Science

Mocks Workbook

2014-2015

Science Department Guide

Hinchingbrooke School

Science Department

Inspiring excellence Fulfilling potential

AQA revision booklet

Within this booklet you will find the specification content that are in each of the examinations for the Sciences.

The specifications can be found in the following links:

Double Award

Science (4405) http://filestore.aqa.org.uk/subjects/AQA-4405-W-SP-14.PDF

Additional Science (4408) http://filestore.aqa.org.uk/subjects/AQA-ADDSCI-W-SP-14.PDF

Triple Award

Biology (4401) http://filestore.aqa.org.uk/subjects/AQA-BIOL-W-SP-14.PDF

Chemistry (4402) http://filestore.aqa.org.uk/subjects/AQA-4402-W-SP-14.PDF

Physics (4403) http://filestore.aqa.org.uk/subjects/AQA-PHYS-W-SP-14.PDF

REVISION TECHNIQUE

ccrevision will be most effective in the first hour.

So make sure you:

- plan revision slots of between 40-60 minutes
- have something to look forward to, e.g. a TV show
- tick off things that you have done, and note things you have to do

How you revise is most important. Some don'ts:

- don't just read your books or class notes
- don't just work through questions
- don't forget to take a break!

So, fire yourself up and do:

- use lots of ways to revise
- plan your revision with a timetable
- read, and write summaries of, your notes
- draw diagrams
- sketch mind maps (spider diagrams) of key issues
- use mnemonics (rhymes of word lists) to prompt you
- revise with a friend: ask and answer questions
- work through this question book
- make revision cards
- answer guided questions in revision books

Biology

Tuesday 2nd December

9am Start

Double students

- One 1 hour paper
- Based on the content of Biology 1

Triple students

- Two 1 hour papers (back to back)
- Based on the content of Biology 1

		Before			After		
B1.1 Keeping healthy							
B1.1.1 Diet and exercise		☺	😐	☹	☺	😐	☹
Revision video	Evaluate information about the effect of food on health.						
	Explain how carbohydrates, fats and proteins are used by the body to release energy and to build cells.						
	State that mineral ions and vitamins are needed in small amounts for healthy functioning of the body.						
	Describe factors that affect the metabolic rate, e.g. the rate varies with the amount of activity you do and the proportion of muscle to fat in your body.						
	Explain how inherited factors can also affect our health; these include metabolic rate and cholesterol levels.						
	Analyse and evaluate claims made by slimming programmes and products.						
	Evaluate information about the effect of lifestyle on development of diseases.						

B1.1.2 How our bodies defend themselves against infectious diseases		☺	😐	☹	☺	😐	☹
Revision Video	Describe the work of Semmelweis and link to results of class investigations.						
Revision Video	Explain how pathogens cause disease.						
	Describe ways in which the body defends itself against disease.						
	Explain how microbes make us feel ill and how viruses damage cells.						
	Describe the actions of white blood cells using terms ‘ingest’, ‘antibodies’ and ‘antitoxins’.						
	Explain the processes of natural and acquired immunity.						
	Evaluate the advantages and disadvantages of being vaccinated against a disease, e.g. the measles, mumps and rubella (MMR) vaccine.						
Revision Video	Explain how the treatment of disease has changed due to understanding the action of antibiotics and immunity.						
	Explain how antibiotics work.						
Revision Video	Use aseptic techniques and explain the precautions taken when handling microorganisms.						
	Describe aseptic techniques.						
	Explain the difficulty in developing drugs that kill viruses without damaging body tissues.						
	Evaluate the consequences of mutations of bacteria and viruses in relation to epidemics and pandemics.						

B1.2 Nerves and hormones							
B1.2.1 The nervous system		☺	😐	☹	☺	😐	☹
Revision Video	Describe the functions of the main structures in the nervous system.						
	Match receptors of the eye, ear, tongue and skin with the stimuli they detect.						
	Label a light receptor cell with a nucleus, cytoplasm and cell membrane.						
	Explain the importance of being able to respond to environmental changes.						
	Explain the importance of reflex actions and be able to give examples.						
	Describe the pathway of a nerve impulse in a reflex response and explain the roles of the structures involved.						
	Explain the role of chemicals at synapses.						
	Describe different ways of measuring reaction time.						

B1.2.2 Control in the human body		☺	😐	☹	☺	😐	☹
Revision Video	Describe some conditions that need to be controlled in the body.						
	Measure body temperature.						
	Explain why body temperature has to be controlled.						
	Explain what hormones are.						
Revision Video	Give some changes that occur at puberty and link with secretion of hormones.						
	Name the hormones that control the menstrual cycle and state the glands that produce them.						
Revision Video	Evaluate the benefits and problems of using hormones to control fertility.						
	State the hormones that may be present in oral contraceptives.						
	Link the hormones used in oral contraceptives to their effects on the body.						
	Produce a flow diagram to explain the process of In Vitro Fertilisation (IVF).						

B1.2.3 Control in plants		☺	😐	☹	☺	😐	☹
Revision Video	Describe how plant shoots and roots respond to light, gravity and moisture.						
	Draw diagrams to explain the role of auxin in plant responses in terms of unequal distribution in shoots and roots.						
	Explain how plant hormones are used as weed killers and rooting hormones.						

B1.3 The use and abuse of drugs							
B1.3.1 Drugs		☺	😐	☹	☺	😐	☹
Revision Video	Define the term ‘drug’.						
	Give examples of medical drugs.						
	Explain why drugs need to be tested before they can be prescribed.						
	Describe the uses and problems associated with thalidomide.						
	Explain how the drug testing procedure for thalidomide was inappropriate.						
	Describe the main steps in testing a new drug.						
	Explain the terms placebo and double-blind trial.						
	Describe and evaluate the effect of statins in cardiovascular disease.						
Revision Video	Name some recreational drugs.						
	Describe some effects of caffeine on the body.						
	Evaluate the impact of smoking on health.						
	Evaluate why some people use illegal drugs for recreation.						
	Evaluate claims made about the effect of prescribed and non-prescribed drugs on health.						
	Evaluate the impact of alcohol on health.						
	Evaluate why some people use illegal drugs for recreation.						
	Evaluate claims made about the effect of prescribed and non-prescribed drugs on health.						
	Describe the effects of cannabis on the body.						
	Consider the possible progression from recreational to hard drugs.						
	Describe the effects of heroin/cocaine addiction and withdrawal symptoms.						
	Evaluate the use of drugs to enhance performance in sport.						
	Consider the ethical issues of performance enhancing drugs.						
	Describe some effects and risks of these drugs.						

B1.4 Interdependence and adaptation						
B1.4.1 Adaptations	☺	😐	☹	☺	😐	☹
Revision Video	Observe adaptations of a range of organisms.						
	Explain how organisms are adapted to survive in their habitat.						
	Describe and explain adaptations for survival in the Arctic.						
	Describe and explain adaptations for survival in a desert.						
	Define the term extremophile and be able to give general examples.						
	List factors that affect the survival of organisms in their habitat.						
	Give examples of resources that plants and animals compete for in a given habitat.						
	Describe adaptations that some organisms have to avoid being eaten.						
	Interpret population curves.						

B1.4.2 Environmental change		☺	😐	☹	☺	😐	☹
Revision Video	Evaluate data on environmental change and the distribution and behaviour of living organisms.						
	Give examples of how an environment can change.						
	Interpret data on lichen distribution and sulphur dioxide levels.						
	Interpret data on invertebrates and water pollution.						

B1.5 Energy and biomass in food chains						
B1.5.1 Energy in biomass	☺	😐	☹	☺	😐	☹
Revision Video	Construct and interpret pyramids of biomass.						
	Describe how energy and mass is transferred along a food chain.						
	Explain why energy and biomass is reduced at successive stages in a food chain.						

B1.6 Waste materials from plants and animals						
B1.6.1 Decay processes	☺	😐	☹	☺	😐	☹
Revision Video	Describe how plants and animals return materials to the environment.						
	Describe the role of microorganisms in decay.						
	State factors affecting the rate of decay.						
	Explain how decay is useful to plants.						
	Evaluate the necessity and effectiveness of recycling organic kitchen or garden wastes.						

B1.6.2 The carbon cycle		☺	😐	☹	☺	😐	☹
Revision Video	Explain the carbon cycle in terms of photosynthesis, respiration, feeding, death and decay, combustion of wood and fossil fuels.						
	Explain the role of microorganisms and detritus feeders in decay.						

B1.7 Genetic variation and its control						
B1.7.1 Why organisms are different	☺	😐	☹	☺	😐	☹
Revision Video	Classify characteristics as being due to genetic or environmental causes.						
	Decide the best way to present information about variation in tables and charts.						
	Label diagrams to illustrate the order of size of cell, nucleus, chromosome and gene.						

B1.7.2 Reproduction		☺	😐	☹	☺	😐	☹
Revision Video	Explain why sexual reproduction results in variation, but asexual reproduction doesn't produce variation.						
	Describe sexual reproduction as the joining of male and female gametes.						
	Define the term 'clone'.						
	Take plant cuttings and grow new plants.						
	Interpret information about cloning techniques.						
	Make informed judgements about the economic, social and ethical issues concerning cloning.						
Revision Video	Describe the process of tissue culture in plants.						
	Explain the importance of cloning to plant growers.						
	Describe the process of embryo transplants in animals.						
	Describe the process of adult cell cloning in animals.						
	Explain advantages and disadvantages of cloning techniques.						
Revision Video	Define the term 'genetic engineering'.						
	Describe the process of genetic engineering to produce bacteria that can produce insulin and crops that have desired characteristics.						
	Interpret information about genetic engineering techniques.						
	Make informed judgements about the economic, social and ethical issues concerning genetic engineering.						
	Explain advantages and disadvantages of genetic engineering.						

B1.8 Evolution							
B1.8.1 Evolution		☺	😐	☹	☺	😐	☹
Revision Video	State the theory of evolution.						
	Describe different theories of evolution.						
Revision Video	Identify differences between Darwin's theory of evolution and conflicting theories.						
	Suggest reasons for the different theories.						
	Explain the terms 'inherited' and 'acquired' characteristics.						
	Describe the stages in natural selection.						
	Define the term 'mutation'.						
	Explain why mutation may lead to more rapid change in a species.						
	Suggest reasons why Darwin's theory was only gradually accepted.						
	Interpret evidence relating to evolutionary theory.						
	Classify organisms based on their similarities.						

