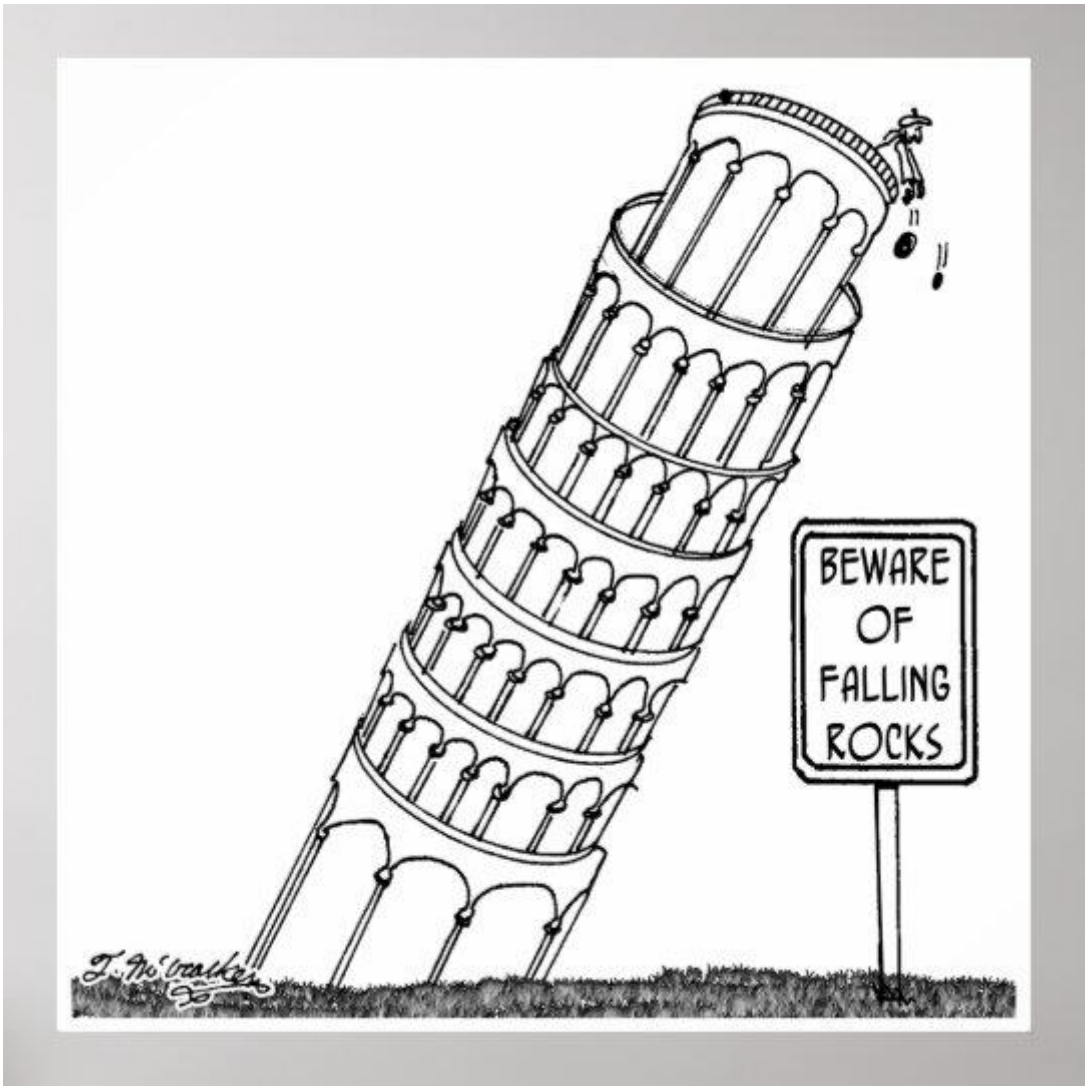
Name……

MYTON SCHOOL

Bridging the Gap
Moving from GCSE to A-Level



KS5 Physics at Myton School

Welcome to Physics

This booklet has been designed to help you move from a GCSE science student into an A Level Physics student.

