		• Revision • Revision				
W35	29-04-24		• Revision • Revision				

W36	06-05-24		• Revision • Revision				BANK holiday Monday 6th
W37	13-05-24		• Revision • Revision				
W38	20-05-24	**Paper 1**					
W39	HT (27-05-23)				BANK holiday Monday 27th		
W40	03-06-24	• Exam • Exam					
W41	10-06-24	• Exam • Exam					
W42	17-06-24	• Exam • Exam					
W43	24-06-24	• Exam • Exam					
W44	01-07-24	• Exam • Exam					
W45	08-07-24	**Paper 2**					
W46	15-07-24	• Exam • Exam					
W47-52	22-07-24 END of the	**Summary break:** ***School breaks Friday 19th***					

	academic Year	