GCSE

Core Gateway Science B
P1: Energy from the Home

"We are what we repeatedly do. Excellence, therefore, is not an act but a habit"

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Use the activities and past exam questions in this booklet to plan and support your revision ready for the B1C1P1 science exam.

REVISION WEBSITE – The follow website is available for you to use to support you revision and help you answer the exam questions in this revision guide

http://www.bbc.co.uk/schools/gcsebitesize/science/ocr_gateway/

Introduction

OCR uses assessments to test how good your understanding of scientific ideas is, how well you can apply your understanding to new situations and how well you can analyse and interpret information you've been given. The assessments are opportunities to show how well you can do these.

To be successful in exams you need to:

- ✔ have a good knowledge and understanding of science
- ✔ be able to apply this knowledge and understanding to familiar and new situations, and
- ✔ be able to interpret and evaluate evidence that you've just been given.

You need to be able to do these things under exam conditions.

The language of the external assessment

When working through an assessment paper, make sure that you:

- ✔ re-read a question enough times until you understand exactly what the examiner is looking for
- ✔ make sure that you highlight key words in a question. In some instances, you will be given key words to include in your answer
- ✔ look at how many marks are allocated for each part of a question. In general, you need to write at least as many separate points in your answer as there are marks.

Verb used in question	Response expected in answer	Example question
write down; state; give; identify	These are usually more straightforward types of question in which you're asked to give a definition, make a list of examples, or the best answer from a series of options	'Write down three types of microorganism that cause disease' 'State one difference and one similarity between radio waves and gamma rays'
calculate	Use maths to solve a numerical problem	'Calculate the relative formula mass for sodium hydrogen carbonate'

P1a: Heating Houses

Grade E →	Grade C →	Grade A
know the difference between heat and temperature **understand** how rate of cooling is affected by temperature **know** that a thermogram indicates temperature **know** what affects energy needed to change temperature or state	**know** the effects of energy flow from hotter to cooler bodies **interpret** data on rate of cooling **explain** how thermograms use colour **understand** specific heat capacity and latent heat **use** specific heat capacity and latent heat equations	**understand** that temperature depends on kinetic energy **know** that heat is measured on an absolute scale

Key Information

Heat **energy** is needed to **increase** the **temperature** of an object. The amount of energy needed depends on the mass of the object, the **type of material** it is made from and the **temperature increase**.

Heat energy is also absorbed when substances **melt** or **boil**, but the **temperature does not alter during a change of state**. The amount of energy needed to melt or boil something depends upon the **mass** of the object and the type of material it is made from.

Revision Ideas

1. Draw a mind map for the P1 unit. Add pictures and colour code key words and information
2. Write some practice exam questions for other students to try, make sure you write a mark scheme.

QWC Question (6 marks)

When answering a QWC question remember the following points: Use correct science vocabulary, organise ideas, avoid using "it", and write in full sentences. You also need to try and keep you answer relevant to the question. A good way to do all this is to write out important key vocabulary and then use them to structure your answer. Underlining them will help you keep track and highlight to the examiner your good use of key terms,

Question – This question is heating

A liquid in a beaker is heated to a certain temperature. **State** what the amount of energy needed to heat the water depends on, and **describe** what happens to the temperature of the water as it changes state. (***6marks)***

Important words list
Temperature
Heat
Changes of state
Melting
Boiling
Gas, Solid, Liquid
Latent heat
Mass
Energy

P1b: Keeping Homes Warm

Grade E →	Grade C →	Grade A
explain why trapped air is a good insulator **describe** examples of energy saving in the home **explain** how trapped air is used to keep homes warm **use** the energy efficiency equation	**explain** how energy transfer can be reduced in homes **interpret** data for different energy saving strategies **use** the energy efficiency equation to complete Sankey diagrams	**describe** how conduction, convection and radiation occur **explain** how design features reduce energy loss **explain** why trapped air reduces energy loss through a cavity wall **use** information on efficiency to draw Sankey diagrams

Key Information

Heat energy can be lost from homes in many different places but there are ways of reducing these losses.

Heat can be **transferred** from place to place by **conduction**, **convection** and **radiation**. **Dark matt** surfaces are better at absorbing heat energy than **light shiny** surfaces

Revision Ideas

1. Draw a diagram of a house. Label all the places where heat is being lost and how heat loss is minimised.
2. Write out the formula for working out energy efficiency. Practice using the equation.

