

Learner Guide

Cambridge IGCSE™

International Mathematics 0607

For examination from 2020



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Section 1: About this guide

This guide explains what you need to know about your Cambridge IGCSE Cambridge International Mathematics 0607 course and examinations.

It will help you to:

- ✓ understand what skills you should develop by taking this course
- ✓ understand how you will be assessed
- ✓ understand what we are looking for in the answers you write
- ✓ plan your revision programme
- ✓ revise, by providing revision tips and an interactive revision checklist (Section 7).

Section 2: Syllabus content – what you need to know about

This section gives you an outline of the syllabus content for this course. Only the main topics of the syllabus have been included here, which are the same for both the **Core** and **Extended** courses. In the 'overview' column you are given a very basic idea of what each topic covers.

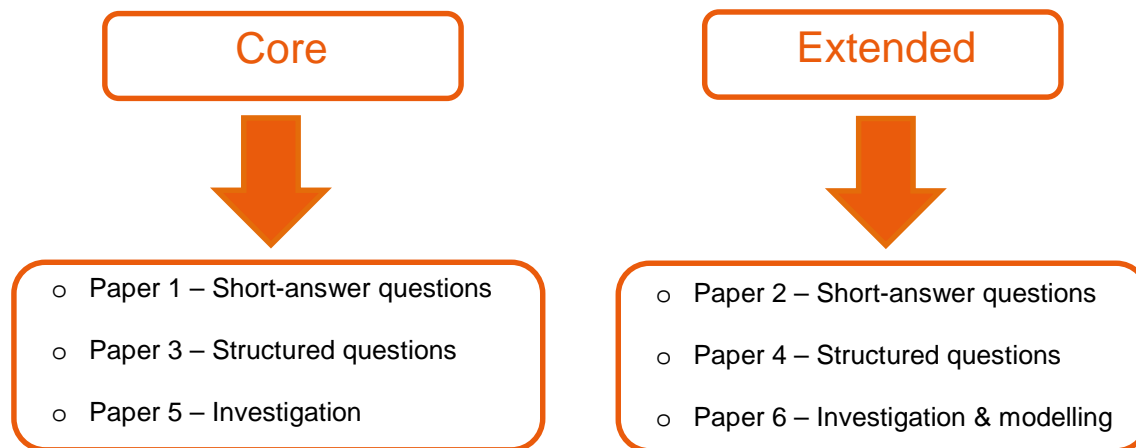
Learners taking the **Extended** course need to know all the Core content as well as some extra content. This extra content requires learners to explore topics and sub-topics of the Core syllabus in more detail, to cover some more complex techniques, and to learn new sub-topics.

Topic	Overview
Number	Primes, squares, cubes, integers, rational numbers, triangle numbers, fractions, decimals, percentages, simple & compound interest, indices, estimates, ratio & proportion, time, speed
Algebra	Algebraic manipulation, factorisation, equations, formulae
Functions	Mapping diagrams, sketching functions, graphics display calculator, transforming graphs Extended only: recognising functions, logarithms
Coordinate geometry	Coordinates, distance, gradient, midpoint, straight line equation
Geometry	Vocabulary, symmetry, angles, regular polygons, similarity, Pythagoras, angles in circles
Vectors and transformations	Translation, reflection, rotation, enlargement Extended only: Combining vectors & transformations, stretch
Mensuration	Units, area, volume, circumference
Trigonometry	Bearings, right-angled triangles Extended only: exact values, area of triangle, sine & cosine rules, graphs.
Sets	Notation, Venn diagrams, intersection & union
Probability	Relative frequency, combined events, tree diagrams
Statistics	Bar chart, line graph, pie chart, stem-and-leaf diagram, scatter diagram, mean, mode, median, quartiles, cumulative frequency, correlation, line of best fit, graphics calculator use

Ask your teacher for more detail about each topic, including the differences between the Core and Extended courses. You will find more detail in the Revision checklists later in this guide and in the syllabus, which you can find on our [public website](#).

Section 3: How you will be assessed

You will be assessed at the end of the course using three written papers.



Components at a glance

The tables below give you further information about the examination papers. In each paper you are expected to answer **all** the questions.