Even if you did “triple science”, you still need to bridge the gap. The gap is larger than a lot of students think and by spending time reading below, it will tell you what you have let yourself in for, explain the expectations and ensure that you are ready for your new course in September.

Over the summer holidays, you must complete the transition booklet (a separate booklet to this). You may wish to work through the “Head Start” book by CGP as well. We have a few copies you may be able to borrow or you can buy a copy.

It is strongly recommended that you purchase a textbook, though you can borrow one from the LRC.

At the back of this document, there is a checklist that will help you prepare for September. By doing this, we believe it will best prepare you to succeed in what is one of the hardest A Levels that you could have chosen.

During your second week back (or thereabouts), you will have two exams that will reveal your suitability for the course. It will give you and your teacher an indication of areas of weakness so that we can best support you.

Y12 Physics – course outline

Content:	Assessment (for AS only):
• ***Module 1: Development of practical skills in physics*** Assessed in the exam • ***Module 2: Foundations of physics*** *Physical quantities and units, making measurements and analysing data, nature of quantities* • ***Module 3: Forces and motion*** *Motion, forces in action, work energy & power, materials, momentum* • ***Module 4: Electrons, waves and photons*** *Charge & current, energy power & resistance, electrical circuits, waves, quantum physics*	**Breadth in physics (worth 50% of AS)** 20 marks multiple choice, 50 marks written answers **Depth in physics (worth 50% of AS)** 70 marks written answers **Both 1hr 30mins** *EXAMINED IN JUNE* It is anticipated that very few, if any students will sit the AS exam. There will, however, be a mock exam at the end of this year covering the content taught.

Y13 Physics – course outline

The content is in addition to that studied in Y13, **but the exams will cover all of the work over the 2 years**.

Content:	Assessment:
• ***Module 5: Newtonian world and astrophysics*** *Thermal physics, circular motion, oscillations, gravitational fields, astrophysics & cosmology* • ***Module 6: Particles and medical physics*** *Capacitors, electric fields, electromagnetism, nuclear & particle physics, medical imaging*	**Modelling physics (worth 37%)** 15 marks multiple choice, 85 marks written answers (modules 1,2,3 & 5) **2hr 15mins** **Exploring physics (worth 37%)** 15 marks multiple choice, 85 marks written answers (modules 1,2,4 & 6) **2hr 15mins** **Unified physics (worth 26%)** 70 marks written answers (modules 1-6) **1hr 30mins** *EXAMINED IN JUNE*

How hard is my physics A Level going to be?

Congratulations! You have chosen one of the hardest subjects that there is. *The following page has Ten Commandments that if followed will lead to your success.*

Over the course you will have 10 hours of lessons per fortnight that will cover all the theory and practical skills you will need. You will be given homework questions nearly every lesson and these will be expected to be completed by the next lesson in most cases.

At A Level you are expected to be spending 5 hours per week out of class completing homework, reviewing your work and reading around the subject.

In addition to the lessons you will receive, there are also plenty of support options available:

- Teachers: Your teacher is your first point of call as they are the experts – you will have 2 experienced teachers who will always offer their time when they are available to help you in and out of lessons. If you cannot find your teacher, please email us
- Mr Benjamin (benjamin.j@myton.co.uk)
  Mr Cannon (cannon.c@myton.co.uk)
  Mr Isaac (isaac.w@myton.co.uk
- Homework booklets – These are on the HAP
- Intervention: You will be told a night when staff or Y13 students will always be available to help you on anything you are struggling with. However, your teachers are always happy with you coming to find them to ask questions.
- Textbook: This will be available to purchase from us in September or to borrow from the LRC.
- Revision Guides: We do not ordinarily sell revision guides ourselves, but if you would like advice – ask!
- Specification and past papers: These are on the HAP and you will be given a copy of the specification. You MUST read through the specification as it can be used as tick sheet in time for your exam.

