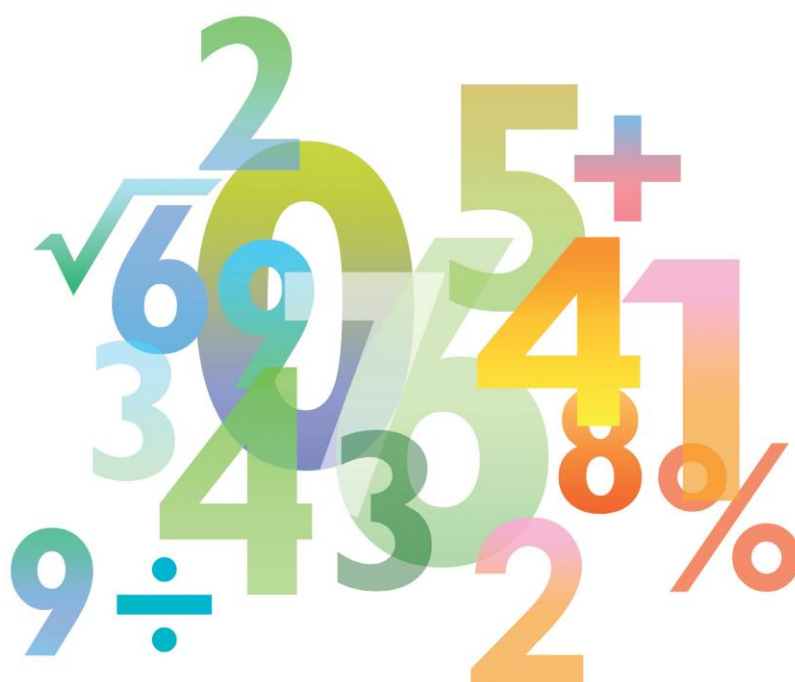


## Next Steps

# Cambridge IGCSE™ Mathematics 0580 and Cambridge International AS & A Level Mathematics 9709

For Cambridge IGCSE examination 2020

For Cambridge International AS & A Level examination from 2020



## Next Steps

In order to help us develop the highest quality resources, we are undertaking a continuous programme of review; not only to measure the success of our resources but also to highlight areas for improvement and to identify new development needs.

We invite you to complete our survey by visiting the website below. Your comments on the quality and relevance of our resources are very important to us.

[www.surveymonkey.co.uk/r/GL6ZNJB](https://www.surveymonkey.co.uk/r/GL6ZNJB)

Would you like to become a Cambridge consultant and help us develop support materials?

Please follow the link below to register your interest.

[www.cambridgeinternational.org/cambridge-for/teachers/teacherconsultants/](https://www.cambridgeinternational.org/cambridge-for/teachers/teacherconsultants/)

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## Contents

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Introduction .....	4
Frequently asked questions by learners .....	5
Skills, topics and assessment .....	8
Resources .....	10
Suggested classroom activity .....	11
Bridging exercise .....	15

## Introduction

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The focus of this guide is on moving on from teaching and studying the **Cambridge IGCSE Mathematics 0580** syllabus to the **Cambridge International AS & A Level Mathematics 9709** syllabus.

This guide will help you and your learners:

- understand better what to expect when you start the AS & A Level course
- prepare for the AS & A Level course
- think about ways to achieve success and gain confidence.

You may be using this document at the end of the academic year for Cambridge IGCSE Mathematics or at the start of the academic year for Cambridge International AS & A Level Mathematics. Either way, the aim is to motivate and inspire learners. If there is to be a time gap between delivering this session and starting the AS & A Level course, then the aim is for every learner to look forward to the new course positively.

This Introduction, the Resources and Suggested classroom activity sections of this guide are written directly for you, the teacher. The rest of this guide has been written to make it easy for you to adapt and reproduce the content for use by your learners.

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## Frequently asked questions by learners

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Listed below are some questions which learners frequently ask. The answers to each of the questions below are written as a direct communication to your learners. You could copy and paste these to make a PowerPoint, read them out to your group, or produce a booklet for them to read through and discuss.

### Is it helpful to have taken the Cambridge IGCSE Mathematics course?

Yes. The move from Cambridge IGCSE to Cambridge International AS & A Level has been designed to be as smooth a transition as possible. Many of the topic headings are the same so you will already be familiar with the topic and will just progress from there. The style of questions may be similar and the skills you have developed will be useful.

