Bishop Walsh Catholic School
Physics Department

Year 11 Mock Exams 2015
Revision Lists and Tips

Introduction and Grade Boundaries

If you are studying Physics as a separate GCSE, as opposed to studying Physics as part of the Core & Additional GCSEs, then you will be sitting two papers for the Mock Exams. They will both be full past GCSE papers; one of which will be a P1 Universal Physics paper and the other will be a P2 Physics for Your Future paper. Both of these papers will be of 1 hour duration and be worth 60 marks in total. As an approximate guide you should be aiming for 27 marks for a Grade C and 48 for an A*.

Topics that will be covered

The following pages list the topics and objectives that could be covered on the Mock Exams. Obviously, this is a far greater amount of subject knowledge that could possibly feature on the exam papers. What you should remember however, that in reality Physics has far less to remember than other GCSE subjects as the principles that you will have learnt in lessons and homework can be applied in lots of different ways and can also linked to each other.

These topic and objective sheets are also exactly the same as those that you have in your exercise books, so it should be relatively easy to locate the sections of work that you have completed in lessons and homework.

In essence, what you will find is that there will be one question per topic on the exam papers.

Sources of Revision Materials

There are many resources that have been placed in the Physics section of the school's VLE: these include

Past Exam Papers

Mark Schemes

Workbooks for the P1 Topics

Revision Notes and Questions

Obviously, these are not the only sources of revision material; there are many revision resources available on the Internet. Some of the best are:

BBC Bitesize, www.s-cool.co.uk/gcse/physics, www.gcsescience.com/gcse-physics-revision.htm, www.cyberphysics.co.uk

We would advise avoiding student chatrooms and such like, as these can sometimes give misleading information and be somewhat scaremongering.

Tips and Hints

Though you are provided with all the equations and formulae that you might need for the exams, we still recommend that you learn them off by heart. You may disagree, but experience has shown that if you have learnt the formulae and equations you will identify which ones you need to use in answering a particular question much more quickly.

Also, you should also learn the units for the different Physics quantities as there are usually marks awarded for including the units in your answers to numerical problems. Don't throw away easy marks!

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Remember to show your working out in numerical problems. Start by writing out the formula; rearrange if necessary and then substitute the numbers in. You will pretty much inevitably get the correct answer, but if for any reason you don't , then you have every chance of securing marks for your methodology. If you don't show any working and get the correct answer you can score full marks, but get the answer wrong and its zero! Is it worth the risk?

When interpreting graphs, for example to determine half-life, you should always draw the construction lines on them and make them obvious and clear to see. The question will often ask you to show your working. Do so.

In your written answers, you should write in good English, never bullet pointing, but making your answers clear and concise. Don't waffle however, there will be enough space provided to write the answer that is required.

For the 6 mark questions remember that the marks are awarded in 3 bands. Level 1 is a limited answer worth 1-2 marks that provides one or two basic statements in response to the question. Level 2 answers, worth 3-4 marks, will provide well constructed responses with two or three explanations which relate to the question. Level 3 answers, worth 5-6 marks, will provide clear, concise and accurate responses which often will require you to compare and contrast two things that are described in the question.

You will never get beyond Level 1 if you bullet point: this will be considered as a limited use of English and will restrict you to that level.

Above all, answer the question that is printed, not what you think that it said. For that reason, you should always read the question through more than once. Futhermore, the different sections of the question often link to each other and later sections may refer to previous ones, or even to information contained in the initial part, so you may need to revisit it.

P1 Topics, Objectives and Targets

Topic 1: Visible Light and the Solar System

	Learning Objective	**I am confident I do this well**	**I am OK at this**	**I struggle with this and need help**
1.1	I am able to explain why our understanding the structure of the Solar System has changed over time			
1.2	I can describe how scientists investigate the Milky Way and the Universe			
1.3	I can explain how Galileo's observations led to the acceptance of the heliocentric model of the Solar System			
1.4	I can compare different ways of observing the Universe in terms of the detail they provide			
1.5	I can describe an experiment to determine the focal length of a converging lens			
1.6	I can describe the image formed by a converging lens, using scientific terms such as real, virtual, upright, inverted, magnified, diminished			
1.7	I can investigate factors that affect the			