The Ten Commandments for Success in Physics

1 **Success needs organisation.** In addition to your stationery items, you need to bring your text-book, "Homework Book" and 3 – 4 weeks of previous work ***every lesson***. In your folder, you should have your Unit 1 and 2 logs at the front filled in to date.

2 **Success needs knowledge of *what* to learn.** Use lesson objectives plus recent previous work, the text-book and the specifications in the Workbook to inform your learning.

3 **Success needs good *initial* learning.** Ensure you leave each lesson with objectives mastered.

4 **Success needs a "stuck menu".** Know what to do when you didn't get a piece of content the first time. In particular, know when you are going to ask the teacher.

5 **Every 60 minutes of lesson needs 45 – 60 minutes of additional work.** The teacher will give many suggestions and a long deadline. Do the most appropriate work.

6 **All additional work needs to produce a product.** You should be answering questions or making additional notes. Reading is to look stuff up. Background reading is for historians.

7 **Doing additional work as a team can be a weakness or a strength.** Never be satisfied with work that is very similar to someone else's or which you don't fully understand.

8 **All deadlines should be met.** The work you are told to hand in is the tip of the iceberg. If you miss a deadline, how seriously are you taking the work you're not handing in?

9 **Work should be filed by chapter.** Keep in the same area of your folder: notes made in lessons plus additional notes made outside lessons, SAQ answers, Worksheet answers, sample-marked by the teacher then marked and corrected by you and any other written tasks set by your teacher.

10 **It won't be "all right on the night"** unless you plan for it to be. If you feel that your learning is sliding into a mess, do something straight away including seeking help.

It is very easy to feel overwhelmed (physics is hard!). The WORST thing you can do is to think it will get better if it is forgotten about / glossed over. Be true to yourself and **ask for help before it is too late**.

The following pages outline what knowledge is expected in time for your test when you start in September.

Mathematical content

Do I need to be good at maths? ***The simple answer to this is 'yes'.***

Do I need to be studying A-Level maths? ***No, but it helps.***

BUT we are mindful that students will have a range of mathematical ability. The OCR course has been developed so that all of the physics in AS level can be explained with a good understanding of GCSE mathematics (that is why we expect students to attain at least a grade B at GCSE maths).

At A-level however, some more difficult maths is necessary to help explain concepts and analyse data but these skills will be developed as you study. Do not panic!

If you have chosen to do maths as one of your AS level courses then you will have an advantage, especially if you are taking mechanics modules as there is a massive overlap, but again, it is not essential.

A summary of the mathematical requirements expected are below:

1 Arithmetic and numerical computation:
(a) recognise and use expressions in decimal and standard form;
(b) use ratios, fractions and percentages;
(c) use calculators to find and use power, exponential and logarithmic functions;
(e) use calculators to handle sin x, cos x, tan x when x is expressed in degrees or radians.
2 Handling data:
(a) use an appropriate number of significant figures;
(b) find arithmetic means;
(c) make order of magnitude calculations.
3 Algebra:
(a) understand and use the symbols: =, <, <<, >>, >, ∝, ~;
(b) change the subject of an equation;
(c) substitute numerical values into algebraic equations using appropriate units for physical quantities;
(d) solve simple algebraic equations.
4 Graphs:
(a) translate information between graphical, numerical and algebraic forms;
(b) plot two variables from experimental or other data;
(c) understand that $y = mx + c$ represents a linear relationship;
(d) determine the slope and intercept of a linear graph;
(e) draw and use the slope of a tangent to a curve as a measure of rate of change;
(f) understand the possible physical significance of the area between a curve and the x axis and be able to calculate it or measure it by counting squares as appropriate;
(g) use logarithmic plots to test exponential and power law variations;
(h) sketch simple functions including $y = k/x$, $y = kx^2$, $y = k/x^2$, $y = \sin x$, $y = \cos x$, $y = e^{-x}$.
5 Geometry and trigonometry:
(a) calculate areas of triangles, circumferences and areas of circles, surface areas and volumes of rectangular blocks, cylinders and spheres;
(b) use Pythagoras' theorem, and the angle sum of a triangle;
(c) use sin, cos and tan in physical problems;
(d) understand the relationship between degrees and radians and translate from one to the other;
(e) use relationship for triangles:

$$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C} \text{ and } a^2 = b^2 + c^2 - 2bc\cos A.$$

