Combined Science - Physics - Paper 2 – Higher Tier
Personal Learning Checklist (PLC)

		Dates		
	Learning objectives:			
5.	**Forces**			
	Forces in balance (Kerboodle Chapter 8)			
5.1.	Write down what displacement is.			
5.2.	Write down what a vector quantity is.			
5.3.	Write down what a scalar quantity is.			
5.4.	Describe how to represent a vector quantity.			
5.5.	Write down what forces can do.			
5.6.	Write down the unit of force.			
5.7.	Write down what a contact force is.			
5.8.	Describe the forces being exerted when two objects interact.			
5.9.	Describe what a resultant force is.			
5.10.	Describe what happens if the resultant force on an object is zero.			
5.11.	Describe what happens if the resultant force on an object is greater than zero.			
5.12.	Calculate the resultant force when two forces acting along the same line act an object.			
5.13.	State what a free-body force diagram is. (HT only)			
5.14.	State what the centre of mass of an object is.			
5.15.	State where the centre of mass of a metre ruler is.			
5.16.	Find the centre of mass of an object suspended from a fixed point.			
5.17.	Find the centre of mass of a symmetrical object.			
5.18.	State what a parallelogram of forces is. (HT only)			
5.19.	State what a parallelogram of forces is used for. (HT only)			
5.20.	Write down what is needed to draw a scale diagram of a parallelogram of forces. (HT only)			
5.21.	Use a parallelogram of forces to find the resultant of two forces. (HT only)			
5.22.	Describe what resolving a force means. (HT only)			
5.23.	Describe how to resolve a force into two components. (HT only)			
5.24.	Define equilibrium. (HT only)			
5.25.	Explain why an object at rest is in equilibrium. (HT only)			

	Motion (Kerboodle Chapter 9)			
5.26.	Calculate speed for an object moving at constant speed.			
5.27.	Use a distance-time graph to determine whether an object is stationary or moving at constant speed.			
5.28.	State what the gradient of the line on a distance-time graph can tell you.			
5.29.	Use the equation for constant speed to calculate distance moved or time taken.			
5.30.	State the difference between speed and velocity.			
5.31.	Calculate the acceleration of an object.			

5.32.	State the difference between acceleration and deceleration.			
5.33.	Explain that motion in a circle involves constant speed but changing velocity. (HT only)			
5.34.	Measure velocity change.			
5.35.	State what the horizontal line on a velocity-time graph tells you.			
5.36.	Use a velocity time graph to work out whether an object is accelerating or decelerating.			
5.37.	State what the area under a velocity-time graph tells you. (HT only)			
5.38.	Calculate speed from a distance-time graph where the speed is constant. (HT only)			
5.39.	Calculate speed from a distance-time graph where the speed is changing. (HT only)			
5.40.	Calculate the acceleration from a velocity-time graph.			
5.41.	Calculate the distance from a velocity-time graph. (HT only)			

	Force and motion (Kerboodle Chapter 10)			
5.42.	Describe how the acceleration of an object depends on the size of the resultant force acting upon it.			
5.43.	Describe the effect that the mass of an object has on its acceleration.			
5.44.	Describe how to calculate the resultant force on an object from its acceleration and its mass.			
5.45.	*Core practical: investigating F = ma*			
5.46.	State what the inertia of an object means. (HT only)			
5.47.	Describe the difference between mass and weight.			
5.48.	Describe and explain the motion of a falling object acted on only by gravity.			
5.49.	State what terminal velocity means.			
5.50.	State what can be said about the resultant force acting on an object that is falling at terminal velocity.			
5.51.	Describe the forces that oppose the driving force of a vehicle.			
5.52.	State what the stopping distance of a vehicle depends on.			
5.53.	State what can cause the stopping distance of a vehicle to increase.			
5.54.	Describe how to estimate the braking force of a vehicle. (HT only)			
5.55.	Calculate momentum. (HT only)			
5.56.	State the unit of momentum. (HT only)			
5.57.	Describe what momentum means in a closed system. (HT only)			
5.58.	Describe what happens when two objects push each other apart. (HT only)			
5.59.	State what elastic means.			
5.60.	*Core practical: describe how to measure the extension of an object when it is stretched.*			
5.61.	Describe how the extension of a spring changes with the force applied to it.			
5.62.	State what the limit of proportionality of a spring means.			

