Curriculum Plans: Year _____ (Subject)

Topic	Knowledge: By the end of the unit students will know:	Skills: What skills will students have developed by the end of this unit?	Key terms: What new key terms and vocabulary will be learnt in this unit?	Summative Assessment: How will pupils be assessed in this unit?
Forces 1	**Write down what displacement is.** **Write down what a vector quantity is.** **Write down what a scalar quantity is.** **Describe how to represent a vector quantity.** **Write down what forces can do.** **Write down the unit of force.** **Write down what a contact force is.** **Describe the forces being exerted when two objects interact.** **Describe what a resultant force is.** **Describe what happens if the resultant force on an object is zero.** **Describe what happens if the resultant force on an object is greater than zero.** **Calculate the resultant force when an object is acted by two forces acting along the same line.** **State what a free-body force diagram is.** **State what the centre of mass of an object is.** **State where the centre of mass of a metre ruler is.**	I can state that scalars have size (magnitude) without direction. I can state that vectors have both size (magnitude) and direction. I can list some common scalars and vectors. I can use arrows to represent the directions of forces. I can give examples of contact and non-contact forces. I can compare the sizes of forces using the unit newton (N). I can label a diagram showing several forces acting on an object. I can calculate a resultant force from two parallel forces acting in opposite directions. I can state that a non-zero resultant force will cause a change in motion and a zero resultant force will not.	**Displacement: distance in a given direction.** **Force: a force (in newtons, N) can change the motion of an object.** **Friction: the force opposing the relative motion of two solid surfaces in contact.** **Load: the weight of an object raised by a device used to lift the object, or the force applied by a device when it is used to shift an object.** **Magnitude: the size or amount of a physical quantity.** **Newton's first law of motion: if the resultant force on an object is zero, the object stays at rest if it is stationary, or it keeps moving with**	Homework and Independent Study HW: Assessed past-paper questions. Kerboodle / Seneca online task(s). Revision: For topic test at end of the topic (PP-style questions, ~40 mins) IS: Textbook spread questions on each topic, to self-assess. Use of online resources including BBC Bitesize, physicandmathstutor.com, Seneca Learning and Kerboodle textbook. Especially check the "Appendices". YouTube channels – Free Science Lessons, Primrose Kitten. S & C: ZigZag AQA GCSE Stretch and Challenge Packs on Teams / SharePoint. BBC Science and Tech news sections (https://www.bbc.co.uk/news, independent research). End of topic test

	Find the centre of mass of an object suspended from a fixed point. **Find the centre of mass of a symmetrical object.** **Use your knowledge of forces and turning force to explain why objects at rest don't turn.** **Identify the forces that can turn an object about a fixed point.** **Identify whether a turning force that can turn an object turns it clockwise or anticlockwise.** **Calculate the size of a force (or its perpendicular distance from a pivot) acting on an object that is balanced.** **State what a parallelogram of forces is.** **State what a parallelogram of forces is used for.** **Write down what is needed to draw a scale diagram of a parallelogram of forces.** **Use a parallelogram of forces to find the resultant of two forces.** **Describe what resolving a force means.** **Describe how to resolve a force into two components.** **Define equilibrium.** **Explain why an object at rest is in equilibrium.**	I can state the factors that affect the size of a moment. I can calculate the moment of a force using the appropriate equation and base unit. I can record experimental data clearly. I can identify levers being used as force multipliers. I can calculate the forces produced by force multipliers. I can state that gears can be used to increase or decrease the size of forces. I can identify the approximate centre of mass of a range of simple shapes. I can state that a suspended object will come to rest so that the centre of mass lies below the point of suspension. I can use lines of symmetry to identify the location of the centre of mass. I can calculate moments using the appropriate equation. I can state the principle of moments.	**the same speed in the same direction.** **Newton's third law: when two objects interact with each other, they exert equal and opposite forces on each other.** **Parallelogram of forces: a geometrical method used to find the resultant of two forces that do that do not act along the same line.** **Resultant force: a single force that has the same effect as all the forces acting on the object.** **Scalars: a physical quantity, such as mass or energy that has magnitude only (unlike a vector which has magnitude and direction).** **Vector: a vector is a physical, such as displacement or velocity that has a magnitude and a direction (unlike a**	