B1 Revision Booklet questions

B1.1 Keeping Healthy

B1.1.1 Diet and Exercise

Complete the table to describe the uses of groups:

Food Group	Uses	Examples
Carbohydrate		
Fats		
Proteins		
Vitamins and Minerals		

What is meant by the term “malnourished”?

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What are some of the effects of not having a balanced diet?

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How is energy content related to body mass?

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What is metabolic rate and what affects it?

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Give an example of an inherited factor that can affect our health?

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B1.1.2 How Our Bodies Defend Themselves Against Infections Diseases

What is a pathogen?

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How do bacteria and viruses make us feel ill?

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How do white blood cells help to defend about pathogens?

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What does a phagocyte do?

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What do lymphocytes do?

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How does immunity develop?

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What impact did Semmelweiss' research have?

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How are painkillers useful?

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What are antibiotics are what can they be used for?

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What is one of the impacts of the overuse of antibiotics?

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Why is it so difficult to treat viral infections?

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HT-Only. How do individual pathogens develop resistance?

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Describe the action vaccinations on the body?

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What does the MMR vaccine protect people against?

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Why must petri dishes be sterilised before use?

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When using inoculating loops to transfer bacteria what must be done to avoid contamination?

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Why must petri dishes be taped shut?

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What is the maximum temperature that cultures can be incubated to in a school?.....

Why is this?

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Why would higher temperatures be used in industrial situations?

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1.2 Nerves and Hormones

1.2.1 The Nervous System

What is the nervous system needed for?

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What is a receptor for?

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Complete the following table, indentifying the stimuli for each detector:

Receptor	**Stimuli**
Eyes	
Ears	
Skin	
Tongue	
Nose	

Draw and label a diagram of a light receptor cell:

What is a neurone?

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What three neurones are involved in a reflect action?

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Complete the table:

Neurone	**Function**
Sensory	
Relay	
Motor	
Receptor	
Effector	
Synapse	

Describe what happens in a reflex arc:

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B1.2.2 Control in the Human Body

Water leaves the body via the …… when ……, via the ……. when and via ……. when……

Ions are lost from the body via the……. when …… and via ……. when…….

Why do we need to maintain a constant body temperature?

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What is a hormone?

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Where are hormones produced?

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How do hormones travel around the body?

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What is a gland?

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Which glands control the menstrual cycle?

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What is the role of follicle stimulating hormone (FSH)?

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What is the role of luteinising hormone (LH)?

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What is the role of oestrogen?

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What impact do the hormones in oral contraceptives have on the hormones in the body?

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How have birth control pills changed over time and why?

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Which hormones will be included in “fertility drugs”?

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What happens during *in vitro* fertilisation (IVF)?

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B1.2.3 Control in Plants

List three things that plants are sensitive to:

1) ……..

2) ……..

3) ……..

Describe the direction that shoots grow in, relating to the things that they are sensitive to.

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Describe the direction that roots grow in, relating to the things that they are sensitive to.

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What is the name of the hormone in plants?

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What is phototropism?

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Use diagrams to show how auxin controls phototropism.

What is geotropism?

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Use diagrams to show how auxin controls geotropism.

How can plant growth hormones be used in agriculture?

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B1.3 The Use and Abuse of Drugs

B1.3.1 Drugs

What occurs during pre-clinical drug trials?

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Describe the three phases of clinical trials that drugs go through

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What are statins used for?

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What is Thalidomide?

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What impact can the misuse of drugs have on the body?

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Why is the overall impact of legal drugs much greater than illegal drugs?

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What is addiction?

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What is withdrawal?

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Athletes are banned from using drugs to enhance their performance. What are the impacts of the following:

Stimulants

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Anabolic Steroids

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B1.4 Interdependence and Adaptation

B1.4.1 Adaptations

What do plants compete for?

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- .....
- .....
- .....
- .....

What do animals compete for?

- .....
- .....
- .....
- .....
- .....

What is an adaptation?

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What is an extremophile?

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What adaptations may an organism have to allow it to survive in dry artic conditions?

- .....
- .....
- .....
- .....

What adaptations may an organism have to survive in dry environments?

- .....
- .....
- .....

B1.4.2 Environmental Change

Give some examples of non-living changes in an environment

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Give some examples of living changes in an environment

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Describe how lichens can be used as air pollution indicators

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Describe how invertebrate animals can be used as water pollution indicators

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Give examples of non-living indicators that demonstrate environmental changes

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B1.5 Energy and Biomass in Food Chains

B1.5.1 Energy in Biomass

What process do plants use to collect energy from the sun?

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What is biomass?

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How is biomass created?

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Why is the amount of energy contained in the biomass of organisms reduced at each stage of the food chain?

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B1.6 Waste Materials from Plants and Animals

B1.6.1 Decay Processes

Why do materials decay?

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What conditions cause decay to occur fastest?

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Why is the decay process important?

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What is a “stable community”?

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B1.6.2 The Carbon Cycle

Carbon dioxide is removed from the environment by green plants by

……. The carbon from carbon dioxide is used to make ……, …….. and ……. to make up the body of plants. Plants release carbon dioxide to the atmosphere by ……. Plants are eaten by animals, animals are eaten by other animals, what happens to the carbon?

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Animals release carbon dioxide to the atmosphere by ……

When plants and animals die some animals and ……. feed on their bodies. These organisms release carbon to the air when they ……

Carbon dioxide is released to the atmosphere from wood and fossil fuels by

……..

Draw and label a diagram of the carbon cycle

B1.7 Genetic Variation and Control

B1.7.1 Why Organisms are Different

What is a gene?

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What is a gamete?

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What is a genetic cause of variation?

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What is an environmental cause of variation?

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B1.7.2 Reproduction

What is sexual reproduction?

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What is asexual reproduction?

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What is a “cutting”?

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Describe the following cloning techniques:

Tissue culture

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Embryo Transplant

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Adult Cell Cloning

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What is genetic engineering?

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What is meant by the term “genetically modified” (GM)?

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Give examples of GM crops

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What are the concerns associated with GM crops?

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B1.8 Evolution

What is the name of the theory of evolution proposed by Charles Darwin?

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Why was Darwin's theory only gradually excepted?

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How did Lamarck's theory differ from Darwin's?

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Why is it important to study the similarities and differences between living organisms?

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Describe the process of natural selection

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Chemistry

Tuesday 25th November

9am Start

Double students

- One 1 hour paper
- Based on the content of Chemistry 1

Triple students

- Two 1 hour papers (back to back)
- Based on the content of Chemistry 1

C1.1.Fundamental Ideas in Chemistry								
C1.1.1 Atoms		☺	😐	☹	☺	😐	☹
Revision video	Understand where metals and non-metals appear on the periodic table.						
	Know that substances are made of atoms.						
	State that substances made of only one sort of atom are called elements.						
	Know that elements are found in the periodic table and that groups contain elements with similar properties. State where metals and non-metals appear in the Periodic table.						
	Know that symbols represent atoms of different elements.						
	Know the structure of an atom.						
	Know the charges on sub-atomic particles.						
	Use the periodic table to work out the number of each type of sub-atomic particle for a named atom.						
	Describe electron arrangements for elements up to number 20.						

C1.1.2 The periodic table		☺	😐	☹	☺	😐	☹
Revision Video	Know that elements in the same group have similar reactions because they have identical numbers of outer electrons.						
	Know that the number of outer electrons determines how an atom reacts. Atoms with eight electrons in their outer shell are unreactive, i.e. the noble gases.						
	Know that noble gases have eight outer electrons except for helium, which has two.						

C1.1.3 Chemical reactions		☺	😐	☹	☺	😐	☹
Revision Video	Write word equations to represent reactions.						
	Know how to represent a chemical reaction by using a word equation.						
	Describe the electron arrangements of sodium and chlorine.						
	Describe how an electron is transferred to chlorine from sodium to form two charged particles called ions that attract each other.						
	Know that compounds made from a metal and a non-metal are made from ions.						
Revision Video	Know that non-metal compounds are made from molecules, held together by covalent bonds.						
	Know that all atoms involved in a reaction must be accounted for.						
	Calculate the amount of a product or reactant from masses of other products and reactants						

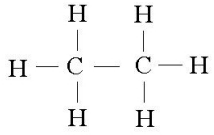
C1.2 Limestone and Building Materials							
C1.2.1 Calcium carbonate		☺	😐	☹	☺	😐	☹
Revision Video	Know that limestone is calcium carbonate and that it is quarried.						
	Know that, when heated limestone becomes calcium oxide giving off carbon dioxide.						
	Know that calcium oxide reacts with water to make calcium hydroxide.						
	Know that calcium hydroxide is an alkali that neutralises acids						
	Know that calcium hydroxide dissolves in water to make a solution called limewater.						
	Know that limewater reacts with carbon dioxide to make calcium carbonate this reaction is a test for carbon dioxide as the solution goes cloudy.						
	Know that metal carbonates decompose on heating to give carbon dioxide and the metal oxide						
	Know that metal carbonates react with acids to produce carbon dioxide						
	Know that limestone is damaged by acid rain.						

	Know that limestone is needed for buildings and that the positive benefits of using this material should be considered against the negative aspects of quarrying.						
	Explain the differences in the making and composition of cement, mortar and concrete.						

C1.3 Metals							
C1.3.1 Extracting metals		☺	😐	☹	☺	😐	☹
Revision Video	Explain how an ore is different from a rock.						
	Know that methods may be used to concentrate an ore before extraction.						
	Know that some metals are so unreactive they can be found as metal in the earth's surface (crust).						
	Know that metals below carbon in the reactivity series are extracted by heating the oxide with carbon coke ,charcoal and wood are all good sources of carbon removal of oxygen from a compound is reduction.						
	Know that by using the Reactivity Series the method of extraction of a named metal.						
	Know that copper is initially reduced in a furnace with carbon						
	Know that it is purified by electrolysis						
	Know that copper ores are finite.						
	Know that metals can be obtained from solutions by displacement reactions with a more reactive metal						
	Know that electrolysis requires vast amounts of electrical energy and therefore is expensive.						
	Know that the more stages in a process the more expensive it becomes.						
	Know and understand that phytomining uses plants to absorb metal compounds and that the plants are burned to produce ash that contains the metal compounds						
	Know and understand that bioleaching uses bacteria to produce leachate solutions that contain metal compounds.						
	Evaluate benefits of recycling metals in terms of economic and environmental benefits.						

