OXFORD OPEN LEARNING

GCSE
Mathematics

Introduction

Maths GCSE

Introduction

Welcome to your Mathematics GCSE course! This introduction contains all the information you need to be able to start your course, and you can also use it as a reference point as you work your way through all the modules.

Which Syllabus Does This Course Follow?

This course has been designed to match the requirements of the Assessment and Qualifications Alliance (AQA) 4306 (2011 exams) and 4365 (exams from 2012) specifications.

The AQA syllabus has been chosen as being the most suitable of those currently available for an 'external' student. An external candidate is usually someone who is not in full-time school-based education, e.g. someone studying part time by open learning, flexistudy, correspondence course, etc, or someone being home-schooled.

Examination Tiers

In a subject like Maths, it is very difficult to produce an exam that tests the skills of all students, from the most able to the weakest. In order to overcome this problem, the exam boards set two different groups of exams, for students of different abilities. When you come to take your exams, you have a choice as to which level of difficulty you aim for.

There are two levels of difficulty, or 'tiers of assessment': Foundation and Higher. The Higher tier exams are for students who hope to achieve grades A* to D (A* is a relatively new grade, which is higher than an A; it was introduced because too many GCSE students were achieving grade A); the Foundation tier is for grades C to G.

In other words, if you take the Higher tier exams and fail to achieve a grade D, you will not pass the exam. When the time comes to apply to sit your exams, you will need to make a

realistic assessment of the grades you are capable of. Don't worry about this: your tutor will be able to help you decide nearer the time which is the most appropriate level for you.

Which Tier to Aim for?

The OOL Course is suitable for students aiming for Foundation OR Higher Tier exams and it is not necessary to be certain at the outset which tier of exams you will eventually sit. You may find that the Higher Tier topics are too hard or you may be able to cope. The syllabus specifies certain topics which will only come up in Higher Tier examinations. These topics are covered in Section 2 of the course and there is no need to study this section unless you are going to attempt the Higher papers.

Students will normally request that they should be sent Section 2 as they approach the end of their study of the main part of the course. By then students are usually able to judge whether it is worth attempting this section.

Arrangement of Lessons

Section 1: Standard Course

Module 1: Numbers

Lesson	Subject
1	Numbers
2	Prime Numbers, Factors and Fractions
3	Decimals, Approximations and Accuracy
4	Indices and Standard Form
	Tutor-Marked Assignment A

Module 2: Money

5	Ratios and Percentages
6	Interest
7	Other Money Matters

Module 3: Measurement

8 Time, Distance and Speed
9 Measurements and Money
Tutor-Marked Assignment B

Module 4: Basic Algebra

10 Basic Algebra
11 Factorisation
12 Fractions and Equations
13 Equations in Action; Formulae
14 Inequalities and Accuracy
Tutor-Marked Assignment C

Module 5: Basic Geometry

15 Angles, Straight Lines and Symmetry
16 Triangles
17 Quadrilaterals and Polygons
18 Transformations
19 The Circle
Tutor-Marked Assignment D

Module 6: Further Geometry and Trigonometry

20 Mensuration
21 Geometrical Constructions and Solid Figures
22 Nets
23 Capacity and Volume
24 Loci
Tutor-Marked Assignment E

Module 7: Graphwork and Statistics

25 From Tables to Graphs
26 Graphs (2): Experimental Data
27 Further Graphwork
28 Statistics
Tutor-Marked Assignment F

Module 8: Probability and Experimental Work

29 Experiments and Surveys
30 Probability
31 Testing a Hypothesis
Tutor-Marked Assignment G

Section 2: Harder Topics (Higher Level Students only)

32 More on Numbers
33 Solving Equations
34 Intersecting Graphs
Tutor-Marked Assignment H
35 Formulae and Fractions
36 Brackets, Indices, etc
Tutor-Marked Assignment I
37 Trigonometry (1)
38 Trigonometry (2); Bearings
39 Higher Level Geometry
40 Trigonometry (3)
41 Cumulative Frequency
Tutor-Marked Assignment J
42 Samples and Spreadsheets

Section 3: Your Exam (All Students)

43 Problem-solving and Examination Practice
Tutor-Marked Assignments K and L

How to Study This Course

Start with Module One, Lesson One and work your way through the course materials. The first page of each lesson sets out the aims and context of the lesson. After looking at this, you simply start reading the lesson and follow the instructions given.