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		I can find the weight of an object using a balanced beam.	**scalar which has magnitude only).**	
Forces 2	Calculate speed for an object moving at constant speed. Use a distance-time graph to determine whether an object is stationary or moving at constant speed. State what the gradient of the line on a distance-time graph can tell you. Use the equation for constant speed to calculate distance moved or time taken. State the difference between speed and velocity. Calculate the acceleration of an object. State the difference between acceleration and deceleration. Explain that motion in a circle involves constant speed but changing velocity. Measure velocity change. State what the horizontal line on a velocity-time graph tells you. Use a velocity time graph to work out whether an object is accelerating or decelerating.	I can state that the gradient of a distance-time graph represents the speed. I can estimate typical speeds for walking, running, and cycling. I can calculate the distance an object at constant speed will travel in a given time. I can describe the difference between speed and velocity using an appropriate example. I can recall he equation relating velocity, acceleration, and time. I can calculate the acceleration of an object using the change in velocity and time. I can identify the feature of a velocity-time graph which represents the acceleration (the gradient), and compare these values.	**Acceleration: change of velocity per second (in metres per second per second (m/s2).** **Deceleration: change of velocity per second when an object slows down.** **Displacement: distance in a given direction.** **Distance-time graph: a graph of the distance travelled against time for a moving object. The gradient of the line on a distance-time graph gives us the speed.** **Force: a force (in newtons, N) can change the motion of an object.** **Magnitude: the size or amount of**	**<u>Homework and Independent Study</u>** HW: Assessed past-paper questions. Kerboodle / Seneca online task(s). Revision: For topic test at end of the topic (PP-style questions, ~40 mins) IS: Textbook spread questions on each topic, to self-assess. Use of online resources including BBC Bitesize, physicandmathstutor.com, Seneca Learning and Kerboodle textbook. Especially check the "Appendices". YouTube channels – Free Science Lessons, Primrose Kitten. S & C: ZigZag AQA GCSE Stretch and Challenge Packs on Teams / SharePoint. BBC Science and Tech news sections (https://www.bbc.co.uk/news, independent research). End of topic test

	State what the area under a velocity-time graph tells you. Calculate speed from a distance-time graph where the speed is constant. Calculate speed from a distance-time graph where the speed is changing. Calculate the acceleration from a velocity-time graph. Calculate the distance from a velocity-time graph.	I can identify the feature of a velocity-time graph which represents the distance travelled (the area beneath the line), and compare these values. I can measure the acceleration of an object as it moves down a ramp. I can identify speed on a distance-time graph using change in gradient. I can identify acceleration on a velocity-time graph using change in gradient. I can calculate the distance travelled by an object at constant velocity using data extracted from a graph.	**a physical quantity.** **Newton's first law of motion: if the resultant force on an object is zero, the object stays at rest if it is stationary, or it keeps moving with the same speed in the same direction.** **Scalars: a physical quantity, such as mass or energy that has magnitude only (unlike a vector which has magnitude and direction).** **Vector: a vector is a physical, such as displacement or velocity that has a magnitude and a direction (unlike a scalar which has magnitude only).** **Velocity: speed in a given direction**	

			(in metres/second, m/s). **Velocity-time graph: a graph of velocity against time for a moving object. The gradient of the line on a velocity-time graph gives us the acceleration. The area under the graph gives us the distance travelled.**	
Forces 3	Describe how the acceleration of an object depends on the size of the resultant force acting upon it. Describe the effect that the mass of an object has on its acceleration. Describe how to calculate the resultant force on an object from its acceleration and its mass. State what the inertia of an object means. Describe the difference between mass and weight. Describe and explain the motion of a falling object acted on only by gravity. State what terminal velocity means.	I can state the factors that will affect the acceleration of an object acted on by a resultant force. I can calculate the force required to cause a specified acceleration on a given mass. I can investigate a factor that affects the acceleration of a mass. I can state the difference between the mass of an object and its weight. I can describe the forces acting on an object falling through a fluid. I can investigate the motion of an object when it falls.	**Braking distance: the distance travelled by a vehicle during the time it takes for its brakes to act.** **Conservation of momentum: in a closed system, the total momentum before an event is equal to the total momentum after the event.** **Momentum is conserved in any collision or explosion, provided no**	**<u>Homework and Independent Study</u>** HW: Assessed past-paper questions. Kerboodle / Seneca online task(s). Revision: For topic test at end of the topic (PP-style questions, ~40 mins) IS: Textbook spread questions on each topic, to self-assess. Use of online resources including BBC Bitesize, physicandmathstutor.com, Seneca Learning and Kerboodle textbook. Especially check the "Appendices". YouTube channels – Free Science Lessons, Primrose Kitten.