Physics ideas you should be comfortable with:

Can you…?	☺	😐	☹
Energy and energy resources			
Describe ways in which energy can be stored.			
Describe how energy can be transferred.			
Describe the energy transfers that happen when an object falls.			
Describe the energy transfers that happen when a falling object hits the ground without bouncing back.			
Describe what conservation of energy is.			
Explain why conservation of energy is a very important idea.			
Describe what a closed system is.			
Describe energy transfers in a closed system.			
Describe what work means in science.			
Describe how work and energy are related.			
Calculate the work done by a force.			
Describe what happens to work that is done to overcome friction.			
Describe what happens to the gravitational potential energy store of an object when it moves up and down.			
I can explain why an object moving up increases its gravitational potential energy store.			
Explain why it is easier to lift an object on the Moon rather than on Earth.			
Calculate the change in gravitational potential energy of an object when it moves up and down.			
Write down what the kinetic energy of an object depends on.			
Calculate kinetic energy.			
Describe what an elastic potential energy store is.			
Calculate the amount of energy in an elastic potential energy store.			
Describe what is meant by useful energy.			
Describe what is meant by wasted energy.			
Describe what eventually happens to wasted energy.			
Describe if energy is still as useful after it is used.			
Describe what is meant by efficiency.			
Write down the maximum efficiency of any energy transfer.			
Describe how machines waste energy.			
Describe how energy is supplied to our homes.			
Explain why electrical appliances are useful.			
Describe what most everyday electrical appliances are used for.			
Explain how to choose an electrical appliance for a particular job.			
Describe what is meant by power.			
I can calculate the power of an appliance.			
Calculate the efficiency of an appliance in terms of power.			

Can you…?	☺	😐	☹
Energy transfer by heating.			
Write down which materials make the best conductors.			
Write down which materials make the best insulators.			
Describe how the thermal conductivity of a material affects the rate of energy transfer through it by conduction.			
Describe how the thickness of a layer of material affects the rate of energy transfer through it by conduction.			
Describe what the specific heat capacity of a substance means.			
Calculate the energy needed to change the temperature of an object.			
Describe how the mass of a substance affects how quickly its temperature changes when you heat it.			
Describe how to measure the specific heat capacity of a substance.			
Describe how homes are heated.			
Describe how you can reduce the rate of energy transfer from your home.			
Describe what cavity wall insulation is.			
Energy resources.			
Describe how most energy demands are met today.			
Name the energy resources that are used.			
Describe how nuclear fuels are used in power stations.			
Name the other fuels that are used in power stations.			
Name the other fuels that are used to generate electricity.			
Describe what a wind turbine is made up of.			
Describe how waves can be used to generate electricity.			
Name the type of power station that uses water running downhill to generate electricity.			
Describe how the tides can be used to generate electricity.			
Describe what solar cells are and how they are used.			
Describe the difference between a panel of solar cells and a solar heating panel.			
Describe what geothermal energy is.			
Describe how geothermal energy can be used to generate electricity.			
Describe what fossil fuels do to the environment.			
Explain why people are concerned about nuclear power.			
Describe the advantages and disadvantages of renewable energy resources.			
Evaluate the use of different energy resources.			
Describe how best to use electricity supplies to meet variations in demand.			
Compare the economic costs of different energy resources.			
Name energy resources that need to be developed to meet people's energy needs in the future.			