Additional Textbooks

The course contains a number of tests and activities, sufficient for most students to do well in the examination. However if you feel you need more practice or an alternative viewpoint, we can recommend the following textbook:

> Dave Capewell, Peter Mullarkey & Katherine Pate: *GCSE Maths in a Year (Student Book)*, published by OUP (ISBN 978-0199151561).

It is *not* compulsory to purchase this text or any other. One easy way to buy supporting texts is through the OOL website (www.ool.co.uk). You may also choose to buy another textbook that is specifically aimed at a lower level. You could use this for extra practice. There are a variety of other textbooks available, and the answers to problems are usually given in the book, so you can check your own work.

Understanding Basic Ideas

The GCSE places great emphasis on 'doing Mathematics' and relating this, wherever possible, to everyday life. Certain techniques and formulae need to be learnt, but the emphasis on 'doing' means that you should work carefully through all the examples and exercises in order to be able to solve problems effectively.

Activities

There are a number of activities in each of the lessons. These are placed in special boxes so that you don't miss them. Space is given underneath each question for you to attempt your answer. The pencil icon is a reminder that you are expected to do some writing.

Please do not ignore any activity just because you think you understand the topic already. Practice is vital! Where appropriate, suggested answers to the activity are to be found at the end of the lesson.

Try not to look at the answers to activities before you have had a go at working them out yourself.

Do make a habit of checking the answers after you have done the activities.

Don't be discouraged if your answers aren't right first time. Mistakes are one of the best means of helping you identify what you need to learn. Study the suggested answer, go back and study the method again in the course materials or textbook, and if you can't understand, contact your tutor.

Your Tutor

Maths is a subject where it is vital to make good use of your tutor. No matter how good you are, you are bound to hit a brick wall every so often where a topic does not make sense no matter how many times you work through it. There is no need to feel you have failed or that your tutor will think any the worse of you if you ask for guidance. Quite the reverse. Often it will only take a couple of minutes to supply the missing link and set you on the right course.

Tutor-Marked Assignments (TMAs)

There will be a series of tutor-marked assignments (TMAs for short) throughout the course, usually after every three or four lessons or at the end of a module. These tests should be tackled under exam conditions.

You should send your answers to your tutor, with a cover sheet clearly indicating your name and study programme. Your tutor will mark and return your script, and you will be sent specimen answers. The tests are all to be found at the relevant point in the course.

When you first start the course, keep your sights firmly set on the first TMA. It is very satisfying to see it done and send it off, and it gives your tutor a vital indication of how best he or she can help you.

Equipment

- You will need a ruler with metric markings (centimetres), a protractor, and a pair of compasses. For graph work, you will need some squared paper, which is available from most stationers.

- **Electronic calculator.** Since a calculator is allowed on one of the written exam papers, it is important that you become familiar with the operation of your calculator at an early stage. As a minimum, it should have the following functions:

  $+$ $-$ $\times$ $\div$

  π x^2 $\sqrt{x}$ $\frac{1}{x}$

  Also: sine, cosine, tangent and their inverses in degrees.
  If you ask for a calculator 'for GCSE Maths', most shops will be able to advise you.

Planning Your Work

Think about when you might take the exam and work out how many study weeks you have available. That will give you a rough idea of how many weeks you might allow for each lesson. (The lessons do vary in length and you will find some easier than others, depending on your previous experience.) As you progress with the course, you will have a better idea of how long you need and how much you can fit into the time you have available.

Working Habits

Here are a few tips to help you make the most of your study.

1. Always show all your working. If you can do a problem in your head, you should still write down how you did it. In the examination, you get marks for showing that you understand the method as well as for using it accurately. If you make an arithmetical error, you will still get marks for using the correct method. (If you get the answer wrong and don't show your method, you won't get any marks.)

2. Set your work out neatly, one step at a time. This really helps you to organise your thinking, which is essential, especially in longer activities.

3. Do lots of examples of each technique. Different questions give you a chance to practise the different variations of a problem, and this helps to make you more skilled and flexible in your work.

4. Make a list of mathematical words and their meaning as you come across them in each lesson. This helps you to remember the technical vocabulary and is extremely useful when you come to doing your revision. It is also very rewarding to see just how many concepts you have mastered!

Syllabus and Examinations

The AQA Specification

Students following the AQA syllabus (or "specification") take two written papers. The subject codes for exam entry in 2011 are as follows: Foundation tier (4306XF) and Higher tier (4306XH). This specification is examined for the last time in autumn 2011.