	magnification of a converging lens			
1.8	I can describe how a simple **refracting** telescope works			
1.9	I can describe how a reflecting telescope works			
1.9	I can compare the relative advantages and disadvantages of reflecting and refracting telescopes			
1.10	I can explain what happens to waves when they meet the boundary of two substances			
1.11	I can explain the refraction of waves at a boundary between two substances			
1.12	I can describe how waves transfer energy without transferring matter			
1.13	I know how to use the terms frequency, amplitude, wavelength and waves speed when describing waves			
1.14	I know the difference between transverse and longitudinal waves and can state examples of each			
1.15	I can use the following equations to describe waves Wave speed = frequency x wavelength Wave speed = distance ÷ time			

Topic 2: The Electromagnetic Spectrum

	Learning Objective	**I am confident I do this well**	**I am OK at this**	**I struggle with this and need help**
2.1	Demonstrate an understanding of how Herschel and Ritter contributed to the discovery of waves outside the limits of the visible spectrum			
2.2	I know that all electromagnetic waves are transverse and that they travel at the same speed in a vacuum			
2.3	I can list the continuous electromagnetic spectrum in order: radio waves, microwaves, infrared, visible (including the colours of the visible spectrum), ultraviolet, X-rays and gamma rays			
2.4	I can group the electromagnetic spectrum in order of decreasing wavelength and increasing frequency			
2.5	I understand that the potential danger associated with an electromagnetic wave increases with increasing frequency			
2.6	I can Relate the harmful effects, to bodily tissues and life, of excessive exposure to the frequency of the electromagnetic radiation			
2.7	I can describe some uses of each part of the electromagnetic radiation			
2.8	I know that ionising radiations are emitted all the time by radioactive sources			
2.9	I can describe three types of ionising radiation			

	includes alpha and beta particles and gamma rays and know that they transfer energy			

Topic 3: Waves and the Universe

	Learning Objective	**I am confident I do this well**	**I am OK at this**	**I struggle with this and need help**
3.1	I know that the Solar System is part of the Milky Way galaxy			
3.2	I can describe a galaxy as a collection of stars			
3.3	I know that the Universe includes all of the galaxies			
3.4	I can compare the relative sizes of and the distances between the Earth, the Moon, the planets, the Sun, galaxies and the Universe			
3.5	I can explain why we have to use other regions of the electromagnetic spectrum in some modern telescopes			
3.6	I can describe the methods used to gather evidence for life beyond Earth, including space probes, soil experiments by landers, Search for Extraterrestrial Intelligence (SETI)			
3.7	I can communicate an understanding of the impact of data gathered by modern telescopes on our understanding of the Universe			
3.8	I can construct a simple spectrometer, from a CD or DVD, and use it to analyse common light sources			
3.9	I can explain why some telescopes are located outside the Earth's atmosphere			
3.10**H**	I can analyse data which supports the location of telescopes outside the Earth's atmosphere			
3.11	I can describe the life cycle of stars of similar mass to the Sun			
3.12	I can describe the role of gravity in the life cycle of stars			
3.13**H**	I can describe the life of stars with a mass larger than the Sun, and how this may end in a black hole or neutron star			
3.14	*I can provide an outline of the key points of the Steady State and Big Bang theories*			
3.15	*I can describe the evidence which supports the Big Bang theory,*			
3.16	*I can explain why the Big Bang theory is the currently accepted model for the origin of the Universe than the Steady State theory*			
3.17	I know that if a wave source is moving relative to an observer there will be a change in the observed frequency and wavelength			
3.18**H**	I can demonstrate an understanding that if a wave			

	source is moving relative to an observer there will be a change in the observed frequency and wavelength			
3.19**H**	I can describe what red-shift in light received from galaxies is			
3.20**H**	I can explain why the red-shift of galaxies provides evidence for the Universe expanding			