Can you…?	☺	😐	☹
Electric circuits.			
Describe how electric circuits are shown as diagrams.			
Write down the difference between a battery and a cell.			
Describe what determines the size of an electric current.			
Calculate the size of an electric current from the charge flow and the time taken.			
Write down what is meant by potential difference.			
Write down what resistance is and what its unit is.			
Write down Ohm's law.			
Describe what happens when you reverse the potential difference across a resistor.			
Describe what happens to the resistance of a filament lamp as its temperature increases.			
Describe how the current through a diode depends on the potential difference across it.			
Describe what happens to the resistance of a temperature-dependent resistor as its temperature increases.			
Describe what happens to the resistance of a light-dependent resistor as the light level increases.			
Describe the current, potential difference, and resistance for each component in a series circuit.			
Describe the potential difference of several cells in series.			
Calculate the total resistance of two resistors in series.			
Explain why adding resistors in series increases the total resistance.			
Describe the currents and potential differences for components in a parallel circuit.			
Calculate the current through a resistor in a parallel circuit.			
Explain why the total resistance of two resistors in parallel is less than the resistance of the smaller individual resistor.			
Explain why adding resistors in parallel decreases the total resistance.			

Can you…?	☺	😐	☹
Electricity in the Home			
Write down what direct current is and what alternating current is.			
Describe what is meant by the live wire and the neutral wire of a mains circuit.			
Describe the National Grid.			
Describe how to use an oscilloscope to measure the frequency and peak potential difference of an alternating current.			
Describe what the casing of a mains plug or socket is made of and explain why.			
Write down what is in a mains cable.			
Write down the colours of the live, neutral, and earth wires.			
Explain why a three-pin plug includes an earth pin.			
Describe how power and energy are related.			
Use the power rating of an appliance to calculate the energy transferred in a given time.			
Calculate the electrical power supplied to a device from its current and potential difference.			
Work out the correct fuse to use in an appliance.			
Calculate the flow of electric charge given the current and time.			
Write down the energy transfers when electric charge flows through a resistor.			
Describe how the energy transferred by a flow of electric charge is related to potential difference.			
Link the electrical energy supplied by the battery in a circuit to the energy transferred to the electrical components.			
Calculate the energy supplied to an electrical appliance from its current, its potential difference, and how long it is used for.			
Work out the useful energy output of an electrical appliance.			
Work out the output power of an electrical appliance.			
Compare different appliances that do the same job.			

Can you…?	☺	😐	☹
Molecules and matter			
Define density and write down its unit.			
Describe how to measure the density of a solid object or a liquid.			
Use the density equation to calculate the mass or the volume of an object or a sample.			
Describe how to tell from its density if an object will float in water.			
Describe the different properties of solids, liquids, and gases.			
Describe the arrangement of particles in a solid, a liquid, and a gas.			
Explain *why* gases are less dense than solids and liquids.			
Explain why the mass of a substance that changes state stays the same.			
Write down what the melting point of and the boiling point of a substance mean.			
Describe what you need to do to melt a solid or to boil a liquid.			
Explain the difference between boiling and evaporation.			
Use a temperature-time graph to find the melting point or the boiling point of a substance.			
Describe how increasing the temperate of a substance affects its internal energy.			
Explain the different properties of a solid, a liquid, and a gas.			
Describe how the energy of the particles of a substance changes when it is heated.			
Explain in terms of particles why a gas exerts pressure.			
Write down what latent heat means as a substance changes its state.			
Write down what specific latent heat of fusion and of vaporisation mean.			
Use specific latent heat in calculations.			
Describe how to measure the specific heat latent heat of ice and of water.			
Describe how a gas exerts pressure on a surface.			
Describe how changing the temperature of a gas in a sealed container affects the pressure of the gas.			
Explain why raising the temperature of a gas in a sealed container affects the pressure of the gas.			
Describe how to see evidence of gas molecules moving around at random.			
Describe how pressure (or volume) changes affect the volume (or pressure) of the gas.			
Describe why the pressure of a gas changes when its volume is changed at constant temperature.			
Use the equation pV = constant.			
Explain why the temperature of a gas increases when it is compressed quickly enough.			