QWC Question (6 marks)

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Question – This question is about Energy transfer

It is very cold in the Arctic. Explorers keep warm because they have fur coats. **Describe** the different ways an explorer can lose heat and **explain** how they could reduce heat loss. (***6marks)***

Important words list

Conduction
Convection
Radiation
Absorbs
Radiates
Particles
Insulator
Conductor
Vacuum
Vibrations

P1c: A Spectrum of Waves

Grade E →	Grade C →	Grade A
recognise the features of a transverse wave	**describe** the main features of a transverse wave	
know that electromagnetic waves travel in straight lines	**describe** how waves diffract at an opening	
recognise what happens when reflection or refraction occurs	**understand** that refraction occurs due to a change in the wave speed	
know that all electromagnetic waves travel at the same speed	**draw** ray diagrams to illustrate reflection and refraction	
use the wave equation	**arrange** the electromagnetic spectrum in order by wavelength and frequency	
	manipulate the wave equation and use standard form	

Key Information

White light can be split up into many colours by using a **prism**. This **visible light** is just part of the whole spectrum of **electromagnetic radiation**. Not all types of electromagnetic radiation are **visible**. Each type has a **different wavelength** and a different use in everyday life. Electromagnetic radiation can be used for **wireless communications**.

Revision Ideas

1. Draw a diagram of a transverse wave and label the following; crest, trough, amplitude, wavelength
2. Create a poster of the electromagnetic spectrum. Add pictures for all the different uses of the different wavelengths.

QWC Question (6 marks)

When answering a QWC question remember the following points: Use correct science vocabulary, organise ideas, avoid using "it", and write in full sentences. You also need to try and keep you answer relevant to the question. A good way to do all this is to write out important key vocabulary and then use them to structure your answer. Underlining them will help you keep track and highlight to the examiner your good use of key terms,

Question – This question is fighting disease.

When a ray of light hits a mirror it is reflected. **Draw** a **diagram** showing this reflection, labelling the key parts and then use the **diagram** to **explain** how a periscope uses this reflection to view objects. ***(6marks)***

Important words list

Reflection
Plane Mirror
Angle
Incidence
Refection
Equal
Normal Line
Ray of light
Periscope

P1d: Light and Lasers

Grade E →	Grade C →	Grade A
know that using light increases the speed of communication **recognise** where total internal reflection happens **understand** how light and infrared can travel along an optical fibre **understand** that lasers produce an intense, narrow beam of light **recall** uses of lasers	**explain** advantages and disadvantages of using light, radio and electrical signals for communication **describe** how light behaves at a boundary between two materials **explain** how total internal reflection occurs in optical fibres **know** that laser light is a narrow beam of light of a single colour	**describe** applications of total internal reflection in optical fibres **explain** the term coherent beam of light **explain** how a laser is used in a CD player

Key Information

Digital signals are a series of **pulses** with two states - **on or off**. Light can be used for digital communications, such as in **Morse code** and **CD players**. **Optical fibres** can carry information coded in light waves or infrared waves. **Lasers** produce intense **narrow beams of light.**

Revision Ideas

1. Write a message using a digital signal such as Morse code.
2. Produce a revision card on Total Internal Reflection. Your revision aid should include a diagram.

QWC Question (6 marks)

When answering a QWC question remember the following points: Use correct science vocabulary, organise ideas, avoid using "it", and write in full sentences. You also need to try and keep you answer relevant to the question. A good way to do all this is to write out important key vocabulary and then use them to structure your answer. Underlining them will help you keep track and highlight to the examiner your good use of key terms,

Question – This question is about sending signals.

Signals can be sent by light, electrical, radio waves or microwaves. **Discuss** the **advantages** and **disadvantages** of each type of signal (***6marks)***

Important words list

Instantaneous
Secure
Equipment
Wires
Amplified
Large Distances
Space
Atmosphere

P1e: Cooking and Communicating Using Waves

Grade E →	Grade C →	Grade A
interpret information about the electromagnetic spectrum **explain** how the emission and absorption of infrared radiation by an object is affected by its temperature, colour and texture **recognise** that water and fat absorb microwaves **recall** that mobile phones use microwave signals **know** the different views about the risks from mobile phones	**describe** properties of infrared radiation and microwaves **understand** the problems when microwaves transmit information **realise** the evidence of dangers from mobiles is not conclusive	**explain** how microwaves and infrared transfer energy **know** how the energy of microwaves depends on frequency **explain** how to reduce signal loss with microwaves **know** it is not easy to decide on the siting of phone masts

Key Information

Infrared radiation and **microwaves** can be used to **cook food**. Microwaves are also used to **transmit information**, such as **mobile phone** networks.

Revision Ideas

1. Make some true false statements cards. Practice sorting them into true/false piles. Time yourself and see if you can beat it the next day.
2. Write a script for a "TV drama" where the characters are concerned about the dangers from a new mobile phone mast being situated near their homes

QWC Question (6 marks)

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Question – This question is about infrared and microwave cookery.