Core

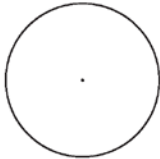
Paper	Time	Mark	Details	Percentage of total
Paper 1	45 minutes	40	Short answer questions No calculators are allowed	25%
Paper 3	1 hour 45 minutes	96	Structured questions Graphics display calculator required	60%
Paper 5	1 hour 10 minutes	36	One investigation question Graphics display calculator required	15%

Extended

Paper	Time	Mark	Details	Percentage of total
Paper 2	45 minutes	40	Short answer questions No calculators are allowed	20%
Paper 4	2 hour 15 minutes	120	Structured questions Graphics display calculator required	60%
Paper 6	1 hour 40 minutes	60	One investigation question One modelling question Graphics display calculator required	20%

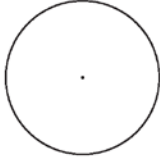
8

13 (a) Shade a segment inside this circle.



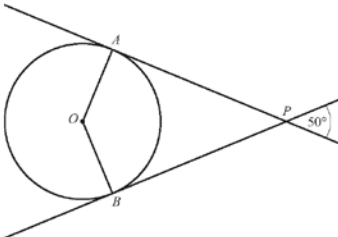
[1]

(b) Draw a radius inside this circle.



[1]

(c)



NOT TO SCALE

The diagram shows a circle, centre O .
 AP and BP are tangents to the circle at A and B .
 Find angle AOB .

Angle $AOB =$

[3]

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The number of marks for each part is shown.

Write your working and answers in the spaces provided.

8 Write down the gradient of the line $y = 7 - x$.

..... [1]

Paper 1 and Paper 3 have short-answer questions. These are usually worth 1–3 marks in Paper 1, and 1–4 marks in Paper 2. Some questions might be broken into parts, which is shown by letters (a), (b), etc. or numbers (i), (ii).

3

Answer all the questions.

1 (a) What type of number is 7?
 Give two possible mathematical words to describe it. [2]

(b) (i) Write down a multiple of 7. [1]

(ii) Write 70 as a fraction. [1]

(c) Work out.
 $7 \times 7^2 \times 7^3$ [3]

(d) Write
 (i) $\frac{1}{7}$ as a decimal, correct to 2 decimal places. [2]

(ii) $\sqrt{7}$ as a decimal, correct to 3 significant figures. [2]

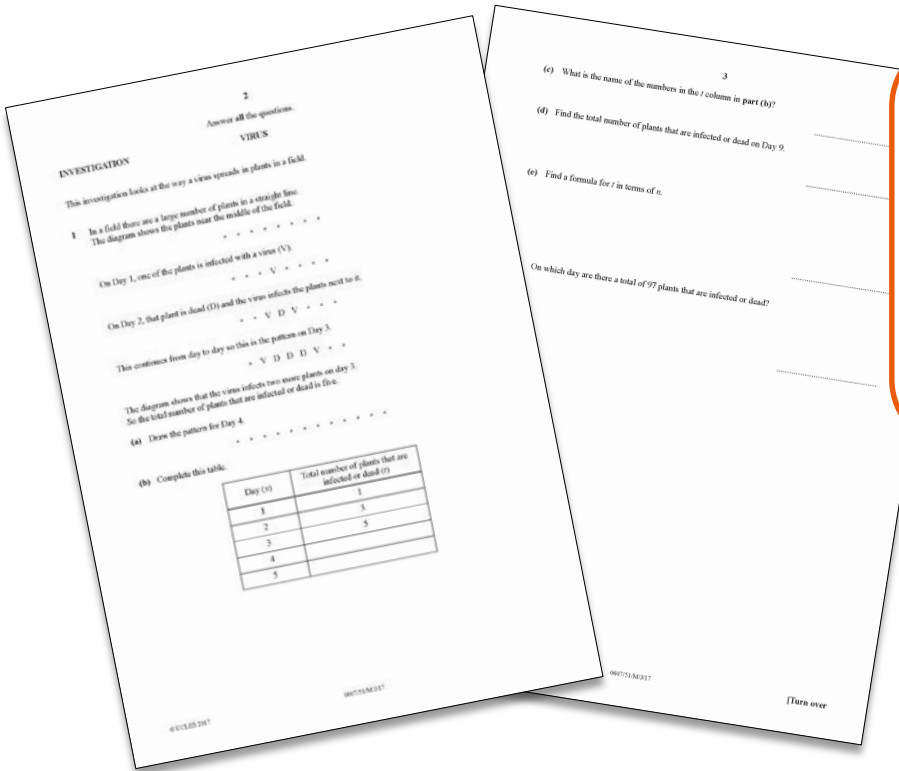
(iii) 7° in standard form. [2]