Topic 4: Waves and the Earth

	Learning Objective	**I am confident I do this well**	**I am OK at this**	**I struggle with this and need help**
4.1	I know what ultrasound is			
4.2	I can describe uses of ultrasound including sonar, foetal scanning and animal communication			
4.3	I can calculate depth or distance from time and velocity of ultrasound			
4.4	I can use and apply the formulas for calculating wave speed v = f x □ and v = d ÷ t			
4.6	I know where seismic waves come from			
4.7	I can investigate and account the unpredictability of earthquakes by experiment			
4.8	I can explain why scientists find it difficult to predict earthquakes and tsunamis			
4.9	I know the properties of the two main types of seismic wave			
4.10	I can explain how data from seismometers can be used to locate an earthquake			
4.11	I can describe and explain how P and S waves travel inside the earth including refraction and reflection			
4.12	I can explain how plate tectonics works			
4.13	I can describe how earthquakes may often arise at plate boundaries			

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Topic 5: Generation and Transmission of Electricity

	Learning Objective	**I am confident I do this well**	**I am OK at this**	**I struggle with this and need help**
5.1a	I can d**escribe** current as the rate of flow of charge			
5.1b	I can describe voltage as giving a measure of the energy transferred			
5.2	I can define power as the energy transferred per second and measured in watts			
5.3	Use the equation: electrical power = current × potential difference $P = I \times V$			
5.4	*I can investigate the power consumption of low-voltage electrical items*			
5.5a	I can compare the advantages and disadvantages of methods of electricity production using a variety of renewable and non-renewable resources			
5.6	I know the factors that affect the size and direction of an induced current			
5.7	*I know how to Investigate factors affecting the generation of electric current by induction.*			
5.8	I can explain how the process of EM Induction produces current: a) on a small scale b) in the large-scale generation of electrical energy			
5.9	I know that generators supply alternating current			
5.10	I can explain the difference between direct and alternating current			
5.11	I know how a transformer can change the size of an alternating current			
5.12H	I can use and re-arrange the transformer equation to predict either the missing voltage or the missing number of turns			
5.13	I can explain why electrical energy has to be transmitted at high voltages			
5.14	I can explain where and why step-up and step-down transformers are used in the transmission of electricity in the National Grid			
5.15	I can describe the hazards associated with electricity transmission			
5.16	I know that energy from the mains supply is measured in kilowatt-hours			
5.17	I can use the equation: cost = power (kilowatts, kW) × time (hour, h) × cost of 1 kilowatt-hour (p/kW h)			
5.18/ 5.19	I can use data to compare and contrast the advantages and disadvantages of low-energy and energy-saving appliances			
5.20	I can use data to consider cost-efficiency by calculating payback times			
5.21	I can use and rearrange the equation: power (watt, W)			

	= energy used (joule, J) / time taken (second, s) $P = E/t$			

Topic 6: Energy Transfers

	Learning Objective	**I am confident I do this well**	**I am OK at this**	**I struggle with this and need help**
6.1	I can communicate an understanding that energy is conserved when it is transferred			
6.2	I can describe energy transfer chains involving the following forms of energy: thermal (heat), light, electrical, sound, kinetic (movement), chemical, nuclear and potential (elastic and gravitational)			
6.3	I can construct diagrams to represent energy transfers			
6.4	Apply the idea that efficiency is the proportion of energy transferred to useful forms to everyday situations			
6.5	Use the efficiency equation: efficiency = (useful energy transferred by the device / total energy supplied to the device) × 100%			
6.6	Demonstrate an understanding that for a system to be at a constant temperature it needs to radiate the same average power that it absorbs			
6.7	*Investigate how the nature of a surface affects the amount of thermal energy radiated or absorbed*			

P2 Additional Physics Topics

Topic 1: Static Electricity

	Learning Objective	**I am confident I do this well**	**I am OK at this**	**I struggle with this and need help**
1.1	Describe the structure of the atom and its principal constituents			
1.2	Explain how insulating and insulated materials can be charged by contact by the transfer of electrons			
1.3	Explain how materials can become positively and negatively charged			
1.4	Understand that like charges repel and unlike charges attract			
1.5	Explain common electrostatic phenomena in terms of the movement of electrons e.g a charged balloon sticking to a wall, a charged comb picking up small pieces of paper			
1.5	Explain common electrostatic phenomena in terms of the movement of electrons, for example, shocks from car doors, charges on synthetic fibres, dust			

	on television screens and lightning			
1.6	Explain how earthing removes excess charge by movement of electrons			
1.7	describe some of the uses of electrostatic charges, e.g. fingerprinting and laser printing.			
1.8	Describe some of the potential dangers of electrostatic charges, e.g. fuelling aircraft and tankers			
1.9	Recall that an electric current is a flow of charge			
1.10	Recall that the current in metals is a flow of electrons			
1.11	Use and manipulate the equation Charge = Current x Time (Q = I x t)			
1.12 1.13	Describe what direct current (d.c.) is and name some sources of direct current (d.c.)			