Infrared radiation and microwaves are part of the electromagnetic spectrum. Both can be used to cook food. **Describe** how food is cooked using microwaves and infrared, making sure you **identify** the **differences** between the two methods. (***6marks)***

Important words list

Absorbed by water
Molecules
Penetration
Surface
Reflected
Kinetic Energy
Conduction / Convection
Energy
Wavelength

P1f: Data Transmission

Grade E →	Grade C →	Grade A
describe uses of infrared radiation **describe** the differences between analogue and digital signals **know** how infrared sensors and thermal imaging cameras work	**describe** how infrared signals control electrical devices **describe** the transmission of light in optical fibres	**explain** how the signal from an infrared remote controls a device **describe** advantages of using digital signals **describe** advantages of using optical fibres **explain** how the properties of digital signals allow us to switch to digital TV and radio

Key Information

Information can be transmitted using **analogue** or **digital** signals

Revision Ideas

1. Produce a revision card on the uses of infrared radiation
2. Make a card sort on the differences between digital and analogue signals. Practices sorting the statements into two piles.

QWC Question (6 marks)

When answering a QWC question remember the following points: Use correct science vocabulary, organise ideas, avoid using "it", and write in full sentences. You also need to try and keep you answer relevant to the question. A good way to do all this is to write out important key vocabulary and then use them to structure your answer. Underlining them will help you keep track and highlight to the examiner your good use of key terms,

Question – This question is about Optical Fibres

Optical fibres are used to transmit data. **Draw** a diagram to show how optical fibres work and state the **advantages** of using optical fibres instead of copper wires for data transmission. (***6marks)***

Important words list

Reflection
Speed of light
Long distances
Coating
Total Internal Reflection
Angle of incidence
Angle of reflection
Energy Loss

P1g: Wireless Signals

Grade E →	Grade C →	Grade A
recognise that wireless technology uses electromagnetic radiation **describe** how radiation used for communication can be reflected **describe** the advantages of wireless technology **interpret** information on digital and analogue signals	**recall** how radiation used for communication is refracted and reflected and this can be an advantage or disadvantage for good reception **describe** common uses of wireless technology **describe** advantages and disadvantages of DAB radio	**explain** how long-distance communication uses satellites and the ionosphere **recall** that radio waves (like light) exhibit total internal reflection **explain** the advantages of digital radio

Key Information

Wireless communication is convenient. It is used for **radio programmes**, **mobile phones** and **computer networks**. **DAB broadcasts** have advantages and disadvantages compared to traditional **analogue broadcasts**.

Revision Ideas

1. Make a poster showing how the TV signal to a house can be reflected causing a problem called "ghosting"
2. Write an exam question with mark scheme about the refraction of electromagnetic waves

QWC Question (6 marks)

When answering a QWC question remember the following points: Use correct science vocabulary, organise ideas, avoid using "it", and write in full sentences. You also need to try and keep you answer relevant to the question. A good way to do all this is to write out important key vocabulary and then use them to structure your answer. Underlining them will help you keep track and highlight to the examiner your good use of key terms,

Question – This question is about radio interference.

Shaun is listens to the same radio station every day. Some days he can hear the faint sound of a different station in the background. **Explain** to Shaun why he can hear the other station and **describe** the **advantages** and **disadvantages** of buying a digital radio (***6marks)***

Important words list

Frequency
Interference
Distance
Weather
Digital
More stations
Poor coverage
Audio Quality

P1h: Stable Earth

Grade E →	Grade C →	Grade A
describe the effects of shock waves from an earthquake **recall** effects of exposure to ultraviolet radiation **recognise** that sunscreens can reduce damage to skin **recall** that scientists were surprised to find the ozone hole	**recall** the differences between P waves and S waves **explain** how darker skins have lower cancer risk **interpret** data about sun protection factor **describe** how measurements of ozone reduction were checked	**describe** how seismic waves help to model the Earth's structure **explain** how the ozone layer protects the Earth from ultraviolet radiation **describe** why the ozone layer is depleting and the effect this has **describe** how the discovery of the ozone hole changed attitudes

Key Information

Earthquakes produce **shock waves** that cause **damage**. There are two types of **seismic wave**, **P-waves** and **S-waves**. **Seismometers** can detect these waves and provide evidence of the Earth's structure.

The **ozone layer** reduces the amount of **ultraviolet light** from the Sun that reaches the Earth's surface. Exposure to ultraviolet radiation can lead to **sunburn** and **skin cancer**, but sunscreens can reduce this damage.

Revision Ideas

1. Draw a picture showing how a seismometer measures the strength of an earthquake. Cut it up and make it into a jigsaw puzzle.
2. Write an information card that can be passed to tourists as they go on holiday informing them about the harmful effects of UV radiation and how to avoid them.

QWC Question (6 marks)

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Question – This question is variation

Sandra is going on holiday and wants to get a suntan. A tan is caused by the action of ultraviolet radiation. **Describe** the dangers of sunbathing and **explain** to Sandra how she can use the sun index to **reduce** the risks of sunbathing. (6marks)

Important words list

Melanin
Pigment
Skin Cancer
Ultra Violet
Strength of the Sun
Sunscreen
SPF Number
Amount of time in the sun