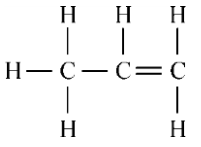
C1.3.2 Alloys		☺	😐	☹	☺	😐	☹
Revision Video	Know the difference between iron from the blast furnace and steel in terms of less carbon in steel than iron from the blast furnace.						
	Know that the many types of steel are really alloys.						
	Know that alloys have improved properties as a result of the combination of metal atoms.						

C1.3.3 Properties and uses of metals		☺	😐	☹	☺	😐	☹
Revision Video	Know that the central block of the Periodic table are known as the Transition metals.						
	Many commonly used metals are in this block.						
	Know and understand that copper:						
	Know and understand that copper is a good conductor of electricity and heat						
	Know and understand that copper can be bent but is hard enough to be used to make pipes or tanks						
	Know and understand that copper does not react with water.						

C1.4 Crude Oil and Fuels								
C1.4.1 Crude oil		☺	😐	☹		☺	😐	☹
Revision Video	Know what a mixture is in terms of elements and compounds.							
	Describe fractional distillation as based on each compound having a different boiling point.							
	Know that each compound vaporises and condenses at different temperatures, and so they are separated.							
	Describe the relationship between molecule size and boiling point, viscosity, ease of ignition, and flammability.							
	Recognise alkanes from their formulae in any of the forms: C_2H_6 							
	Describe what the structural formula shows.							
	Know the general formula for alkanes.							

C1.4.2 Hydrocarbons		☺	😐	☹		☺	😐	☹
	Know how fractional distillation works							

C1.4.3 Hydrocarbon fuels		☺	😐	☹		☺	😐	☹
Revision Video	Know that burning fuels releases carbon dioxide, water (vapour), carbon monoxide, sulfur dioxide and oxides of nitrogen into the atmosphere. Solid particles (particulates) may also be released.							
	Know that these cause global warming acid rain and global dimming.							
	Know how harmful emissions are reduced.							
	Describe the use of ethanol and hydrogen as alternative fuels.							
Revision Video	Describe advantages and disadvantages of each fuel.							
	Know how to measure simply the amount of energy produced by a burning fuel.							
	Know about different types of error, and how to deal with them.							
	Understand how secondary sources can help confirm a hypothesis/ theory.							

C1.5 Other useful substances from crude oil.								
C1.5.1 Obtaining useful substances from crude oil		☺	😐	☹		☺	😐	☹
Revision Video	Recall that heating large alkanes with a catalyst or steam and hot temperature decomposes to make the hydrocarbon smaller molecules.							
	Know that some of these smaller molecules are called alkenes.							
	Recognise alkenes from their formulae in any of the forms: C_3H_6 							
	Know that '=' represents a double bond in the structure.							
	Know that cracking produces more useful molecules including alkenes and fuels.							
	Know that the presence of double bonds in a molecule can be tested for by the decolorisation of bromine water.							

C1.5.2 Polymers		☺	😐	☹	☺	😐	☹
Revision Video	Represent polymerisation of ethane						
	Know that we use a wide range of polymers developed for specific purposes.						
	Identify from properties relevant uses for a polymer.						
	Realise that polymers are often hard to dispose of, and that biodegradable ones offer some solutions to these problems.						
	Be aware that crude oil is used to produce fuels and chemicals, and that it is a limited resource.						
	Evaluate information about the ways in which crude oil and its products are used.						

1.5.3 Ethanol		☺	😐	☹	☺	😐	☹
Revision Video	Know that ethanol can be made from ethane and steam, or by yeast: sugar $\rightarrow$ carbon dioxide + ethanol						
	Compare the environmental impact of producing ethanol from renewable and non-renewable sources.						

C1.6 Plant oils and their uses		☺	😐	☹	☺	😐	☹
C1.6.1 Vegetable oils							
	Know two ways in which vegetable oils are obtained.						
	Know that cooking in vegetable oils allows food to be heated to higher temperatures causing different chemical changes to those brought about by boiling in water.						

C1.6.2 Emulsions		☺	😐	☹	☺	😐	☹
Revision Video	Know how emulsifying agents can help oil and water mixtures to remain mixed.						
	Give two uses of emulsions.						

C1.6.3 Saturated and unsaturated oils		☺	😐	☹	☺	😐	☹
Revision Video	Know how to determine the relative amounts of saturation in an oil/fat by using bromine water.						

C1.7 Changes in the Earth and its atmosphere							
C1.7.1 The Earth's crust		☺	😐	☹	☺	😐	☹
Revision Video	Know the three parts of the Earth, and the atmosphere.						
	Know that all our resources come for the crust, the seas, or the air.						
	Know key features of Wegener's theory, and evidence to support it.						
	Explain why no one believed the theory at first.						
	Know that convection currents driven by the heat from radioactive processes cause the movement of the plates.						
	Explain what earthquakes are and why we cannot predict them						
	Explain what volcanoes are and why we cannot predict their eruptions.						

C1.7.2 The Earth's atmosphere		☺	😐	☹		☺	😐	☹
Revision Video	Describe the atmosphere today.							
	Know that our atmosphere originated from volcanic gases							
	Know that water vapour condenses to make the seas							
Revision Video	Know that simple organisms evolved producing oxygen by photosynthesis							
Revision Video	Know that plants and animals evolved later							
	Know that there is evidence for amounts of oxygen in the air at different times.							
Revision Video	Describe how carbon cycles round the earth and atmosphere.							
	Describe how human activity has affected the proportions in each part of the cycle.							

C1.1 The fundamental Ideas in Chemistry

C1.1.1 Atoms

What is an atom?

……

……

What is an element?

……

……

Indicate where you would find metals and non-metals:

Periodic Table of the Elements

1 H 1.008																	2 He 4.00
3 Li 6.94	4 Be 9.01											5 B 10.81	6 C 12.01	7 N 14.01	8 O 16.00	9 F 19.00	10 Ne 20.18
11 Na 22.99	12 Mg 24.31											13 Al 26.98	14 Si 28.09	15 P 30.97	16 S 32.07	17 Cl 35.45	18 Ar 39.95
19 K 39.20	20 Ca 40.08	21 Sc 44.96	22 Ti 47.88	23 V 50.94	24 Cr 52.00	25 Mn 54.94	26 Fe 55.85	27 Co 58.93	28 Ni 58.69	29 Cu 63.55	30 Zn 65.39	31 Ga 69.72	32 Ge 72.61	33 As 74.92	34 Se 78.96	35 Br 79.90	36 Kr 83.80
37 Rb 85.47	38 Sr 87.62	39 Y 88.91	40 Zr 91.22	41 Nb 92.91	42 Mo 95.94	43 Tc (98)	44 Ru 101.0	45 Rh 102.9	46 Pd 106.4	47 Ag 107.8	48 Cd 112.4	49 In 114.8	50 Sn 118.7	51 Sb 121.7	52 Te 127.6	53 I 126.9	54 Xe 131.2
55 Cs 132.9	56 Ba 137.3	57 La 138.9	72 Hf 178.5	73 Ta 180.1	74 W 183.9	75 Re 186.2	76 Os 190.2	77 Ir 192.2	78 Pt 195.1	79 Au 197.0	80 Hg 200.6	81 Tl 204.4	82 Pb 207.2	83 Bi 209.0	84 Po (209)	85 At (210)	86 Rn (222)
87 Fr 223.0	88 Ra 226.0	89 Ac 227.0	104 Rf (261)	105 Db (262)	106 Sg (263)	107 Bh (262)	108 Hs (265)	109 Mt (266)	110 Ds (281)	111 Rg (272)	112 Uub (285)	113 Uut (284)	114 Uuq (289)	115 Uup (288)	116 Uuh (292)		

58 Ce 140.1	59 Pr 141.0	60 Nd 144.2	61 Pm (145)	62 Sm 150.4	63 Eu 153.0	64 Gd 157.3	65 Tb 158.9	66 Dy 162.5	67 Ho 164.9	68 Er 167.3	69 Tm 168.9	70 Yb 173.0	71 Lu 175.0
90 Th 232.4	91 Pa 231.4	92 U 238.0	93 Np (237)	94 Pu (240)	95 Am (243)	96 Cm (247)	97 Bk (248)	98 Cf (251)	99 Es (252)	100 Fm (257)	101 Md (257)	102 No (259)	103 Lr (262)

Match the name of the element with the symbol

Element	**Symbol**
Oxygen	
Sodium	
	H
	Li
Copper	
Potassium	
	Ar
	Ca

Draw and label the structure of an atom. Ensure that you include the following key words:

Nucleus Protons Neutrons Electrons

Complete the table below

Name of Particle	Charge	Mass
Proton		
Neutron		
Electron		

Explain why atoms have no overall electrical charge.

……

……

What does the atomic number tell you?

……

……

What does the mass number tell you?

……

……

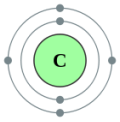
Complete the table

Element	Symbol	Atomic Number	Mass Number	Number of Protons	Number of Neutrons	Number of Electrons
Hydrogen						
	He					
		3				
			9			
				5		

Draw diagrams to show the electronic structure of the elements above. You should use 2 different methods of representing the electron arrangement.

For example:

Carbon



(2,4)

Describe the structure of an atom (6 marks)

……

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……

C1.1.2 The Periodic Table

Complete the table

Group Number	**Number of Electrons in Outer Energy Level (Shell)**
1	
2	
3	
4	
5	
6	
7	
0	

Using information in the table above, explain why elements in the same group of the periodic table have similar properties

……

……

Label each of the group of the periodic table below. You may colour each group a different colour to show where they are.