	State what can be said about the resultant force acting on an object that is falling at terminal velocity. Describe the forces that oppose the driving force of a vehicle. State what the stopping distance of a vehicle depends on. State what can cause the stopping distance of a vehicle to increase. Describe how to estimate the braking force of a vehicle. Calculate momentum and state the unit of momentum Describe what momentum means in a closed system. Describe what happens when two objects push each other apart. Explain how momentum can be described as having direction as well as size. Explain why two objects that push each other apart always move away at different speeds. Explain what happens to the momentum of two objects when they collide. State what elastic means. Describe how to measure the extension of an object when it is stretched. Describe how the extension of a spring changes with the force applied to it.		**external forces act on the objects that collide or explode.** **Directly proportional: a graph will show this if the line of best fit is a straight line through the origin.** **Elastic: a material is elastic if it is able to regain its shape after it has been squashed or stretched.** **Gravitational field strength: the force of gravity on an object of mass 1kg (in newtons per kilogram, N/kg). It is also the acceleration of free fall.** **Hooke's Law: the extension of a spring is directly proportional to the force applied, as long as its limit of proportionality is not exceeded.**	S & C: ZigZag AQA GCSE Stretch and Challenge Packs on Teams / SharePoint. BBC Science and Tech news sections (https://www.bbc.co.uk/news, independent research). End of topic test

	State what the limit of proportionality of a spring means.		**Inertia: the tendency of an object to stay at rest or to continue in uniform motion. Limit of proportionality: the limit for Hooke's law applied to the extension of a stretched spring. Mass: the quantity of matter in an object – a measure of the difficulty of changing the motion of an object (in kilograms, kg). Momentum: this equals mass (kg) x velocity (m/s). Newton's Second Law of motion: the acceleration of an object is proportional to the resultant force on the object, and inversely proportional to**	

			the mass of the object. **Stopping distance: the distance travelled by the vehicle in the time it takes for the driver to think and brake.** **Terminal velocity: the velocity reached by an object when the drag force on it is equal and opposite to the force making it move.** **Thinking distance: the distance travelled by the vehicle in the time it takes the driver to react.** **Weight: the force of gravity on an object (in newtons, N).**	
Waves 1	**Describe what waves can be used for.**	I can state that waves can transfer energy and	**Amplitude: the size of vibrations or the maximum**	**<u>Homework and Independent Study</u>** HW: Assessed past-paper questions.

	Describe what transverse waves are. **State what longitudinal waves are.** **State which types of wave are transverse and which are longitudinal.** **Define the amplitude, frequency, and wavelength of a wave mean.** **Describe how the period of a wave is related to its frequency.** **State the relationship between the speed, wavelength, and frequency of a wave.** **Use the wave speed equation in calculations.** **Draw the patterns of reflection and refraction of plane waves in a ripple tank.** **Determine whether plane waves that cross a boundary between two different materials are refracted.** **Explain reflection and refraction using the behaviour of waves.** **Describe what can happen to a wave when it crosses a boundary between two different materials.** **State what sound waves are.** **State what echoes are.** **Describe how to measure the speed of sound in air.** **State what affects the loudness of a musical note.**	information without the transfer of matter. I can identify waves as either transverse or longitudinal. I can identify waves as either mechanical or electromagnetic. I can outline the derivation of the wave speed equation. I can calculate the period of a wave from its frequency. I can measure the speed of a water wave.	**distance a particle moves away from its resting position when a wave passes.** **Compression: squeezing together.** **Electromagnetic waves: a group of waves that all travel at the same speed in a vacuum, and are all transverse.** **Frequency: the number of cycles of a wave per second, measured in hertz (Hz).** **hertz (Hz): the unit for frequency, 1 hertz is 1 wave per second.** **Longitudinal wave: a wave where the vibrations are parallel to the direction in which the wave is travelling, i.e. in a sound wave.**	Kerboodle / Seneca online task(s). Revision: For topic test at end of the topic (PP-style questions, ~40 mins) IS: Textbook spread questions on each topic, to self-assess. Use of online resources including BBC Bitesize, physicandmathstutor.com, Seneca Learning and Kerboodle textbook. Especially check the "Appendices". YouTube channels – Free Science Lessons, Primrose Kitten. S & C: ZigZag AQA GCSE Stretch and Challenge Packs on Teams / SharePoint. BBC Science and Tech news sections (https://www.bbc.co.uk/news, independent research). End of topic test