Topic 2: Current Electricity

	Learning Objective	**I am confident I do this well**	**I am OK at this**	**I struggle with this and need help**
2.1	I can describe how an ammeter is used to measure the current, in amps, in a component			
2.2	Explain how current is conserved at a junction			
2.3	Explain how the current in a circuit depends on the potential difference of the source			
2.4	I can describe how a voltmeter is used to measure the voltage, in volts, across a component			
2.5H	I understand that potential difference (voltage) is the energy transferred per unit charge passed and hence that the volt is a joule per coulomb			
2.6	I know how to investigate the relationship between potential difference (voltage), current and resistance			
2.7	I can explain how changing the resistance in a circuit changes the current and how this can be achieved using a variable resistor			
2.8	I can use the equation: potential difference = current $\times$ resistance, $V = I \times R$			
2.9	I can explain how current varies with potential difference for the following devices: a) filament lamps b) diodes c) fixed resistors			
2.10	I can describe how the resistance of a light-dependent resistor (LDR) changes with light intensity			
2.11	I understand how the resistance of a thermistor changes with change of temperature			
2.12	I can explain the heating effect of a current in a resistor			

2.13 H	I can explain the energy transfer (in 2.12 above) in terms of electron collision theory			
2.14	I can evaluate the advantages and disadvantages of the heating effect of an electric current			
2.15	Use the equation: electrical power = current × potential difference , $P = I \times V$			
2.16	Use the equation: energy transferred = current × potential difference × time , $E = I \times V \times t$			

Topic 3: Forces and Motion

	Learning Objective	**I am confident I do this well**	**I am OK at this**	**I struggle with this and need help**
3.1	To know what vector quantities are and some examples			
3.2	To interpret distance/time graphs and calculate speed from the gradient			
3.3	To describe velocity as speed in a given direction			
3.4	To use the equation speed = distance/time			
3.5	To use an equation to calculate acceleration			
3.6	To interpret velocity/time graphs to determine acceleration and distance travelled			
3.7	To draw and interpret a free-body force diagram			
3.8	To identify the forces that act as action-reaction pairs			
3.9	To calculate a resultant force using a range of forces			
3.10	To know what happens to an object when the resultant force is zero			
3.11	To understand what happens to an object when the resultant force is not zero			
3.12	To understand that a resultant force will produce an acceleration which depends on the size of the force and the mass of the object			
3.13	To use the formula F = ma			
3.14	To use the equation W = mg			
3.15	To investigate the relationship between force, mass and acceleration			
3.16	To know that all bodies in a vacuum accelerate at the same rate			
3.17	To explain the forces that act on a falling object and how they change and affect the velocity			

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Topic 4: Momentum, Energy, Work and Power

	Learning Objective	**I am confident I do this well**	**I am OK at this**	**I struggle with this and need help**
4.1	Recall that the stopping distance is the sum of the thinking distance and braking distance			
4.2	Demonstrate an understanding of the factors that affect the stopping distance of a vehicle			
4.3	Be able to investigate how friction affects the force required to slide blocks along different surfaces			
4.4	To use and manipulate the formula momentum = mass x velocity			
4.6	To show an understanding of the conservation of momentum in collisions			
4.7	To understand of force being the rate of change of momentum and apply this to car safety features such as crumple zones and air bags			
4.8	Be able to investigate how crumple zones reduce the forces in collisions			
4.9	To apply the formula Force= Change in Momentum ÷ Time taken F = (mv-mu)/t			
4.10	use the equation: work done = force × distance moved in the direction of the force W = F × s			
4.11	explain that work done is equal to energy transferred			
4.12	To know that Power is the rate of doing work and is measured in watts			
4.13	use the equation: power = work done/time taken P = W/t			
4.14	To know that 1 Watt = 1 Joule per second (1 J/s)			
4.15	use the relationship: change in potential energy = mass × gravitational field strength × change in height PE = m × g × h			
4.16	use the relationship: kinetic energy = ½ × mass × (velocity) ^{2} KE = ½ mv ^{2}			
4.17	demonstrate understanding of and apply the principle of conservation of energy, for example, gravitational potential energy, kinetic energy and other forms of energy			
4.18	Use calculations to show how work done by brakes = initial kinetic energy of a vehicle			