Can you…?	☺	😐	☹
Radioactivity			
Write down what a radioactive substance is.			
Write down the types of radiation given out from a radioactive substance.			
Write down what happens when a radioactive source emits radiation (radioactive decay).			
Write down the different types of radiation emitted by radioactive sources.			
Describe how the nuclear model of the atom was established.			
Explain why the 'plum pudding' model of the atom was rejected.			
Describe what conclusions were made about the atom from experimental evidence.			
Explain why the nuclear model was accepted.			
Write down what an isotope is.			
Describe how the nucleus of an atom changes when it emits an alpha particle or a beta particle.			
Represent the emission of an alpha particle from the nucleus.			
Represent the emission of a beta particle from the nucleus.			
Write down how far each type of radiation can travel in air.			
Describe how different materials absorb alpha, beta, and gamma radiation.			
Describe the ionising power of alpha, beta and gamma radiation.			
Explain why alpha, beta, and gamma radiation are dangerous.			
Write down what the half-life of a radioactive source means.			
Write down what the count rate from a radioactive source means.			
Describe what radioactive isotopes are used for in medicine.			
Describe how to choose a radioactive isotope for a particular job.			
Describe what type of nuclear radiation be used for medical imaging.			
Explain how to use radioactivity to destroy cancer cells.			
State what nuclear fission is.			
Explain the difference between spontaneous fission and induced fission.			
State what a chain reaction is.			
Describe how a chain reaction in a nuclear reactor is controlled.			
State what nuclear fusion is.			
Describe how nuclei can be made to fuse together.			
Describe where the Sun's energy comes from.			
Explain why it is difficult to make a nuclear fusion reactor.			
State what radon gas is and why it is dangerous.			
Describe how safe nuclear reactors are.			
Explain why nuclear waste is dangerous.			
Explain what happens to nuclear waste.			

Can you…?	☺	😐	☹
Forces in balance			
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 moment of a force measures.			
Calculate the moment of a force.			
Describe how the moment of a force can be increased.			
Describe why levers are force multipliers.			
Describe how levers act as force multipliers.			
Explain how you can tell if a lever is a force multiplier.			
Describe what gears do.			
Explain how gears can give a bigger turning effect.			
State what the centre of mass of an object is.			
State where the centre of mass of a metre ruler is.			
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 moments 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.			

Can you…?	☺	😐	☹
Motion			
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.			
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.			

Can you…?	☺	😐	☹
Force and motion			
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.			
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.			
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.			
Explain what affects the force of impact when two vehicles collide.			
Describe how the impact force depends on the impact time.			
Explain what can be said about the impact forces and the total momentum when two vehicles collide.			
Explain why the impact force depends on the impact time.			
Describe how cycle helmets and cushioned surfaces reduce impact forces.			
Explain why seat belts and air bags reduce the force on people in car accidents.			
Explain how side impact bars and crumple zones work.			
Explain how we can work out if a car in a collision was speeding.			
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.			
State what the limit of proportionality of a spring means.			

Can you…?	☺	😐	☹
Force and pressure			
Define the term pressure.			
State the unit of pressure.			
Use the pressure equation.			
Explain why the area of contact is important in pressure applications.			
Describe how the pressure in a liquid increases with liquid depth.			
Explain why the pressure along a horizontal line in a liquid is constant.			
State what the pressure in a liquid depends on.			
Calculate the pressure caused by a liquid column.			
Explain why the atmosphere exerts a pressure.			
Explain how and why atmospheric pressure changes with altitude.			
Explain how the density of the atmosphere changes with altitude.			
Calculate the force on a flat object due to a pressure difference.			
Explain why the atmosphere exerts a pressure.			
Explain how and why atmospheric pressure changes with altitude.			
Explain how the density of the atmosphere changes with altitude.			
Calculate the force on a flat object due to a pressure difference.			
State what is meant by an upthrust on an object in a fluid.			
Describe what causes upthrust.			
Describe what the pressure in a fluid depends on.			
Explain whether an object in a fluid floats or sinks.			

