# GCSE

# Core Gateway Science B

*"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 B2C2P2 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;<br>state;<br>give;<br>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'<br>'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' |

# C2a The Structure of the Earth

| Grade E → | Grade C → | Grade A |
|---|---|---|
| **describe** the structure of the Earth – rocky crust, mantle and iron core<br><br>**understand** most scientists accept that very slow plate movements over millions of years result in volcanoes and earthquakes<br><br>**describe** how crystal size in magma is linked to cooling time<br><br>**understand** volcanoes can release runny lava slowly, or thick lava violently | **describe** the lithosphere as the outer mantle and crust, composed of tectonic plates less dense than the mantle<br><br>**explain** how seismic waves are used to study the Earth's structure, and why the evidence is widely accepted<br><br>**understand** the type of volcanic eruption is linked to the composition of the lava<br><br>**explain** geologists study volcanoes to forecast eruptions better and to reveal information about the Earth's structure | **link** the properties of the mantle to how it moves<br><br>**describe** the development of plate tectonic theories, in terms of energy transfers, convection currents and subduction zones<br><br>**explain** how igneous rocks are formed – 'safe' runny iron rich basalt and thick silica rich rhyolite from explosive eruptions<br><br>**explain** why scientists are better able to predict eruptions |

*Key Information*

**The Earth is made of a layered structure, a thin crust, the mantle and an iron core. The two types of tectonic plates are oceanic and continental**

*Revision Ideas*

1. Draw a picture labelling the structure of the Earth – Include detailed descriptions
2. Find a YouTube clip showing how volcanoes and earthquakes happen

# 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 the structure of the Earth***

The Earth is made of a layered structure. Describe the structure of the Earth and use ideas about plate tectonics to explain how the movements cause earthquakes and volcanoes ***(6marks)***

***Important words list***

Crust
Mantle
Core
Lithosphere
Density
Oceanic Plate
Continental Plate
Tectonic Plates
Earthquake
Volcanoes

# C2b Construction Materials

| Grade E → | Grade C → | Grade A |
|---|---|---|
| **recall** the main rocks used for construction and problems of mining or quarrying<br><br>**recall** limestone and marble are calcium carbonate, limestone thermally decomposes into calcium oxide and carbon dioxide<br><br>**describe** how concrete is made and reinforced | **relate** the main construction materials to substances found in the Earth's crust<br><br>**know** how to compare hardness, i.e. limestone is softer than marble which is softer than granite<br><br>**construct** word and balanced symbol equations to describe the thermal decomposition of limestone<br><br>**recall** how cement is made | **explain** why granite, marble and limestone have different hardnesses<br><br>**construct** balanced symbol equations (formula not given) for the decomposition of limestone<br><br>**explain** why reinforced concrete is a better construction material |

## *Key Information*

**When calcium carbonate is heated it breaks down into calcium oxide and carbon dioxide.**

**Glass, concrete and cement are all made from sand.**

## *Revision Ideas / Task*

1. Print pictures of the different building materials. Use post it notes to label what each one is made from
2. Draw a cartoon showing the impact of mines and quarries on the environment

# QWC Question (6 marks)

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***Question – This question is about construction materials***

Many construction materials come from rocks. Describe how 3 different construction materials are made and explain the impact extraction of the raw materials has on the environment ***(6 marks)***

***Important words list***

Ores
Concrete
Iron / Aluminium
Cement
Sand
Aggregates
Limestone
Reduce
Impact
Environment

# C2c Metals and Alloys

| Grade E → | Grade C → | Grade A |
|---|---|---|
| **understand** that copper can be extracted from its ore by heating with carbon, and that removal of oxygen is reduction<br><br>**recall** alloys are mixtures containing one or more metals, and give one use for amalgams, brass and solder<br><br>**recognise** alloys have different properties from their metals, and be able to interpret data on the main properties | **label** the apparatus needed for electrolysis<br><br>**explain** the advantages and disadvantages of recycling copper<br><br>**recall** the main metals in amalgams, brass and solder.<br><br>**explain** why metal or alloy are suited to given use | **describe** how electrolysis is used to purify copper, and be able to give ionic half equations to explain oxidation and reduction<br><br>**evaluate** the suitability of metals for different uses when given data<br><br>**explain** how the use of 'smart alloys' like nitinol for spectacle frames have increased alloy applications |