Periodic Table of the Elements

1 H 1.008																	2 He 4.00
3 Li 6.94	4 Be 9.01											5 B 10.81	6 C 12.01	7 N 14.01	8 O 16.00	9 F 19.00	10 Ne 20.18
11 Na 22.99	12 Mg 24.31											13 Al 26.98	14 Si 28.09	15 P 30.97	16 S 32.07	17 Cl 35.45	18 Ar 39.95
19 K 39.20	20 Ca 40.08	21 Sc 44.96	22 Ti 47.88	23 V 50.94	24 Cr 52.00	25 Mn 54.94	26 Fe 55.85	27 Co 58.93	28 Ni 58.69	29 Cu 63.55	30 Zn 65.39	31 Ga 69.72	32 Ge 72.61	33 As 74.92	34 Se 78.96	35 Br 79.90	36 Kr 83.80
37 Rb 85.47	38 Sr 87.62	39 Y 88.91	40 Zr 91.22	41 Nb 92.91	42 Mo 95.94	43 Tc (98)	44 Ru 101.0	45 Rh 102.9	46 Pd 106.4	47 Ag 107.8	48 Cd 112.4	49 In 114.8	50 Sn 118.7	51 Sb 121.7	52 Te 127.6	53 I 126.9	54 Xe 131.2
55 Cs 132.9	56 Ba 137.3	57 La 138.9	72 Hf 178.5	73 Ta 180.1	74 W 183.9	75 Re 186.2	76 Os 190.2	77 Ir 192.2	78 Pt 195.1	79 Au 197.0	80 Hg 200.6	81 Tl 204.4	82 Pb 207.2	83 Bi 209.0	84 Po (209)	85 At (210)	86 Rn (222)
87 Fr 223.0	88 Ra 226.0	89 Ac 227.0	104 Rf (261)	105 Db (262)	106 Sg (263)	107 Bh (262)	108 Hs (265)	109 Mt (266)	110 Ds (281)	111 Rg (272)	112 Uub (285)	113 Uut (284)	114 Uuq (289)	115 Uup (288)	116 Uuh (292)		

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90 Th 232.4	91 Pa 231.4	92 U 238.0	93 Np (237)	94 Pu (240)	95 Am (243)	96 Cm (247)	97 Bk (248)	98 Cf (251)	99 Es (252)	100 Fm (257)	101 Md (257)	102 No (259)	103 Lr (262)

The elements in group 0 (the noble gases) are very unreactive, explain why.

……

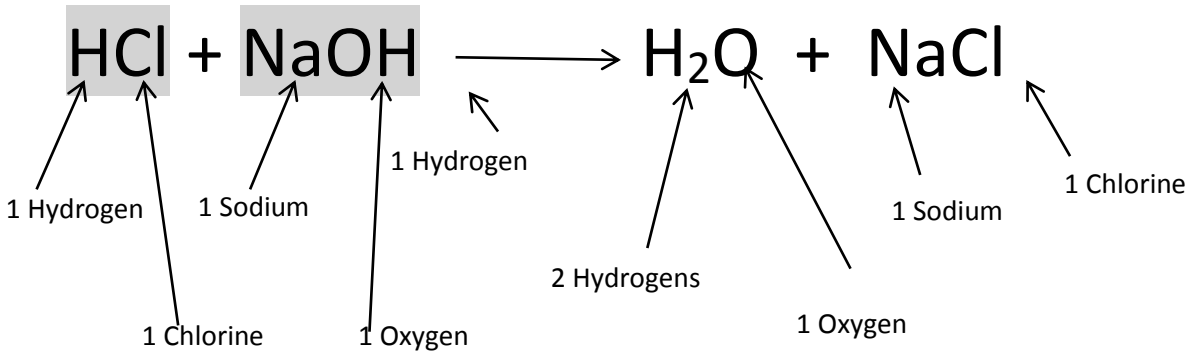
……

C1.1.3 Chemical Reactions

For each chemical reaction:

a. **Write the word equation**
b. **Colour the reactants in one colour and the products in another**
c. **Identify how many of each element there is in each compound**

Example



Word Equation:

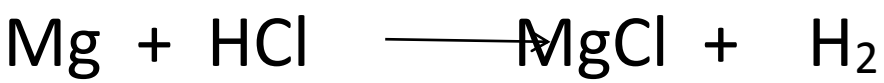
Hydrochloric acid + Sodium Hydroxide → Water + Sodium Chloride

$CaCO_3 \longrightarrow CaO + CO_2$

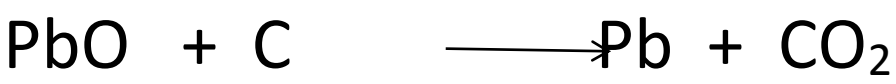
Word Equation:

$Zn + H_2SO4 \longrightarrow H_2 + ZnSO_4$

Word Equation:



Word Equation:



Word Equation:

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d. ***Extension: Balance the symbol equations (Higher tier only)***

What is a compound?

……

……

What is an ion?

……

……

What type of bonding occurs between:

Metal and non-metals?

……Two non-metals?

……

Complete the table about forming ions:

Metal/Non-metal	**Gain/Loose Electrons?**	**Positive/Negative Ion?**
Metal		
Non-Metal		

Draw a diagram showing the bonding between sodium and chlorine to form sodium chloride.

Draw a diagram to show how hydrogen and chlorine bond together to form HCl.

Complete the table, calculate the mass in each case.

Reactants		**Products**	
Hydrochloric acid 20g	Sodium Hydroxide 20g	Sodium Chloride 10g	Water ……..g
Calcium Carbonate ……..g		Calcium Oxide 10g	Carbon dioxide 15g
Zinc 10g	Sulfuric Acid ……g	Hydrogen 20g	Zinc Sulfate 10g
Magnesium 12g	Hydrochloric Acid 17g	Hydrogen …….g	Magnesium Chloride 15g
Lead Oxide ……g	Carbon 14g	Carbon Dioxide 23g	Lead 12g

C1.2 Limestone and Building Materials

C1.2.1 Calcium Carbonate

What is limestone made from?

……

……

How do you get limestone out of the ground?

……

……

What is limestone used for?

……

……

What is thermal decomposition?

……

……

Write the word and symbol equations for the thermal decomposition of calcium carbonate.

……

……

What happens to magnesium carbonate, copper carbonate, zinc carbonate and calcium carbonate when they are heated?

……

……

Give a reason why not all of the above reactions could be observed in a classroom?

……

……

Write word and symbol equations to show what happens when calcium oxide reacts with water. What can the product be used for?

……

……

How do you test for the presence of carbon dioxide? Draw a diagram and write a description.

……

……

What is the chemical name and formula for lime water?

……

……

Describe the reaction that occurs when limewater reacts with carbon dioxide.

……

……

What are the products produced when a carbonate reacts with an acid?

- ……
- ……
- ……

What happens to limestone statues when exposed to acid rain?

……

……

Complete the following:

Limestone + Heat + Clay = ……..

Cement + Sand = ……..

Cement + Sand + Aggregate = ……..

Discuss the advantages and disadvantages associate with limestone quarries. You will need to consider environmental, social and economic factors. (6 marks)

……

……

……

……

……

……

……

……

……

……

C1.3 Metals and Their Uses

C1.3.1 Extracting Metals

What is an ore?

……

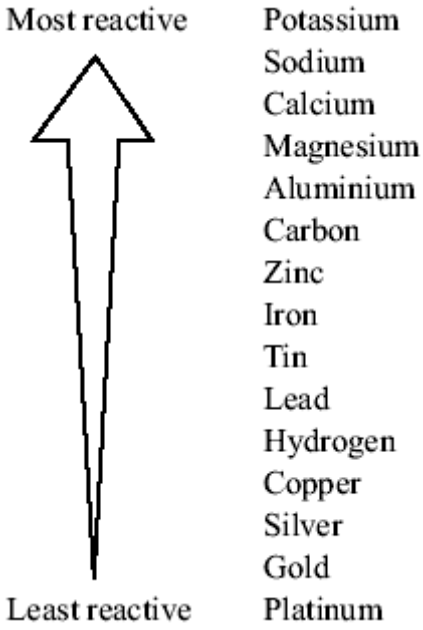
……

Explain why it is possible to find gold in the Earth as a metal.

……

……

What does the reactivity series show us?



……

……

……

How can carbon be used to extract a metal from its ore?

……

……

What method do we use to extract more reactive metals such as aluminium?

……

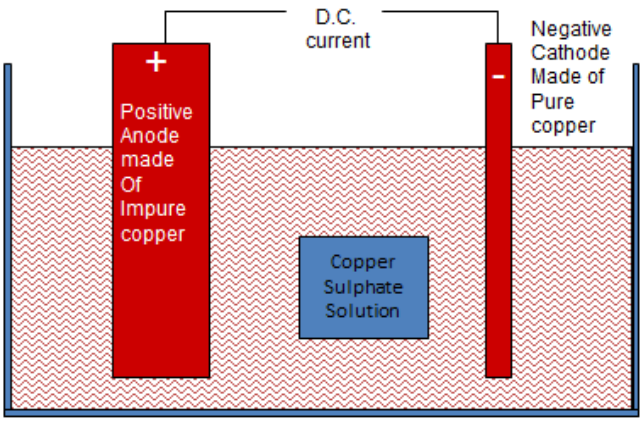
……

Why is aluminium expensive?

……

……

Refining copper



Add the following statements to the correct place on the diagram above

1. Copper atoms lose electrons and become copper ions.
2. The positive ions drift away from the anode
3. **$Cu^{2+} + 2e- \rightarrow Cu$**
4. Positive copper ions drift to the cathode.
5. The cathode is electroplated
6. **$Cu \rightarrow Cu^{2+} + 2e^-$**
7. The anode dissolves
8. Copper atoms gain electrons and become copper atoms

Define the following words:

Phytoming

……

……

Bioleaching

……

……

Why are these processes important?

……

……

List methods of extracting copper:

- ……
- ……
- ……
- ……

Why is it important that we recycle metals?

……

……

……

……

C1.3.2 Alloys

What impact do impurities have on the properties of iron when it comes from the blast furnace?

……

……

What is steel?

……

……

Complete the table

Properties of high carbon steel	Properties of low carbon steel

Why do we convert copper, gold, iron and aluminium into alloys?