### What extra work will I have to do, if I have not taken Cambridge IGCSE Mathematics?

This will depend on the course you have taken. Many learners without a Cambridge IGCSE background have the same skills and subject knowledge and generally adjust quickly to the 'Cambridge' style when they start their AS & A Level.

You may not have covered some topics that are a useful base for AS & A Level. This is not a problem – you will probably find that your teacher goes over some IGCSE work as a start to a new AS & A Level topic, or if not, you can easily develop your research skills and read up what you need to know. You will find that teaching yourself subject matter at IGCSE level is much easier when you are working at AS & A Level.

### What is the syllabus?

The syllabus for Cambridge International Mathematics AS & A Level 9709 is a complete description of the content, examinations and what you need to do to be successful in the qualification. '9709' is the reference number of the Mathematics syllabus.

An important part of the syllabus for you is the Syllabus content, which details all the subject material you should cover during the course. This content is divided into components, which match the assessments. Each component outlines any prior knowledge (in addition to IGCSE Mathematics) required. Components are divided into topics which contain 'learning outcomes'. These are statements explaining what you should know and understand about the topic.

Your teacher may give you a copy of the subject content of the syllabus. Or go to the Cambridge website at <http://www.cambridgeinternational.org/9709> for the full copy of the syllabus.

### How do I make the transition from Cambridge IGCSE Mathematics to Cambridge International AS & A Level Mathematics?

This guide will help you prepare for the transition, so there are no surprises in what to expect.

You may find you hardly notice the transition to AS & A Level, or you may find it more difficult to adjust at first and need a bit of time to settle into the new course. Try and assess your own situation and then decide your best course of action.

## What are the differences?

Some of the main differences you will find when you study Cambridge International AS&A Level compared to Cambridge IGCSE are listed in the table below.

<b>Fewer subjects</b>	Hopefully you will have chosen the subjects that you really enjoy, are really good at or those which you need to take you on to university and/or your chosen career.
<b>Smaller classes</b>	You will have an opportunity to contribute more to lessons and have more one-to-one interaction with your teacher. You will have more lessons each week: the recommended guided learning hours for IGCSE Mathematics are 130, compared with 180 learning hours for AS and 360 learning hours for the full A Level qualification.
<b>Detailed and specialist content</b>	You will find increased challenge as you study in greater depth, work more independently and begin to develop your own ideas. You will be able to explore topics in much more depth than at IGCSE, maybe finding answers to unanswered questions and learning about certain topics which are completely new.
<b>Independent study</b>	Greater independence is a key part of AS & A Level qualifications which helps prepare you for study at university. It is important that you use this independent study time well. You can use this time in a variety of constructive ways – for completion of homework tasks, assignments, research or for completing additional reading around the subject.
<b>Revision</b>	Try to build in some time for revision throughout the course – consolidating and learning notes as you go along makes it much easier to remember when it comes to examination time.
<b>Read around your subject</b>	Use a range of textbooks and internet sites, though you will probably find the Cambridge endorsed textbooks the most helpful.
<b>Take notes</b>	When you take notes, try to summarise the main information that you need. Use headings and bullet points to reduce the content, and colour to highlight key pieces of information. If using the internet, don't just print pages of information, make notes from them or highlight text to show the key points. Always use your own words where possible.
<b>Independent research</b>	You might have completed some research tasks at IGCSE but you can expect this to be a more regular feature of homework tasks. Ask your teacher for a recommended list of textbooks and websites that you can use so you have a good starting point. Save useful websites to your favourites bar so you know where to find them again.