## *Key Information*

**Electrolysis uses an electric current to purify copper. Alloys are mixtures of a metal and another element that improves the metals properties to make it more useful**

## *Revision Ideas / Task*

1. Make revision cards with the following key words. Put their definitions on the back and get family members to test you. (Key words: Reduction, Electrolysis, Electrode, Anode, Cathode, Impurities, Electrolyte, Alloy)
2. Make a card game to help you remember the elements that make up different alloys

# QWC Question (6 marks)

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***Question – This question is about the metals and alloy***

Explain how copper is extracted form copper ore and then purified using electrolysis ***(6marks)***

***Important words list***

Heating
Carbon
Reduction
Impure
Electrolysis
Electric Current
Electrolyte
Electrode
Impurities
Cathode
Anode

# C2d Making Cars

**recall** rusting needs iron, water and oxygen and that adding oxygen is oxidation

**compare** the properties of iron and aluminium

**recall** the main materials needed to make a car

**understand** how salt water and acid rain affect rusting

**understand** rusting is oxidation and construct the word equation

**explain** why aluminium does not corrode

**describe** advantages and disadvantages of building cars from aluminium and steel

**explain** the advantages of aluminium in cars: better fuel economy and longer lifetime.

*Key Information*

**Rusting is an example of an oxidation reaction. Rusting needs iron, water and oxygen.**

**Iron + Oxygen + Water → iron oxide**

*Revision Ideas / Task*

1. Take a picture of a car and label the different materials used to make it and state why they are good for that purpose.
2. Make a notes page on the reasons we recycle. Use a highlighter to colour all the key points

# 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 the materials used to make cars and recycling***

Many different materials are used to make cars, Describe why aluminium and steel are chosen to make car bodies and explain how steel corrodes and aluminium doesn't. ***(6marks)***

***Important words list***

Density
Malleable
Corrodes
Rusting
Oxidation
Aluminium oxide
Protective Layer
Oxygen
Water
Iron

# C2e Manufacturing Chemicals

**recall** the Haber process makes ammonia from the air and from hydrogen that comes from cracking oil or gas

**describe** the factors that add to the cost of making a new substance

**understand** that reversible reactions proceed in both directions

**describe** the conditions needed to make ammonia in the Haber process and construct the balanced symbol equation.

**interpret** data about percentage yield in reversible reactions, and recognise the importance of ammonia in world food production

**explain** why the conditions used in the Haber process are needed

**explain** the economic considerations in manufacturing ammonia

**interpret** data about rate, percentage yield and costs for alternative industrial processes

*Key Information*

**Ammonia is a gas made by the Haber process. It is used to make nitric acid and fertilisers.**

**The reaction is reversible**

*Revision Ideas / Task*

1. Record yourself talking about the Haber Process and the factors that affect the cost .Add it to your MP3 playlist
2. Draw out the formula with the reversible sign and add the optimum conditions needed

# 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 the Haber Process***

Ammonia is an important gas used to make fertilisers. It is made on a large scale in the Haber Process. Describe the Haber Process and the factors that affect the cost of making ammonia. ***(6marks)***

***Important words list***

High pressure
Catalyst
Nitrogen
Hydrogen
Optimum Conditions
Unreacted Gases
Costs
Temperature
Workforce
Equipment

# C2f Acids and Bases

**describe** how universal indicator can be used to estimate pH levels

**recall** an alkali is a soluble base

**understand** that an acid can be neutralised by an alkali

**recall** that in neutralisation, acid + base → salt + water

**recall** that all acid solutions contain $H^+$ ions, and that pH is determined by concentration of $H^+$ ions

**explain** how metal oxides and hydroxides, and carbonates react with acid, and construct word equations. Predict the names of salts from laboratory acids