6.	Waves			
	Wave properties (Kerboodle Chapter 12)			
6.1.	Describe what waves can be used for.			
6.2.	Describe what transverse waves are.			
6.3.	State what longitudinal waves are.			
6.4.	State which types of wave are transverse and which are longitudinal.			
6.5.	Define the amplitude, frequency, and wavelength of a wave mean.			
6.6.	Describe how the period of a wave is related to its frequency.			
6.7.	State the relationship between the speed, wavelength, and frequency of a wave.			
6.8.	Use the wave speed equation in calculations.			
6.9.	*Core practical: investigating waves on a string and in a ripple tank.*			
6.10.	Draw the patterns of reflection and refraction of plane waves in a ripple tank. (HT only)			
6.11.	Determine whether plane waves that cross a boundary between two different materials are refracted. (HT only)			
6.12.	Explain reflection and refraction using the behaviour of waves. (HT only)			
6.13.	Describe what can happen to a wave when it crosses a boundary between two different materials. (HT only)			
6.14.	State what sound waves are.			

	Electromagnetic Waves (Kerboodle Chapter 13)			
6.15.	State the parts of the electromagnetic spectrum.			
6.16.	Explain the range of wavelengths within the electromagnetic spectrum that the human eye can detect.			
6.17.	Describe how energy is transferred by electromagnetic waves.			
6.18.	*Core practical: investigating how different surfaces emit infrared radiation.*			
6.19.	Calculate the frequency or wavelength of electromagnetic waves.			
6.20.	Describe the nature of white light.			
6.21.	List some uses of infrared radiation, microwaves, and radio waves.			
6.22.	State what mobile phone radiation is.			
6.23.	Explain why these types of electromagnetic radiation are hazardous.			
6.24.	Explain why radio waves of different frequencies are used for different purposes.			
6.25.	State which waves are used for satellite TV.			
6.26.	Describe how to decide whether or not mobile phones are safe to use.			
6.27.	Describe how fibre optics are used in communications.			
6.28.	Describe what a carrier wave is. (HT only)			
6.29.	Describe the differences between ultraviolet and visible light.			
6.30.	List some uses of X-rays and gamma rays.			
6.31.	State ionising radiation.			
6.32.	Explain why ultraviolet waves, X-rays, and gamma rays are dangerous.			
6.33.	Describe what x –rays are used for in hospitals.			
6.34.	State which parts absorb x-rays when they pass through the body.			
6.35.	Explain the difference between the uses of low- and high-energy X-rays in hospitals. (HT only)			

7.	Magnetism and Electromagnetism			
	Electromagnetism (Kerboodle Chapter 15)			
7.1.	State the force rule for two magnetic poles near each other.			
7.2.	Describe the pattern of magnetic field lines around a bar magnet.			
7.3.	Describe what induced magnetism is.			
7.4.	Explain why steel, not iron, is used to make permanent magnets.			
7.5.	Describe the pattern of the magnetic field around a straight wire carrying a current and in and around a solenoid.			
7.6.	Describe how the strength and direction of the field varies with position and with the current.			
7.7.	Describe what a uniform magnetic field is.			
7.8.	Describe what an electromagnet is.			
7.9.	Describe how to change the size and reverse the direction of the force on a current-carrying wire in a magnetic field.			
7.10.	Explain how a simple electric motor works. (HT only)			
7.11.	Explain what is meant by magnetic flux density.			
7.12.	Calculate the force on a current-carrying wire.			
7.13.	State what transformers are used for.			
7.14.	Describe what a step-up transformer does and what a step-down transformer does.			
7.15.	Explain how the ratio of the primary potential difference to the secondary potential difference depends on the number of turns on each coil. (HT only)			
7.16.	Explain how the number of turns on the secondary coils relates to the number of coils on the primary coil for a step-down transformer and for a step-up transformer. (HT only)			

	Equations I need to know			
XV.	**speed (*v*)** (m/s) **= <u>distance (*s*)</u>** (metres, m) **time taken(*t*)** (seconds, s)			
XVI.	**acceleration (*a*)** (m/s^2) **= <u>change in velocity (*Δv*)</u>** (m/s) **time taken (*t*)** (s)			
XVII.	**resultant force (*F*) = mass (*m*) x acceleration (*a*)** (N) (kg) (m/s^2)			
XVIII.	**weight (*W*) = mass (*m*) x gravitational field strength (*g*)** (N) (kg) (N/kg)			
XIX.	**momentum (*M*) = mass (*m*) x velocity (*v*) (HT only)** (kg m/s) (kg) (m/s)			
XX.	**force applied (*F*) = spring constant (k) x extension (*e*)** (N) (N/m) (m)			
XXI.	**Pressure (*p*)** (Pa) **= <u>force (F)</u>** (N) **area (A)** (m^2)			
XXII.	**wave speed (*v*)** (m/s) **= frequency (*f*)** (Hz) **x wavelength (*λ*)** (m)			