……

……

C1.3.3

Colour in the transition metals

Periodic Table of the Elements

1 H 1.008																	2 He 4.00
3 Li 6.94	4 Be 9.01											5 B 10.81	6 C 12.01	7 N 14.01	8 O 16.00	9 F 19.00	10 Ne 20.18
11 Na 22.99	12 Mg 24.31											13 Al 26.98	14 Si 28.09	15 P 30.97	16 S 32.07	17 Cl 35.45	18 Ar 39.95
19 K 39.20	20 Ca 40.08	21 Sc 44.96	22 Ti 47.88	23 V 50.94	24 Cr 52.00	25 Mn 54.94	26 Fe 55.85	27 Co 58.93	28 Ni 58.69	29 Cu 63.55	30 Zn 65.39	31 Ga 69.72	32 Ge 72.61	33 As 74.92	34 Se 78.96	35 Br 79.90	36 Kr 83.80
37 Rb 85.47	38 Sr 87.62	39 Y 88.91	40 Zr 91.22	41 Nb 92.91	42 Mo 95.94	43 Tc (98)	44 Ru 101.0	45 Rh 102.9	46 Pd 106.4	47 Ag 107.8	48 Cd 112.4	49 In 114.8	50 Sn 118.7	51 Sb 121.7	52 Te 127.6	53 I 126.9	54 Xe 131.2
55 Cs 132.9	56 Ba 137.3	57 La 138.9	72 Hf 178.5	73 Ta 180.1	74 W 183.9	75 Re 186.2	76 Os 190.2	77 Ir 192.2	78 Pt 195.1	79 Au 197.0	80 Hg 200.6	81 Tl 204.4	82 Pb 207.2	83 Bi 209.0	84 Po (209)	85 At (210)	86 Rn (222)
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90 Th 232.4	91 Pa 231.4	92 U 238.0	93 Np (237)	94 Pu (240)	95 Am (243)	96 Cm (247)	97 Bk (248)	98 Cf (251)	99 Es (252)	100 Fm (257)	101 Md (257)	102 No (259)	103 Lr (262)

List properties of transition metals

……

……

Complete the table

Metal	**Properties**	**Uses**
Copper		
Aluminium		
Titanium		

C1.4 Crude Oil and Fuels

C1.4.1 Crude Oil

What is crude oil?

……

……

Use diagrams to show how crude oil was formed.

What is a mixture?

……

……

What is a hydrocarbon?

……

……

Name a saturated hydrocarbon

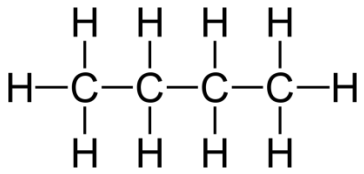
……

Give the general formula of an alkane

……

C1.4.2 Hydrocarbons

Complete the following table

Alkane	**Number of Carbons**	**Number of Hydrogens**	**Formula**	**Structure**
	1			
		6		
			C_3H_8	
Butane				
Pentane	5			

What is fractional distillation?

……

……

What method can you use to separate liquids with different boiling points?

……

What is a boiling point?

……

……

Draw a diagram of a fractionating column

Where do substances with high boiling points condense in the fractionating column?

……

……

Where do substances with low boiling points condense in the fractionating column?

……

……

Define the following words:

Viscosity

……

……

Flammability

……

……

How does the length of the carbon chain affect the following:

Boiling point

……

……

Viscosity

……

……

Flammability

……

……

C1.4.3 Hydrocarbon Fuels

Complete the following equation for the combustion of hydrocarbons

Hydrocarbon + ……. = ……+……

The following substance can be released when fossil fuels are burnt. Explain where they come from and the impact that they have on the environment

Carbon dioxide

Produced due to

……

……

Impact on the environment

……

……

Sulfur Dioxide

Produced due to

……

……

Impact on the environment

……

……

Carbon Monoxide

Produced due to

……

……

Impact on the environment

……

……

Oxides of Nitrogen

Produced due to

……

……

Impact on the environment

……

……

Particulates

Produced due to

……

……

Impact on the environment

……

……

Describe the causes and effects of acid rain

……

……

……

……

……

……

Describe the causes and effects of global warming

……

……

……

……

……

……

Describe the causes and effects of global dimming

……

……

……

……

How are biofuels produced?

……

……

C1.5 Other Useful Substances from Crude Oil

C1.5.1 Obtaining useful substances from crude oil

What is cracking and why is it necessary?

……

……

Describe the process of cracking?

……

……

……

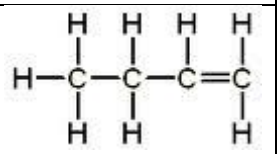
What is the general formula for an alkene?

……

What happens when alkenes react with bromine water?

……

……

Alkene	**Number of Carbons**	**Number of Hydrogens**	**Formula**	**Structure**
	1			
		4		
			C_3H_6	
Butene				
Pentene	5			

C1.5.2 Polymers

Draw a diagram representing the process of polymerisation of ethene. Label the following:

Monomer **Polymer** **Ethene** **Poly(ethene)**

Describe the process of polymerisation.

……

……

What uses do we have for polymers?

……

……

Why is it important to recycle polymers?

……

……

……

……

……

……

C1.5.3 Ethanol

What are the two methods of producing ethanol?

……

……

What are the advantages and disadvantages of each method?

……

……

……

……

C1.6 Plant Oils and Their Uses

C1.6.1 Vegetable Oils

What steps are required to extract oils from fruits, seeds and nuts?

……

……

How is olive oil extracted?

……

……

Why are vegetable oils important foods?

……

……

C1.6.3 Emulsions

What is an emulsifier?

……

……

What is an emulsion?

……

……

Why are emulsions useful?

……

……

Higher Tier – What is meant by hydrophobic and hydrophilic?

……

……

C1.6.3 Saturated and Unsaturated Oils

How do you test for the presence of a double bond?

……

……

The presence of a double bond means that oil is Saturated/unsaturated. (*Delete as appropriate)*

Higher Tier – How can unsaturated oils be hardened? Describe the properties of the product.

……

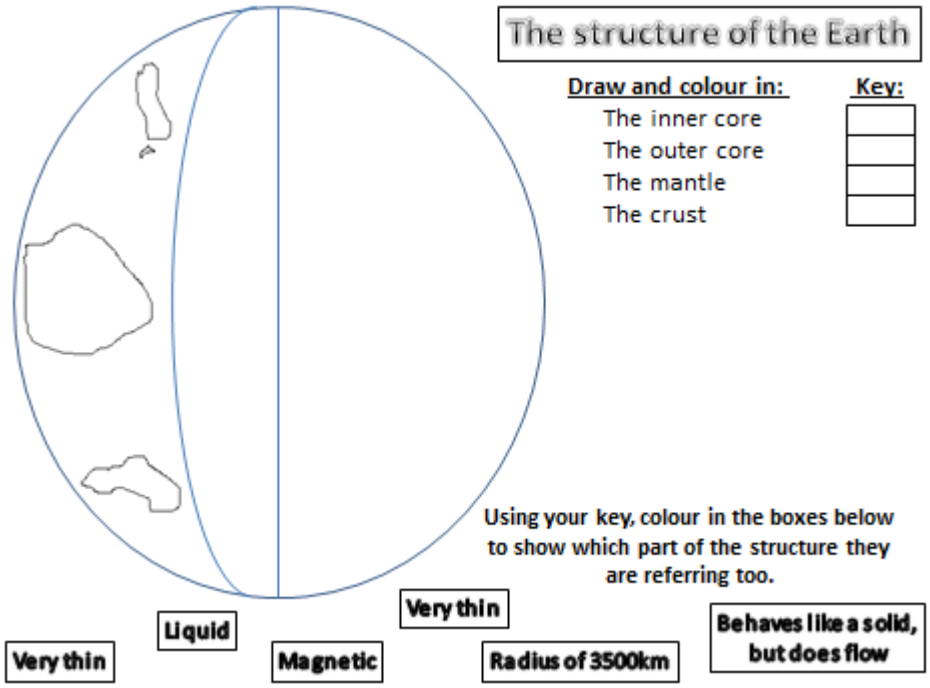
……

……

……

C1.7 Changes in the Earth and its Atmosphere

C1.7.1 The Earth's Crust



How do earthquakes and volcanoes occur?

……

……

……

……

Explain why Wegener's theories of crustal movement were not accepted for many years?

……

……

Explain why scientists cannot accurately predict when earthquakes and volcanic eruptions will occur?

……

……

Higher Tier – Describe why we do not know how life was first formed?

……

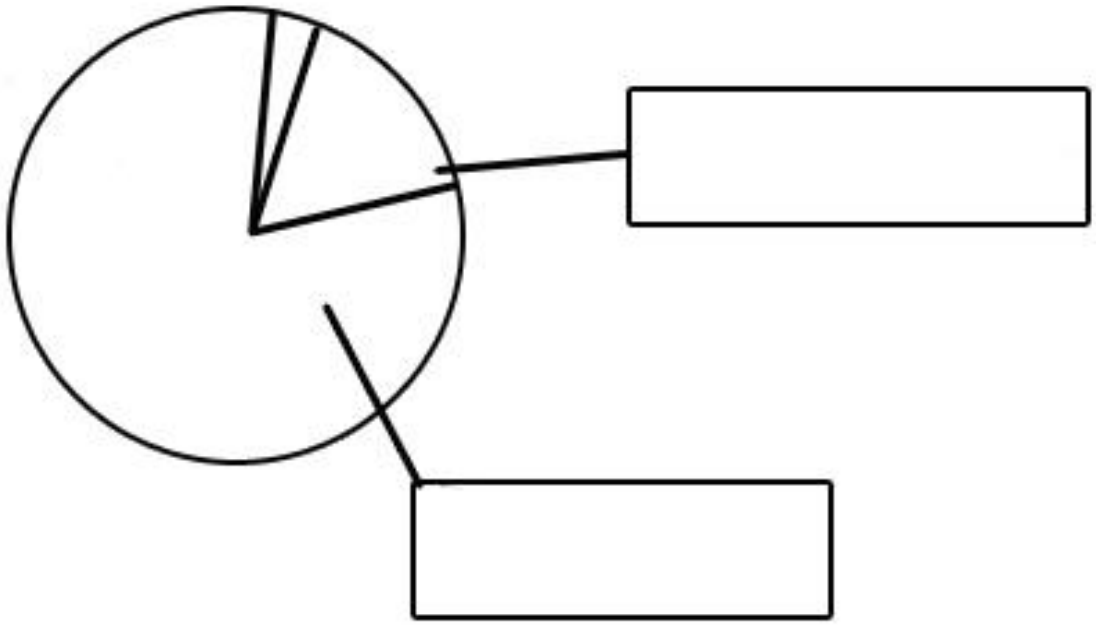
……

……

……

C1.7.2 The Earth's Atmosphere

Label the diagram to show the proportions of different gases in the atmosphere:



What was responsible for the formation of the Earth's early atmosphere and provided the water that formed the oceans?