**explain** neutralisation in terms of $H^+ + OH^- \rightarrow H_2O$

**construct** balanced equations for the neutralisation of common acids by bases and carbonates

*Key Information*

**A soluble base is called an alkali. When you neutralise an acid with a base the reaction produces a salt + water.**

*Revision Ideas / Task*

1. Practice naming the salts made when reacting different acids and bases. Use your what salt cards to help
2. Draw out and colour the pH scale

# 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 the neutralisation reactions***

When an acid and a base are added to each other in the correct amounts they can cancel each other out. This is called a neutralisation reaction. Write about neutralisation reactions; include in your answer ideas about ions. ***(6marks)***

***Important words list***

Neutral
Acid
Alkali
pH
Salt
Water
Hydroxide Ions
Hydrogen Ions
Solution

# C2g Fertilisers and Crop Yield

**recall** nitrogen, phosphorus and potassium are the three essential minerals plants need

**understand** the benefits and problems of using fertilisers

**identify** the apparatus needed to prepare a fertiliser by neutralising an acid with an alkali

**explain** why fertilisers need to be soluble to be absorbed by plants

**identify** arguments for and against using fertilisers

**predict** the names of the acids and alkalis needed to make different fertilisers

**explain** how fertilisers increase crop yield in terms of providing and replacing essential elements

**explain** the process of eutrophication

**describe** in detail the preparation of a named synthetic fertiliser by the reactions of an acid and an alkali

*Key Information*

**Fertilisers make crops grow faster and quicker and increase crop yield.**

**Eutrophication is a problem with using fertilisers**

**The three main elements found in fertilisers are Nitrogen Phosphorus and Potassium**

*Revision Ideas / Task*

1. Draw out and label the equipment needed to make a fertiliser by neutralisation
2. Come up with a Pneumonic to remind you of the 3 essential elements found in fertilisers. NPK

# 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 Fertilisers***

Farmers use fertilisers on their crops. Describe what a fertiliser must be and explain the advantages and disadvantages of using them on farmland. ***(6marks)***

***Important words list***

Nitrogen
Phosphorus
Potassium
Soluble
Yield
Faster / Bigger
Eutrophication
Algae Bloom
Roots
Death of Animals

# C2h Chemicals from the Sea

**recall** that sodium chloride is an important raw material obtained from the sea or from buried salt deposits

**recall** electrolysis of salt solution gives chlorine and hydrogen, and recall chlorine bleaches moist litmus paper

**recall** sodium chloride is used as a preservative and as a flavouring

**recall** uses for chlorine, hydrogen and sodium hydroxide

**describe** how salt can be mined as rock salt if extracted by solution mining

**explain** how mining can cause subsidence

**recall** the products of brine electrolysis

**explain** the need for inert electrodes

**describe** how household bleach is made by reacting sodium hydroxide and chlorine

**explain** the products of brine electrolysis using a balanced equation, and give the ionic equations at the anode and cathode

**explain** why the electrolysis of sodium chloride involves both oxidation and reduction

**explain** the economic importance of the chlor-alkali industry

## *Key Information*

Sodium chloride can be removed from the sea or mined from salt deposits. When sodium chloride solution is electrolysed it makes sodium hydroxide, hydrogen and chlorine.

## *Revision Ideas / Task*

1. Draw and label the process of sodium chloride electrolysis.
2. Make a card sort on the products of electrolysis of sodium chloride and their uses.

# QWC Question (6 marks)

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***Question – This question is about the electrolysis of sodium chloride***

Sodium chloride is an important raw material in the chemical industry. Explain how sodium chloride can be separated into useful products using electrolysis and describe the uses of these products. ***(6marks)***

***Important words list***

Solution
Anode
Cathode
Chlorine
Sterilise
Sodium Hydroxide
Hydrogen
Bleach
Margarine
Litmus Paper