Starting with the June 2012 exams, the 4306 specification is replaced by the AQA 4365 (Linear) specification. The new specification covers all the same topics so this course is suitable for students who start out aiming for 2011 exams but end up having to defer to 2012.

The difference between the two specifications is that the 4365 specification (from 2012) contains a greater emphasis on "problem"-solving – that is to say, questions are more likely to be given a "real world" context. This should make them easier to grasp and visualize while the underlying mathematical skills remain the same. But the 2011 exams also entail problem-solving and there is plenty of problem-solving practice within the course.

Details are given here of the 2011 specification. If you find you are taking the examination in 2012, you are advised to refer to the AQA website for the latest information and detailed specification.

The Assessment Objectives (2011)

There are four assessment objectives which must be covered by the course. You must demonstrate your knowledge, understanding and skills in the following areas:

Ma1 - Using and applying mathematics

This objective is covered in the context of the other three.

Ma2 - Number and algebra

- using and applying number and algebra
- numbers and the number system
- calculations
- solving numerical problems

- equations, formulae and identities
- sequences, functions and graphs

Ma3 - Shape, space and measures

- using and applying shape, space and measures
- geometric reasoning
- transformations and coordinates
- measures and construction

Ma4 - Handling data

- using and applying handling data
- specifying the problem and planning
- collecting data
- processing and representing data
- interpreting and discussing results

Examination Structure (2011)

Details are given here for the Foundation and Higher tiers. The Foundation tier exams are slightly shorter in duration:

Paper 1 - 2 hours (Higher Tier) or 1 hour 30 mins (Foundation Tier) – 50% of the total marks

All Assessment Objectives are assessed. All questions are compulsory. Candidates should attempt all questions and there should be time for able candidates to complete all of them. Calculators are *not* allowed for Paper 1.

Paper 2 - 2 hours (Higher Tier) or 1 hour 30 mins (Foundation Tier)– 50% of the total marks

This has the same definition as Paper 1 except that calculators may be used.

Coursework is optional in Maths and it is assumed that you will enter for the non-coursework specification, 4306. Although coursework is not required, as such, you will still need to develop your problem-solving skills and some sections of this pack will help you do just that.

Revising for Your Exam

In your overall study plan, you need to allow time to go back over the course and revise all the different sections.

The final module of the OOL course, 'Your Exam', is designed to help you prepare for your exams. This module will guide you through the types of question you are likely to encounter in the two papers and encourages you to tackle practice examination papers.

Oxford Open Learning would like to thank the former AQA for their generosity in allowing us to reprint questions from their specimen examination papers.

Studying the Syllabus

You should be sure to acquire your own copy of the syllabus, either via the AQA Publications Dept or from the website www.aqa.org.uk. Be sure to get the syllabus for the right year!

The syllabus can be purchased from

AQA Publications
Unit 2, Wheel Forge Way,
Trafford Park
Manchester
M17 1EH (tel: 0870-410-1036)

or downloaded from www.aqa.org.uk/qual/pdf/AQA4306WSP.pdf.

We advise that you obtain a copy of the syllabus so that you can assess which topics you have covered in the most detail and which ones you will feel happiest about in the exam. AQA can also provide advice booklets on your course, including 'Information for Private Candidates'. As you approach the examination, it will also be helpful to purchase and tackle past papers from AQA.

Course Aims

The AQA 2011 specification encourages candidates to:

a. consolidate their understanding of mathematics;
b. be confident in their use of mathematics;
c. extend their use of mathematical vocabulary, definitions and formal reasoning;
d. develop the confidence to use mathematics to tackle problems in the work place and everyday life;
e. take increasing responsibility for the planning and execution of their work;
f. develop an ability to think and reason mathematically;

g. learn the importance of precision and rigour in mathematics;
h. make connections between different areas of mathematics;
i. realise the application of mathematics in the world around them;
j. use ICT appropriately;
k. develop a firm foundation for appropriate further study.

Using the Internet

All students would benefit from access to the Internet. You will find a wealth of information on all the topics in your course. As well as the AQA website (www.aqa.org.uk), you should get into the habit of checking the Oxford Open Learning site (www.ool.co.uk) where you may find news, additional resources and interactive features as time goes by. If you have not already done so, you may register for your free copy of *How to Study at Home*, our 200-page guide to home learning, or enrol on further courses. Put it on your favourites list now!

Good luck with the course!