……

……

What process produced the oxygen that is now in the atmosphere?

……

……

What happened to a lot of the carbon dioxide that was in the air?

……

……

What human activities have caused a change in our atmosphere?

……

……

Higher Tier – What process could be used to separate the mixture of gases that makes up air?

……

……S

Self-Assess

The topics that I know in detail are:

-
-
-

The topics that I know but need to do some revision for are:

-
-
-

The topics that I do not understand and need to ask for help with are:

-
-
-

Other revision activities that you can now do are:

- Complete BBC bitesize activities
- Make revision cards
- Draw mind-maps
- Use AQA website to find practice questions

Physics

Wednesday 3rd December

9am Start

Double students

- One 1 hour paper
- Based on the content of Physics 1

Triple students

- Two 1 hour papers (back to back)
- One based the content of Physics 1
- Another on the content of Physics 2 (minus 2.5 and 2.6)

		Before			After		
P1.1 Heat Transfers							
P1.1.1 Infrared Radiation		☺	😐	☹	☺	😐	☹
Revision Video	a. All objects emit infrared radiation						
	b. The hotter an object is the more infrared radiation it radiates in a given time						
	c. Dark, matt surfaces are good emitters of infrared radiation						
	d. Light, shiny surfaces are poor emitters of infrared radiation						
	All objects absorb infrared radiation						
	Dark, matt surfaces are good absorbers of infrared radiation						
	Light, shiny surfaces are poor absorbers of infrared radiation						
	Light, shiny surfaces are good reflectors of infrared radiation						

P1.1.2 Kinetic theory		☺	😐	☹	☺	😐	☹
Revision Video	a. The use of kinetic theory to explain the different states of matter						
	b. The particles of solids, liquids and gases have different amounts of energy						

P1.1.3 Energy transfer by heating		☺	😐	☹	☺	😐	☹
Revision Video	a. The transfer of energy by conduction and convection involves particles, and how this transfer takes place. The transfer of energy by evaporation and condensation involves particles, and how this transfer takes place						
Revision Video	b. The factors that affect the rate of evaporation and condensation						
Revision Video	c. The rate at which an object transfers energy by heating depends on a number of factors						
	d. The bigger the temperature difference between an object and its surroundings, the faster the rate at which energy is transferred by heating						

P1.1.4 Heating and insulating buildings		☺	😐	☹	☺	😐	☹
Revision Video	a. U-values measure how effective a material is as an insulator						
	b. The lower the U-value, the better the material is as an insulator						
	c. Solar panels may contain water that is heated by radiation from the Sun. This water may then be used to heat buildings or provide domestic hot water						
Revision Video	d. The specific heat capacity of a substance is the amount of energy required to change the temperature of one kilogram of the substance by one degree Celsius $E = m \times c \times \theta$						

P1.2 Energy and efficiency								
P1.2.1 Energy transfers and efficiency		☺	😐	☹		☺	😐	☹
Revision Video	a. Energy can be transferred usefully, stored or dissipated, but cannot be created or destroyed							
	b. When energy is transferred only part of it may be usefully transferred, the rest is 'wasted'							
	c. Wasted energy is eventually transferred to the surroundings, which become warmer							
	The wasted energy becomes increasingly spread out and so becomes less useful							
Revision Video	d. To calculate the efficiency of a device using:							
	Efficiency = $\frac{\text{useful energy out}}{\text{total energy in}}$							
	Efficiency = $\frac{\text{useful power out}}{\text{total power in}}$							

P1.3 The usefulness of electrical appliances								
P1.3.1 Transferring electrical energy		☺	😐	☹		☺	😐	☹
Revision Video	a. Examples of energy transfers that everyday electrical appliances are designed to bring about							
	b. The amount of energy an appliance transfers depends on how long the appliance is switched on and its power							
	c. To calculate the amount of energy transferred from the mains using the equation **E = Pt**							
	d. To calculate the cost of mains electricity given the cost per kilowatt-hour (kWh) (unit)							
	Total cost = No of kWh used x cost per kWh(unit)							

P1.4 Methods we use to generate electricity								
P1.4.1 Generating electricity		☺	😐	☹		☺	😐	☹
Revision Video	a. In some power stations an energy source is used to heat water. The steam produced drives a turbine that is coupled to an electrical generator							
	b. The steam produced drives a turbine that is coupled to an electrical generator							
Revision Video	c. In some volcanic areas hot water and steam rise to the surface. The steam can be tapped and used to drive turbines. This is known as geothermal energy							
	d. Electricity can be produced directly from the Sun's radiation							
Revision Video	e. Small-scale production of electricity may be useful in some areas and for some uses; eg hydroelectricity in remote areas and solar cells for roadside signs							
	f. Using different energy resources has different effects on the environment							

P1.4.2 The National Grid								
Revision Video	a. Electricity is distributed from power stations to consumers along the National Grid							
	b. For a given power, increasing the voltage reduces the current required and this reduces the energy losses in the cables							
	c. The uses of step-up and step-down transformers in the National Grid							

P1.5 The use of waves for communication and to provide evidence that the universe is expanding								
P1.5.1 General properties of waves		☺	😐	☹	☺	😐	☹
Revision Video	a. Waves transfer energy						
	b. Waves may be either transverse or longitudinal						
	c. Electromagnetic waves are transverse, sound waves are longitudinal and mechanical waves may be either transverse or longitudinal						
	d. All types of electromagnetic waves travel at the same speed through a vacuum (space)						
	e. Electromagnetic waves form a continuous spectrum						
	f. Longitudinal waves show areas of compression and rarefaction						
	g. The terms 'frequency', 'wavelength' and 'amplitude'						
Revision Video	h. Waves can be reflected, refracted and diffracted						
	i. Waves undergo a change of direction when they are refracted at an interface						
Revision Video	j. The terms frequency, wavelength and amplitude						
	k. All waves obey the wave equation; $v = f\lambda$						
	l. Radio waves, microwaves, infrared and visible light can be used for communication						

P1.5.2 Reflection		☺	😐	☹	☺	😐	☹
Revision Video	a. The 'normal' is a construction line perpendicular to the reflecting surface at the point of incidence						
	b. The angle of incidence is equal to the angle of reflection						
	c. The image produced in a plane mirror is virtual						

P1.5.3 Sound		☺	😐	☹	☺	😐	☹
Revision Video	a. Sound waves are longitudinal waves and cause vibrations in a medium, which are detected as sound						
	b. The pitch of a sound is determined by its frequency and loudness by its amplitude						
	c. Echoes are reflections of sounds						

P1.5.4 Red-shift		☺	😐	☹	☺	😐	☹
Revision Video	a. If a wave source is moving relative to an observer there will be a change in the observed wavelength and frequency. This is known as the Doppler effect						
	b. There is an observed increase in the wavelength of light from most distant galaxies. This effect is called the 'red-shift'						
	c. How the observed 'red-shift' provides evidence that the universe is expanding and supports the 'Big Bang' theory						
	d. Cosmic microwave background radiation (CMBR) is a form of electromagnetic radiation filling the universe						
	e. The 'Big Bang' theory is currently the only theory that can explain the existence of CMBR						

P1 Revision Booklet

P1.1 The Transfer of Energy by Heating Processes and the Factors that Affect the Rate at Which that Energy is Transferred

P1.1.1 Infrared Radiation

Use the following key words to complete the sentences

Hotter **Matt** **Shiny** **Emit**

Dark **Absorb** **Light**

All objects ……. and ……. infrared radiation. The ……. an object is, the more infrared radiation it radiates. ……., ……. surfaces are good absorbers and good emitters of infrared radiation. ……., ……. surfaces are poor absorbers and poor emitters of infrared radiation. ……., ……. surfaces are good reflectors of infrared radiation.

P1.1.2 Kinetic Theory

Draw particle diagrams showing the three states of matter

Describe the different amounts of energy in solids, liquids and gases.

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……

……..

P1.1.3 Energy Transfer by Heating

What are the three methods of energy transfer by heating?

- ……
- ……
- ……

Describe the process of conduction

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What is the role of free electrons in conduction?

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What happens to the density of a liquid as it is heated?

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Describe the process of convection

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Describe the energy transfers involved during evaporation and condensation

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List factors that affect the rate at which an object transfers energy

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P1.1.4 Heating and Insulating Buildings

What do U-values measure?

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What uses can solar panels that contain water have?

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What is specific heat capacity?

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P1.2 Energy and Efficiency

P1.2.1 Energy Transfer and efficiency

Energy can be:

- T_ _ _ _ _ _ _ _ _ d
- S _ _ _ _ d
- D _ _ _ _ _ _ _ _ d

Energy cannot be

- C _ _ _ _ _d
- D _ _ _ _ _ _ _ d

What is meant by “wasted” energy?

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……..

What happens to wasted energy?

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……..

What is efficiency?

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……..

How do you calculate efficiency?

……

……..

P1.3 The usefulness of electrical appliances

P1.3.1 Transferring Electrical Energy

Describe the energy transfers for the following appliances:

Hair dryer

Washing machine

Wind Turbine

Light bulb

Solar powered fan

What factors affect how much energy is transferred by an appliance?

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……..

What equation should be used to calculate energy transferred?

……

……..

What is a kilowatt-hour?

……

……..

P1.4 Methods we use to generate electricity

P1.4.1 Generating electricity

Describe how fossil fuels, uranium, plutonium and biofuels are used to produce electricity

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……

……..