<b>Folders</b>	You will probably move from exercise books to folders to record your learning and it is important to be organised. Divide your folder into topic sections and keep your notes in date order. Keep copies of past questions, mark schemes and example answers alongside any completed assessed work. Highlight examination tips in your notes and keep key documents about examinations in a separate section of your folder.
<b>Key terms</b>	You will learn many new terms at AS & A Level, but before the course you may find it useful to familiarise yourself with the terms: prove, show, exact, differentiation, integration, distribution, kinematics, work, energy and power, series, permutations and combinations, distribution, approximation, hypothesis.
<b>Command words</b>	These are the words in an exam question that explain to you what you need to do such as: describe, explain, show, state, evaluate. You may have underlined these when looking at example examination questions. At Cambridge International AS & A level, you may be introduced to some new command words. There is a helpful list of command words in the syllabus. You could start your own glossary too.
<b>Assessment</b>	You need to know what examinations you will sit; how long each examination is; whether you have a choice of questions or not; how many marks each question/paper carries and what the structure of the questions is like. It is a good idea to have an assessment overview and copies of past papers and mark schemes.
<b>Key concepts</b>	<p>The key concepts for Cambridge International AS &amp; A Level Mathematics are:</p> <ul style="list-style-type: none"> <li>• Problem solving</li> <li>• Communication</li> <li>• Mathematical modelling</li> </ul> <p>These key concepts will help you to develop a deeper understanding of mathematics and make links between the different topics.</p>

## Skills, topics and assessment

### What are the skills needed for the Cambridge International AS & A Level course?

For the examinations taken at AS & A Level, you will be assessed on assessment objectives (AOs) which detail the skills and knowledge you need to display in order to fulfil the requirements of the assessment. These skills are divided into two main groups:

**AO1** Knowledge and understanding

**AO2** Application and communication

Both AO1 and AO2 are divided further into specific skills.

### How will I be assessed?

Each of the AS & A Level papers have structured questions based on the content outlined in the syllabus. As well as obtaining the correct answer, clear communication of your ideas and thinking is an expectation in AS & A Level assessments. While AS & A Level topics are assessed for specific components, skills that are learnt within one component may be required in other components.

### What topics will be studied?

Cambridge IGCSE Mathematics 0580 serves as a foundation for Cambridge International AS & A Level Mathematics, which prepares you for the study of mathematics at university. There are some areas of the Cambridge International AS & A Level syllabus which you will already have studied and some areas that will be new to you. This will depend partly on the components you are taking at AS and at A Level. The table below details similarities and areas of progression between the IGCSE and the International AS & A Level syllabus.

Where topics are completely new, there may be more terminology to familiarise yourself with and you may need to read around these topics more widely to consolidate your knowledge and understanding.

#### Six areas of progression from Cambridge IGCSE Mathematics 0580

- 1.1 Quadratics

You use the skills developed at IGCSE in solving quadratic equations using different approaches to understand limitations of solutions and more complex problem solving.

- 1.3 Coordinate geometry

You formalise techniques used for finding equations of straight lines including solving problems with perpendicular and parallel lines. You then extend this into the equation of circles.

- 1.5 Trigonometry

You develop your knowledge of trigonometric relationships to more complex conditions and use trigonometric ratios to solve or simplify trigonometric equations and expressions.

- 1.6 Series

You develop your understanding of sequences and expansion of brackets to formalise arithmetic and geometric series.

- 1.7 Differentiation

You apply your basic differentiation skills to more complex functions, including understanding the relationship between the abstract process and specific functions.

- 5.1 Representation of data

You use your knowledge of statistical data diagrams to interpret information, with the introduction of standard deviation as a measure of spread of data.



### Six new topics or skills at Cambridge International AS & A Level Mathematics 9709

- 1.4 Circular measures

Radians as a measurement of angle are introduced along with the relationship between the angle and the dimensions of a circle.

- 1.8 Integration

You consider integration as the inverse of differentiation. You investigate the information that integration can provide and apply in a variety of situations.

- 4.4 Newton Laws of Motion

You use mathematics to model real life conditions in simple forms. This includes investigating the effect of friction on movement and solving simple practical problems.

- 5.2 Permutations & combinations

You perceive how different conditions affect the ways items can be organised and developing an understanding of how these can be applied in a variety of situations.

- 5.4 Discrete random variable

You look at binomial and geometric distributions and how these can be used to model practical situations.

- 5.5 The normal distribution

You consider how you can model continuous data and when a normal distribution can be used to simplify discrete data scenarios.

## Resources

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Although some of the resources for AS & A Level are similar to those for Cambridge IGCSE, such as past papers and endorsed textbooks, your learners may not have much experience of looking for themselves on websites or reading around a topic for interest and understanding. Learning new skills and tackling new resources is all part of the challenge for learners of stepping up to Cambridge International AS & A Level Mathematics.