	Explain how sound waves are detected by the ear. **Explain why human hearing is limited.**		**Mechanical wave: vibration that travels through a substance.** **Medium: material through which electromagnetic waves travel.** **Period: the time taken for one complete wave to pass a point. It is measured in seconds.** **Rarefaction: stretched apart.** **Reflection: the change in direction of a light ray or wave at a boundary when the ray or wave stays in the incident medium.** **Refraction: the change in direction of light ray when it passes across a boundary between two transparent substances (including air).**	

			Seismic wave: vibrations in the rocks of the Earth caused by earthquakes or explosions. There are transverse and longitudinal seismic waves. **Speed: the speed of an object (metres per second) = distance moved by the object (metres) ÷ time taken to move the distance travelled (seconds).** **Transmission: A wave passing through a substance.** **Transverse wave: a wave where the vibration is perpendicular to the direction of energy transfer.** **Ultrasound: sound wave at a frequency greater than 20 000 Hz**	

			(the upper frequency limit of the human ear). Wavelength: the distance from one wave crest to another.	
Waves 2	State the parts of the electromagnetic spectrum. Explain the range of wavelengths within the electromagnetic spectrum that the human eye can detect. Describe how energy is transferred by electromagnetic waves. Calculate the frequency or wavelength of electromagnetic waves. Describe the nature of white light. List some uses of infrared radiation, microwaves, and radio waves. State what mobile phone radiation is. Explain why these types of electromagnetic radiation are hazardous. Explain why radio waves of different frequencies are used for different purposes.	I can state that electromagnetic waves transfer energy without transferring matter. I can identify the position of EM waves in the spectrum in order of wavelength and frequency. I can state that all EM waves travel at the same speed in a vacuum. I can state that white light is a part of the EM spectrum and composed of a range of frequencies. I can list some simple examples of the uses of light, microwaves, and radio waves. I can carry out a practical task to determine the	Charge-coupled device (CCD): an electronic device that creates an electronic signal from an optical image formed on the CCD's array of pixels. Contrast medium: an x-ray absorbing substance used to fill a body organ so the organ can be seen on a radiograph. Gamma rays: a high frequency electromagnetic wave emitted from the nucleus of a radioactive atom. Gamma rays have the highest frequency in the	Homework and Independent Study HW: Assessed past-paper questions. Kerboodle / Seneca online task(s). Revision: For topic test at end of the topic (PP-style questions, ~40 mins) IS: Textbook spread questions on each topic, to self-assess. Use of online resources including BBC Bitesize, physicandmathstutor.com, Seneca Learning and Kerboodle textbook. Especially check the "Appendices". YouTube channels – Free Science Lessons, Primrose Kitten. S & C: ZigZag AQA GCSE Stretch and Challenge Packs on Teams / SharePoint. BBC Science and Tech news sections (https://www.bbc.co.uk/news, independent research). End of topic test

	State which waves are used for satellite TV. Describe how to decide whether or not mobile phones are safe to use. Describe how fibre optics are used in communications. Describe what a carrier wave is. Describe the differences between ultraviolet and visible light. List some uses of X-rays and gamma rays. State ionising radiation. Explain why ultraviolet waves, X-rays, and gamma rays are dangerous. Describe what x –rays are used for in hospitals. State which parts absorb x-rays when they pass through the body. Explain the difference between the uses of low- and high-energy X-rays in hospitals.	penetrating power of an electromagnetic signal. I can state that radio waves and microwaves are used in communications through the atmosphere. I can state that the higher the frequency of a wave, the greater the rate of data transfer possible. I can describe the sub-regions of the radio spectrum. I can state that high-frequency EM radiation is ionising. I can describe the uses and dangers of UV radiation. I can describe the uses and dangers of X-rays and gamma radiation. I can state some safety procedures that take place during the operation of devices that produce ionising radiation. I can describe the formation of an X-ray	electromagnetic spectrum. Infrared radiation: electromagnetic waves between visible light and microwaves in the electromagnetic spectrum. Ionisation: a process in which atoms become charged. Microwaves: electromagnetic waves between infrared radiation and radio waves in the electromagnetic spectrum. Radiation dose: amount of ionising radiation a person receives. Radio waves: electromagnetic waves of wavelengths greater than 0.10m. Ultraviolet radiation:	

		photograph in terms of absorption or transmission. I can state that X-ray therapy can be used to kill cancerous cells in the body.	electromagnetic waves between visible light and x-rays on the electromagnetic spectrum. Visible light: electromagnetic waves that can be detected by the human eye. Wave speed: the distance travelled per second by a wave crest or trough. X-rays: electromagnetic waves smaller in wavelength than ultraviolet radiation produced by x-ray tubes.	