Draw and label a diagram of a power station

Name three fossil fuels

……

……..

How do uranium and plutonium release energy?

……

……..

What is a biofuel?

……

……..

Method	How does it work?	Examples	Advantages	Disadvantages
Water				
Wind				
Sun				
Volcanic areas				
Fossil Fuels				
Nuclear				
Biofuels				

P1.4.2 The National Grid

What is the national grid?

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What happens to current when voltage is increased (at a given power)?

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What are transformers used for?

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……..

Why does the national grid use transformers?

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Draw and label a diagram of the national grid, explaining what each part is for. Include: power station, step-up transformer, power cables, pylons, step-down transformers.

P1.5 The use of waves for communication and to provide evidence that the univers is expenading

P1.5.1 General properties of waves

What do all waves have in common?

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What are the two types of wave?

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……..

Draw diagrams to represent these two waves

Give examples of each type of wave

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Compare the speed of electromagnetic waves with each other in space

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Wave	Wavelength	Frequency	Uses

Define the following key words and support them with diagrams:

Compression

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……..

Rarefaction

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……..

Reflection

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……..

Refraction

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……..

Diffraction

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……..

Label a diagram of a wave with the following key words: frequency, wavelength, amplitude

Define the key words:

Frequency

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……..

Wavelength

……

……..

Amplitude

……

……..

In the following equation, what do each of the letters stand for and what units are used to measure them:

$V = f \times \lambda$

P1.5.2 Reflection

What is the “normal”?

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What is the rule of reflection?

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How can you describe an image that is produced in a plane mirror?

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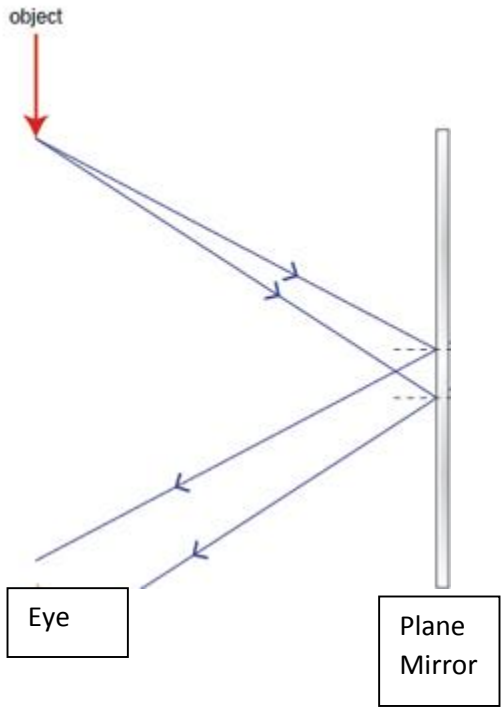
Complete the following ray diagram



P1.5.3 Sound

Describe sound waves

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How are frequency, pitch, amplitude and volume related?

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What is an echo?

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P1.5.4 Red-Shift

What is the Doppler effect?

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What can be the source of a wave that demonstrates the Doppler effect?

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What appears to happen to the wavelength and the frequency as a wave source moves away from an observer?

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……..

What appears to happen to the wavelength and the frequency as a wave source moves towards an observer?

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……..

What is being observed in the wavelength of light from distant galaxies?

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……..

What does this tell us about these galaxies?

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……..

What is the red shift?

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……..

What does an increasing red-shift tell us about distance galaxies?

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……..

What does this suggest about the origins of the universe?

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……..

What is CMBR?

……

……..

What theory explains the presence of CMBR?

……

……..

		Before			After		
P2.1.1 Resultant forces		☺	😐	☹	☺	😐	☹
	Describe equal and opposite pairs of forces						
	Describe and calculate resultant forces						
	Predict how resultant forces (zero or not zero) will affect the motion of stationary and moving objects						

P2.1.2 Forces and motion		☺	😐	☹	☺	😐	☹
Revision Video	Calculate acceleration (*a*) using force (*F*) and mass (*m*), or calculate force using mass and acceleration						
	Remember what the gradient of a distance-time graph represents						
	(HT) Calculate speed of an object from gradient of a distance-time graph						
Revision Video	Define 'velocity'						
	Calculate acceleration (*a*) from final velocity (*v*), initial velocity (*u*) and time taken (*t*)						
	Remember what the gradient of a velocity-time graph represents						
	(HT) Calculate the acceleration of an object from the gradient of a velocity-time graph						

P2.1.3 Forces and braking		☺	😐	☹	☺	😐	☹
Revision Video	Describe the forces acting on a car travelling at a steady speed						
	Explain the relationship between the speed of a vehicle and the braking force needed to stop it in a certain distance						
	Describe the stopping distance as the sum of the thinking distance and the braking distance						
	Evaluate the effects of alcohol and drugs on stopping distances						
	Explain how work is done by friction to reduce the kinetic energy of the vehicle and heat up the brakes						

P2.1.4 Forces and terminal velocity		☺	😐	☹	☺	😐	☹
Revision Video	Describe the relationship between the speed of an object (in a fluid) affects the frictional force (drag) acting on it						
	Describe how the forces change on falling objects, and why a parachute reduces a skydiver's terminal velocity						
Revision Video	Draw and interpret velocity-time graphs for falling objects, and consider the forces acting on them						
Revision Video	Calculate the weight (*W*) of an object using mass (*m*) and gravitational field strength (*g*)						

P2.1.5 Forces and elasticity		☺	😐	☹	☺	😐	☹
Revision Video	Describe how forces applied to elastic objects like springs will result in the objects stretching and storing elastic potential energy						
	Describe how elastic potential energy is stored when work is done on objects that return to their original shapes						
	Calculate the force (*F*) acting on a spring from the spring constant (*k*) and its extension (*e*)						

P2.2.1 Forces and energy		☺	😐	☹	☺	😐	☹
Revision Video	Describe 'work done' in terms of forces causing objects to move						
	Explain how the kinetic energy of an object increases or decreases when its speed changes						
	Calculate work done (W) from force (F) and distance moved in a direction (d)						
	State that energy is transferred when work is done, for example against frictional forces						
	Evaluate the benefits of different types of braking system, such as regenerative braking						
Revision Video	Calculate Power (P) from work done or energy transferred (E) and time (t)						
	Calculate gravitational potential energy (E_p) from mass (m), gravitational field strength (g) and change in height (h)						
	Calculate kinetic energy of an object (E_k) from its mass (m) and speed (v)						

P2.2.2 Momentum		☺	😐	☹	☺	😐	☹
Revision Video	Calculate the momentum of an object (p) from its mass (m) and velocity (v)						
	Explain that, in a 'closed system', the total momentum before an event (such as a collision or explosion) is equal to the total momentum after the event						
Revision Video	Evaluate the benefits of air bags, crumple zones, seat belts and side impact bars using ideas of energy and momentum						

P2.3.1 Static electricity		☺	😐	☹	☺	😐	☹
Revision Video	Describe how some insulating materials can become electrically charged						
	Explain how this charge (positive or negative) depends on the material losing or gaining electrons						
	Describe the forces exerted by electrically charged objects on each other						
	State that electrical charges can move easily through some substances (e.g. electrons moving through metals, or ions moving through a solution)						

P2.3.2 Electrical circuits		☺	😐	☹	☺	😐	☹
Revision Video	Describe an electric current as flow of electric charge						
	Calculate the size of an electric current (*I*) from charge (*Q*) and time (*t*)						
	Describe potential difference (voltage) as the work done per coulomb of charge as it passes between two points						
Revision Video 1 Revision Video 2 Revision Video 3	Calculate the potential difference (*V*) from work done (*W*) and charge (*Q*)						
	Recognise circuit symbols (see P2.2 checklist)						
	Describe how thermistors are use in circuits (e.g. in thermostats)						
	Describe how LDRs are used in circuits (e.g. switching lights on in the dark)						
	Recognise and sketch the current-potential difference graph for a resistor at a constant temperature						
	Recognise and sketch the current-potential difference graph for a filament bulb						
	(HT) Explain how the resistance changes in terms of ions and electrons						
	Recognise and sketch the current-potential difference graph for a diode						
	Describe how to find the resistance of a component by measuring the current through, and the potential difference across, the component						
	Describe the relationship between the current through and potential difference across a resistor (at a constant temperature) as directly proportional						
Revision Video 1 Revision Video 2 Revision Video 3 Revision Video 4	Calculate potential difference (*V*) using current (*I*) and resistance (*R*)						
	Calculate the potential difference of a number of cells connected in series						
	Calculate the resistance of a number of components connected in series						
	Describe and predict the current through and potential difference across components connected in series and parallel circuits						
	Explain why light emitting diodes (LEDs) are increasingly popular						
	Describe how the resistance of an LDR changes as light intensity changes						
	Describe how the resistance of a thermistor changes as the temperature changes						
	Apply the principles of basic electrical circuits to practical situations						
	Evaluate the use of different forms of lighting, in terms of cost and energy efficiency (e.g. filament bulbs, fluorescent bulbs and LEDs)						

P2.4.1 Household electricity		☺	😐	☹	☺	😐	☹
Revision Video 1 Revision Video 2	Understand the principles of safe practice and recognise dangerous practice in the use of mains electricity						
	Explain the difference between direct current (d.c.) and alternating current (a.c.)						
	Compare and calculate the potential differences of d.c. supplies and the peak potential difference of a.c. supplies from diagrams of oscilloscope traces						
	(HT) Determine the period and therefore the frequency of a supply from diagrams of oscilloscope traces						
Revision Video 1 Revision Video 2	Remember the frequency and peak potential difference of the UK mains electricity supply						
	Describe the structure of two-core and three-core electrical cable						
	Evaluate and explain the need to use different cables for different appliances						
	Describe the structure and materials used in a three-pin plug and explain how to wire one safely						
	Describe the role of fuses or circuit breakers in disconnecting circuits if an electrical fault causes the current to become too great						
	Explain how a fuse disconnects a circuit if the current exceeds the rating of the fuse						
	Compare the uses of fuses and circuit breakers						
	Remember that residual current circuit breakers (RCCBs) work by detecting a difference in the current between the live and neutral wires						
	Describe how the earth wire and fuse together protect the wiring of the circuit in appliances with metal cases (unless they are double insulated)						

P2.4.2 Current, charge and power		☺	😐	☹	☺	😐	☹
Revision Video 1 Revision Video 2 Revision Video 3 Revision Video 4 Revision Video 5	Describe the effect of electrical charge flowing through a resistor, and use this idea to explain why filament bulbs waste so much energy						
	Consider the factors involved when making a choice of electrical appliances, including efficiency and power						
	Explain that the power of an electrical appliance is the rate at which it transforms energy						
	Calculate the rate of energy transfer, or power (P) from the energy transferred (E) and time (t)						
	Calculate power (P) from current flowing through (I) and potential difference across (V) an appliance						
	(HT) Calculate energy transferred (E) from potential difference (V) and charge (Q)						

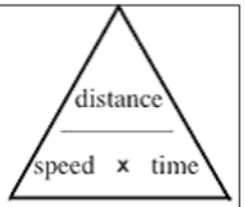
Define these terms:

1) Velocity
2) Gradient
3) Acceleration
4) Deceleration

1. A car on a motorway travel 10 km in 6 minutes. A coach takes 7 minutes to travel the same distance. Which vehicle was travelling faster? Explain your answer.