### Past/specimen papers and mark schemes

Past examination papers and specimen papers provide opportunities for learners to become familiar with the assessment requirements of the course. Learners should try to get as much practice in as they can before their final exams. You can refer to the accompanying mark schemes to guide your learners as to how they will be assessed and how they can improve their responses.

### Textbooks

There is a wide variety of textbooks available, some which cover the entire course and others which focus on a single component. Give your learners a list of suggested reading materials. There are three endorsed textbook series which are currently available for this course.

To find a list of the endorsed textbooks go to [www.cambridgeinternational.org](http://www.cambridgeinternational.org)

### Websites

There are some specific AS & A Level mathematics revision sites which are great to use. You can also use general search engines to find information although some sites might be more relevant than others. Sometimes, teachers put lesson presentations on the internet that you can use. Remember to check all internet resources for suitability, making sure that the content is relevant for your syllabus. Also, some websites tend to match a certain syllabus. That does not mean that they are not useful, you will just need to be selective about the topics that you choose from them.

[www.cambridgeinternational.org](http://www.cambridgeinternational.org)

The syllabus will give details of all the topics that are covered within the course. You can also download the tables and lists of formulae that are necessary for the assessment. There are also copies of past examination papers and reports from the Principal Examiners. Best of all, there is a Learner Guide to help you as you study.

[www.khanacademy.org](http://www.khanacademy.org)

Short video presentations of every topic are covered, which can help your understanding of new topics. You can also see examples of problems and examination questions being solved.

[www.plus.maths.org](http://www.plus.maths.org)

Real world mathematics, as well as interesting mathematical problems and investigations.

[www.stem.org.uk/alevel-maths](http://www.stem.org.uk/alevel-maths)

Further resources which explore the topics you are studying.

[www.revisionmaths.com/advanced-level-level-maths-revision](http://www.revisionmaths.com/advanced-level-level-maths-revision)

A revision resource.

## Suggested classroom activity

You could use the plan below to deliver a lesson that supports the transition to AS & A Level study.

Subject:	Syllabus reference:
<b>Lesson objectives:</b> To use IGCSE coordinate geometry skills to prove geometrical properties.	<b>Lesson outcomes:</b> Learners are able to determine the nature of a geometric shape using coordinate geometry techniques.
<b>Introduction:</b> Using the mini whiteboards: <ol style="list-style-type: none"> <li>check that learners can remember how to calculate the gradient of a line between two given points</li> <li>check that learners can remember the relationship between parallel and perpendicular lines.</li> </ol>	<b>Resources:</b> Mini whiteboards/paper Equation cards and 'Properties' sheet from page 22 and page 23 of this document. Simultaneous squares – in the Geometry of equations section from <a href="https://undergroundmathematics.org">https://undergroundmathematics.org</a>
<b>Main activities:</b> <b>Activity 1</b> Group the class in pairs. Give each pair a copy of the Properties sheet (page 23 enlarged to A3 if possible) and the equation cards (page 22). Ask them to match two equations to each property and to add a new property for the two that are left over. The equations have been chosen to highlight possible learner misconceptions that the number in front of $x$ is the gradient and that the $y$ intercept is the number at the end. Therefore, while learners are working on matching, it is useful to ask them to explain their reasoning. If a pair finish early, ask them to suggest another equation for each property and to write a justification as to why they match. Review the activity by asking pairs of learners to answer questions such as: <ul style="list-style-type: none"> <li>Why were these two not parallel?</li> <li>How do you know that these are perpendicular?</li> <li>These two equations have both got a '3' at the end. Why do they not have the same <math>y</math> intercept?</li> </ul> <b>Activity 2:</b> Combine pairs to make groups of four. Give each learner a copy of page 1 of the Simultaneous squares problem. Ask them to work together to justify that the four given equations do enclose a square. Select a group to present their justification to the class.	