Can you…?	☺	😐	☹
Wave properties			
Describe what waves can be used for.			
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.			
Explain how sound waves are detected by the ear.			
Explain why human hearing is limited.			
State what ultrasound waves are.			
Explain why ultrasound waves can be used to scan the human body.			
Describe how ultrasound waves are used to measure distances in medicine and in industry.			
Describe why an ultrasound scan is safer than taking an x-ray image.			
State what seismic waves are.			
Explain how seismic waves are produced.			
Describe what primary seismic waves and secondary seismic waves are.			
Explain what information seismic waves give about the structure of the Earth.			

Can you…?	☺	😐	☹
Electromagnetic Waves			
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.			
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.			
Light			
Identify the normal in a diagram of light rays.			
State the law of reflection of a light ray at a plane mirror.			
Describe how an image is formed by a plane mirror.			
Describe what is meant by specular reflection and diffuse reflection.			
Identify where refraction of light can happen.			
Describe how a light ray refracts when it goes from air into glass or from glass into air.			
Describe how the wavelength of light changes across the visible spectrum.			
Explain what determines the colour of a surface.			
Define what a translucent object is.			
Explain the difference between a translucent object and a transparent object.			
Define what a convex lens is.			
Define what a concave lens.			
Calculate magnification.			
Find the position and nature of an image formed by a lens.			
Identify what type of image is formed by a convex lens when the object is between the lens and its principal focus (you may be required to draw this).			
Describe what type of lens is used in a camera and in a magnifying glass.			
Identify what type of image is formed in a camera and what type in a magnifying glass.			

Can you…?	☺	😐	☹
Chapter 15: Electromagnetism			
State the force rule for two magnetic poles near each other.			
Describe the pattern of magnetic field lines around a bar magnet.			
Describe what induced magnetism is.			
Explain why steel, not iron, is used to make permanent magnets.			
Describe the pattern of the magnetic field around a straight wire carrying a current and in and around a solenoid.			
Describe how the strength and direction of the field varies with position and with the current.			
Describe what a uniform magnetic field is.			
Describe what an electromagnet is.			
State what electromagnets can be used for.			
Explain how devices that use electromagnets work.			
Describe how to change the size and reverse the direction of the force on a current-carrying wire in a magnetic field.			
Explain how a simple electric motor works.			
Explain what is meant by magnetic flux density.			
Calculate the force on a current-carrying wire.			
Explain what the generator effect is.			
Explain how a potential difference can be induced in a wire.			
Describe what affects the size of the induced potential difference.			
Deduce the direction of an induced current.			
Describe how a simple alternator (alternating-current generator) is constructed and operated.			
Describe how the induced potential difference of an a.c. generator varies with time.			
Explain how a simple dynamo (direct-current generator) is constructed and operated.			
State what transformers are used for.			
Describe what a step-up transformer does and what a step-down transformer does.			
Explain why transformers only work with a.c.			
Describe what a transformer is made up of.			
Explain how the ratio of the primary potential difference to the secondary potential difference depends on the number of turns on each coil.			
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.			
State what you can say about a transformer that is 100% efficient.			
Explain why less power is wasted by using high potential difference to transfer power through the grid system.			

Can you…?	☺	😐	☹
Space			
Describe how the solar system formed.			
Describe what is meant by a protostar.			
Explain how energy is released inside the Sun.			
Explain why the Sun is stable.			
Explain why stars eventually become stable.			
Explain the stages in the life of a star.			
Describe what will eventually happen to the Sun.			
Describe what a supernova is.			
State what forces keep planets and satellites moving along their orbits.			
Identify the direction of the force on an orbiting body in a circular orbit.			
Describe how the velocity of a body in a circular orbit changes as the body moves around the orbit.			
Explain why an orbiting body needs to move at a particular speed for it to stay in a circular orbit.			
State what is meant by the red-shift of a light source.			
Explain how red-shift depends on speed.			
Explain how people know that the distant galaxies are moving away from Earth.			
Explain why people think the Earth is expanding.			
Describe what the Big Bang theory of the universe is.			
Explain why the universe is expanding.			
Explain what cosmic microwave background radiation is.			
Explain what evidence there is that the universe was created in a Big Bang.			