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Topic 5: Uses of ionising Radiation

	Learning Objective	**I am confident I do this well**	**I am OK at this**	**I struggle with this and need help**
5.1	describe the nature of alpha, beta and gamma radiation and compare their abilities to penetrate and to ionise			
5.1 HSW 11	describe the structure of an atom in terms of protons, neutrons and electrons and describe particular nuclei using symbols in the format: ${}^{m}_{p}X$			
5.1	use the terms atomic (proton) number and mass (nucleon) number to explain the structure of isotopes			
5.2	Explain what an ion is and the process of ionisation			
5.3	recall that alpha and beta particles and gamma rays are ionising radiations emitted from unstable nuclei in a random process			
5.4	To know the nature of alpha, beta and gamma radiation			
5.5	To compare alpha, beta and gamma radiations in terms of their abilities to ionise and penetrate			
HSW 3	Understand how scientific theories are used to explain phenomena			
6.3	Describe uses of radioactivity including, food irradiation, sterilisation of equipment, diagnosis and treatment of cancer, smoke alarms, radioactive tracers, thickness gauges			
6.4	describe how the activity of a radioactive source decreases over a period of time			
6.5	To know the definition of the bequerel (Bq)			
6.6	To know the definition of the term half-life			
6.7	use the concept of half-life to carry out simple calculations including graphical representations			
6.8	To use a model to simulate radioactive decay			
6.8	explain how graphical representations of half-life can be made using suitable software, and compare this to traditional methods of creating graphical representation			
6.9	describe the dangers of ionising radiation in terms of tissue damage and possible mutations and relate this to the precautions taken while carrying out demonstrations at school			

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Topic 6: Nuclear Power

	Learning Objective	**I am confident I do this well**	**I am OK at this**	**I struggle with this and need help**
5.6	Explain how nuclear reactions can release energy			
5.7	Describe the fission of U-235 to produce two daughter nuclei and two or more neutrons			
5.8	Explain the principle of a nuclear chain reaction			
5.9	Explain how the chain reaction is controlled in a nuclear reactor			
HSW 13	Evaluate the benefits and drawbacks of nuclear power for generating electricity, e.g. CO_2 emissions, risks, public perception, waste disposal and safety issues			
HSW 13	Describe the environmental and social-economic impact of a nuclear power station on a locality			
5.10	Describe how thermal energy from the chain reaction is transferred to electrical energy in a nuclear power station			
5.11	Explain that the products of nuclear fission are radioactive and discuss the long-term possibilities for storage/disposal of nuclear waste			
5.12	Describe how fusion differs from fission			
5.13	Recognise fusion as the energy source for stars			
5.14	Understand that nuclear fusion requires extremely high temperatures and densities,			
5.16	Relate the conditions for fusion to the difficulty of making a practical and economic form of power			
5.17	Demonstrate understanding that new scientific theories, such as 'cold fusion', are not accepted until they have been validated by the scientific community			
HSW 14	Describe how scientists share data and discuss new ideas and how over time this process helps to reduce uncertainties and revise scientific theories			
6.1	explain what is meant by background radiation and explain how regional variations within the UK are caused in particular by radon gas			
6.2	recall the origin of background radiation from Earth and space			
6.10	describe how scientific ideas change over time, e.g. the risks associated with radioactive sources			
6.11	Discuss the long-term possibilities for storage and disposal of radioactive waste			
6.12	Evaluate the benefits and drawbacks of nuclear power for generating electricity, e.g. CO_2 emissions, risks, public perception, hysterical /misleading/ scaremongering newspaper headlines, waste disposal and safety issues.			