Speed m/s = distance travelled (m) / Time taken (s)

Acceleration (m/s²) = change in velocity (m/s) / Time taken for change (s)



Acceleration, a = $\frac{V - U}{T}$

V = final velocity m/s
U = Initial velocity m/s
T = time taken S

What are the units for:

Speed –
Acceleration –
Time –
Distance –

P2: Motion

Explain the difference between speed and velocity:

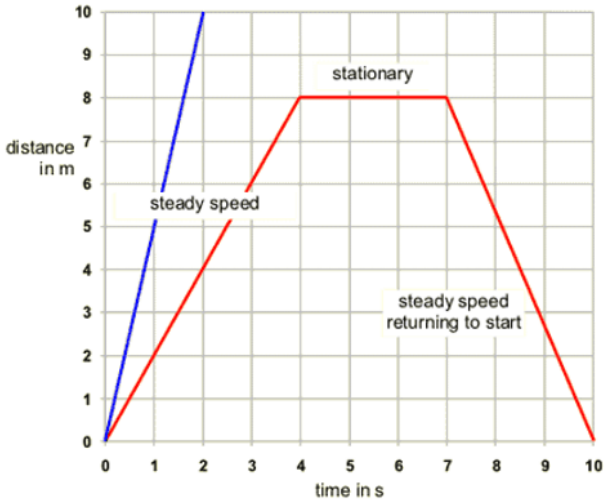
1. The velocity of a car increased from 8 m/s to 28 m/s in 8 s without change of direction calculate:

   a. its change of velocity –

   b. its acceleration –

2. When the car joined the motorway, its velocity increased from 5 m/s to 25 m/s in 10 seconds. What was its acceleration during this time?

Distance time graphs

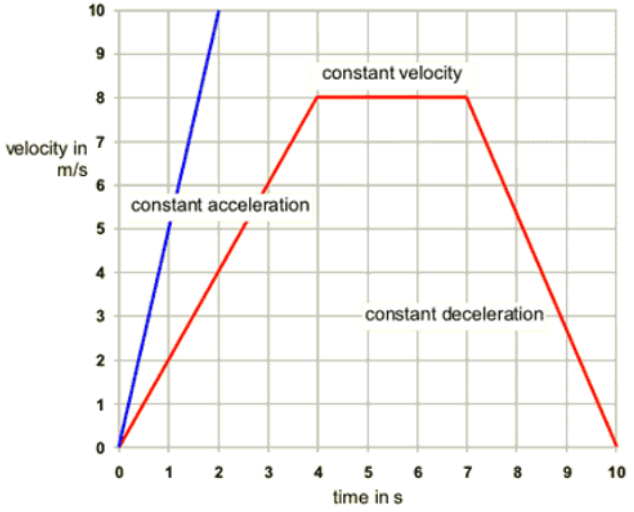


1. Calculate the average speed of a car travelling 1800 m in 60 seconds –

2. Calculate the speed of a car travelling 30 000 m in 1250 seconds –

3. A train travels at a constant speed of 35 m/s calculate how far it travels in 20 s -

Velocity time graphs



If an object falls with no other forces acting on it the resultant force on it is its weight. It accelerates at a constant acceleration of 10 m/s^2. This is acceleration die to gravity.

Explain what terminal velocity is use an example:

Force and acceleration

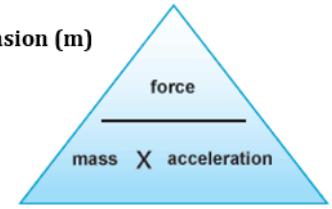
Resultant force (N) = Mass (Kg) x Acceleration (m/s^2)

Stopping distance = thinking distance + braking distance

Weight (N) = Mass (Kg) x Gravitational field strength (N/Kg)

Force applied (N) = Spring constant (N/m) Extension (m)

F = K x e
F = force
K = Spring constant
E = extension



What is an average speed camera?

P2: Forces

What do forces do to an object?

What forces act upon a car when travelling?

What factors affect stopping distances?

Explain the difference between weight and mass, include the units for each:

What is zero resultant force?

What is non - zero resultant force?

When 2 forces interact what can be said about those forces?

1. A tractor pulls a car with a force of 250N but the car doesn't move explain why?
2. A car and a trailer have a total mass of 1500kg calculate the force needed to accelerate the car and trailer at 2 m/s^2
3. A driver has a reaction time of 0.8s. Calculate her thinking distance at a speed of 15 m/s
4. The gravitational field strength on Earth is 10 N/Kg. For the moon it is 1.6 N/Kg. Calculated the weight of a person of mass 50Kg on Earth and on the moon.

What does Hooke's law state?

What can we say about impact time during a collision?

What happens when 2 vehicles collide?

What does the gravitational potential energy (GPE) of an object depend on?

What happens to GPE when an object is moved up or down?

Work done (j) = force applied (N) x Distance moved (m)

Change in gravitational potential energy (j) = its weight (N) x its change of height (m)

Change in gravitational potential energy (j) = mass (Kg) x gravitational field strength (N/Kg) x change of height (m)

Kinetic energy (j) = ½ x mass (Kg) x speed^2 (m/s^2)

Momentum (kg m/s) = Mass (Kg) x Velocity (m/s)

P2: Work, energy and momentum

What do we mean by work done?

Explain how seat belts work:

Explain how crumple zones work:

How can we work out if a car was speeding before a car crash?

1. Calculate the work done when a force of 20N makes an object move 4.8m in the direction of the force.
2. A student of weight 450N steps on a box of height 0.20m calculate the gain of GPE.
3. An object of weight 2 N fired vertically upwards from a catapult reaches a maximum height of 5m calculate the KE of the object when it left the catapult.
4. Calculate the momentum of an 80Kg rugby player running at a velocity of 5 m/s.

What does the kinetic energy (KE) of an object depend on?

What happens to the work done to overcome friction?

What is momentum?

What does the law of conservation of momentum state?

P2: Current electricity

Define these terms:

1) Static electricity

2) Resistance

3) Voltage

4) Current

Explain the Current potential difference graphs for:

Filament bulb:

Diode:

Thermistor/LDR

Potential difference across a component (V) = Work done/energy transferred (j) / Charge (coulombs C)

Resistance (ohms Ω) = Potential difference (v) / Current (amperes (A)

Current (A) = Potential difference (V) / Resistance (Ω)

When objects are rubbed together what is transferred to create a charge?

What happens when charges are brought together?

Resistor	Current (A)	Potential difference (V)	Resistance (Ω)
W	2.0	12.0	
X	4.0		20
y		6.0	3.0

Complete the table

What can we say about the components in a parallel circuit?

What can be said about the potential difference across the components in a parallel circuit?

What does Ohms law state?

Draw the symbol for each component and say what it does/is:

Cell:

Switch:

Bulb:

Diode:

LED:

Ammeter:

Fixed resistor:

Variable resistor:

Fuse:

Heater:

Voltmeter:

What is the difference between a battery and a cell?

What do we mean by potential difference?

Explain how we use an ammeter and voltmeter in a circuit:

What are the rules for a series circuit?

How can we find the total resistance of resistors in series?

What can we say about the potential difference of several cells in series?

Define these terms:

1) Frequency

2) Circuit breaker

3) Direct Current (DC)

4) Alternating Current (AC)

1. Give 2 reasons why a circuit breaker is safer than a fuse:

2. In a mains circuit which wire alternates its potential?

3. What does it mean if we say a light bulb is more efficient than another?

Electrical power supplied (P, watts) = Current (I, Amps) x Potential difference (V)

(P = I x V) (V = P/I) (I = P/V)

$$\text{Correct rating (A)} = \frac{\text{Electrical power (W)}}{\text{Potential difference (V)}}$$

Charge (coulombs C) = Current (A) x Time (s)

Calculate the power supplied to the following devices in normal use:

1. A 12v, 3A light bulb

2. A 230v, 2A heater

Which type of fuse (3A, 5A or 13A) would you use for:

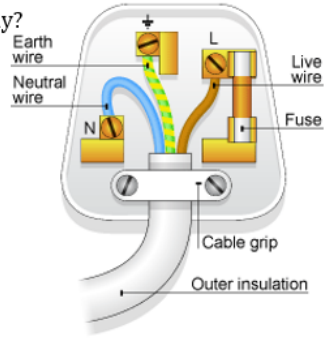
1. A 24 W, 12V heater

2. A 230V, 800w microwave

P2: Mains electricity

What is the casing of a mains plug made from and why?

Why are appliances with plastic cases not earthed?



A heater is made of metal and has an earth wire connected to it. Explain how the fuse and earth wire together protect the wiring of the circuit **(6 marks)**

Explain what a fuse is and how it works in a plug:

Explain the difference between an ordinary circuit breaker and a residual current circuit breaker (RCCB):

Explain why electrical faults can be dangerous and suggest ways we can prevent them happening:

Symbol for double insulation

Label the oscilloscope diagrams to show which shows a DC current and which shows an AC current