Subject:	Syllabus reference:
<p><b>Lesson objectives:</b></p> <p>To use IGCSE coordinate geometry skills to prove geometrical properties.</p>	<p><b>Lesson outcomes:</b></p> <p>Learners are able to determine the nature of a geometric shape using coordinate geometry techniques.</p>
<p>Develop the presentation on the whiteboard to show the full working required for the justification to be a good AS Level answer.</p> <p><b>Homework:</b> To investigate and present a solution for Scenario 1</p>	
<p><b>Organisation:</b></p> <p>Introduction:</p> <p>Learners work independently.</p> <p>Main activity:</p> <ul style="list-style-type: none"> <li>• Activity 1 – Group the class in pairs.</li> <li>• Activity 2 – Combine pairs to make groups of four.</li> </ul> <p>Plenary: learners work independently.</p>	<p><b>Plenary:</b></p> <p>Ask learners to identify all the different skills and techniques they have used during the lesson.</p> <p>Ask learners to state a single skill and record on the whiteboard until all the skills techniques have been identified.</p>
<p><b>Challenge:</b></p> <p>More able learners can develop their own equations for Activity 1.</p> <p>More able learners can identify the alternative solutions for Scenario 1 during homework.</p>	<p><b>Assessment opportunities:</b></p> <p>Formative assessment principles can be used to establish whether each learner is able to:</p> <ul style="list-style-type: none"> <li>• calculate gradients</li> <li>• identify parallel and perpendicular lines</li> <li>• use Pythagoras' theorem to calculate lengths.</li> </ul>

## Activity 1 – Equation cards

$y = 10x - 5$	$5y = x + 3$
$y = 5x + 5$	$y + 5x + 10 = 0$
$5y = 2x - 16$	$y + x + 8 = 0$
$y = 6x - 5$	$2y + 10 = 5x$
$y + 8x = 6$	$2y = 10x + 3$
$2y + x = 8$	$y + 5x = 10$

Activity 1 – Properties

<b>These lines are both parallel</b>	<b>These lines are perpendicular</b>
<b>These lines have the same <math>y</math> intercept</b>	<b>These lines have the same <math>x</math> intercept</b>
<b>These lines both go through the point <math>(1, 5)</math></b>	<b>These lines .....</b>

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## Bridging exercise

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### Note for teachers

This activity is designed to follow on from the learning in the classroom activity. It makes use of a specimen question to give an indication of the how each learner has gained knowledge and understanding from completing the earlier activity. Learners will need access to at least one of the endorsed textbooks. They will also need a copy of Question 4 from the November 2018 Paper (9709/13) and accompanying mark scheme. These are available from the [School Support Hub](#). As this is the first activity they have done, it would be a good idea to pair learners together, providing each with a partner for support.

### Learner task

You will now have completed your classroom activity and we hope you have enjoyed learning how to apply your knowledge of coordinate geometry. You are going to complete the following activity to give you an idea of how you might work independently as part of the AS & A Level Mathematics course. Make sure that you first use your resources, then your partner and lastly your teacher for support.

**Aim:** We want you to:

- Read from an endorsed Cambridge International AS & A Level textbook, for example pages 71–77 of the Pure Mathematics 1 Coursebook by Sue Pemberton, to consolidate your understanding of coordinate geometry. You may also use similar pages from any other A Level textbook or workbook.
- Use internet research to add some extra ideas to your notes. It is a good idea to keep a note of the websites that you used in case you want to return to them later. Try: [www.khanacademy.org](http://www.khanacademy.org) or <https://studywell.com/maths/pure-maths/coordinate-geometry/>
- See if you can find some other websites that you can share with your partner and add to your useful website list.
- Work with a study partner to compare your ideas and support each other's note-taking. Add in any extra information that you have learned from your discussion with each other in a different colour pen.
- Now look at the past question you have been given – November 2018 Paper 13, Question 4 – and underline the key terms and command words. Make sure that you understand what the question is asking you to do before you start.
- Work with a study partner to plan your answer and to write a first draft for the question. Remember, this is the first time that you have seen an AS Level question so don't worry if you find it challenging at this stage.
- Now look at the mark scheme provided to self-assess your first draft. Answer these questions: what has gone well and what could be improved? Add any additional ideas you might have into your answer in a different colour. If there is anything that you are not sure about, do some extra note-taking, chat to your study partner about it or ask your teacher.
- Fasten all your work together and submit it to your teacher. You have successfully completed an independent research task and your first AS Level-standard question. Great work!

Your completed activity will include: note taking; internet research; example questions; first draft; and self-assessment.

Cambridge Assessment International Education  
The Triangle Building, Shaftesbury Road Cambridge, CB2 8EA, United Kingdom  
t: +44 1223 553554  
e: [info@cambridgeinternational.org](mailto:info@cambridgeinternational.org) [www.cambridgeinternational.org](http://www.cambridgeinternational.org)

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