[Turn over]

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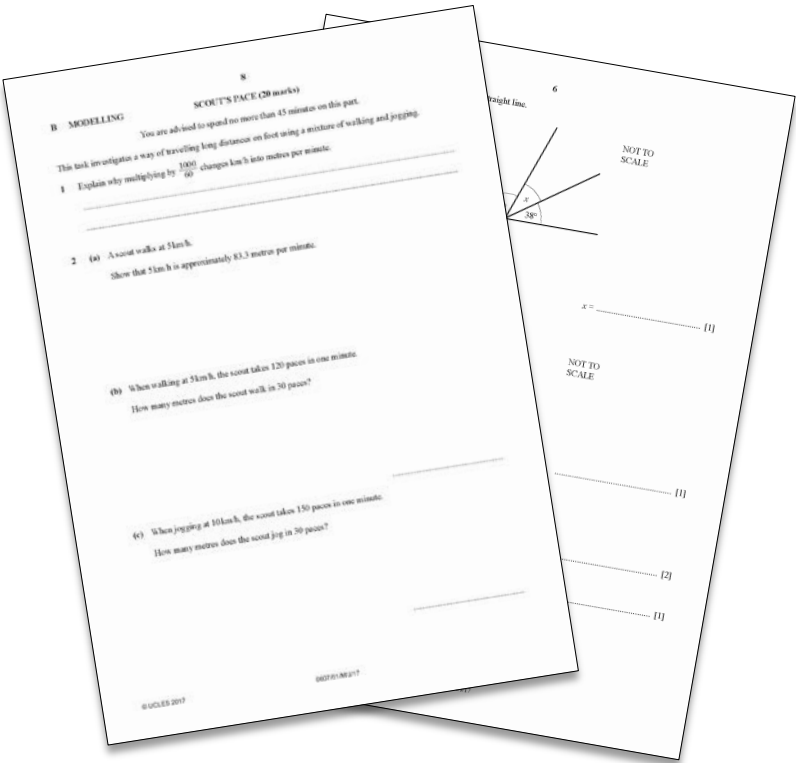
Paper 2 and Paper 4 have structured-questions. This means that each question is broken up into lots of parts using (a), (b), and (i), (ii), etc. Often the answer to some parts will be needed to answer later parts. Some parts might only be worth 1 mark but others could be worth as much as 6 or more.

Paper 5 and Paper 6 are different, as they are investigative papers.



In Paper 5, there is one investigative task to solve. It is broken up into different parts but the number of marks for each part is not indicated. This paper assesses your ability to investigate and solve a more open-ended problem. You need to make sure you communicate clearly and provide full reasoning.

In Paper 6, there is one investigative task to solve and one modelling task. Both are broken up into different parts but the number of marks for each part is not indicated. This paper assesses your ability to investigate, model and solve more open-ended problems. You need to make sure you communicate clearly and provide full reasoning.



1. **Read** the questions carefully to make sure that you understand what is being asked.

2. Give your answers to the accuracy indicated in the question. If none is given, and the answer isn't exact, then:

- give your answer to **three significant figures**

12.3 ✓ 12.298 ✗

- if the answer is in degrees, then give it to **one decimal place**

23.1° ✓ 23° ✗

3. Include **units** with your answers if they are not given on the paper. For example, 1 kg of apples costs ...

$\pounds 1.20$ ✓ 1.20 ✗

4. **Show your working**. Show as much working as you can for all your questions.

5. If you make a mistake, clearly cross out any working or answers that you do **not** want the examiner to mark.

$$= 122.4 + 274 = 58.9$$

$$= 122.4 + 125 = 181.3 \text{ cm}^2$$

Make sure that you give your answer in the form asked for in the question, e.g. some questions ask for answers to be given in terms of π . For lengths, areas and volumes, give answers in decimals (not in surds or in terms of π) **unless** you are told to give an exact answer.

Use the value of π from your calculator, or use **3.142**, which is given on the front page of the question paper.

You can gain marks for the correct working even if you have an incorrect answer or cannot complete the whole question.

If you need more space, ask for another sheet of paper. Make it clear which question(s) you are answering.

Equipment for the exam

Make sure you have:

- a blue or black pen (a spare pen is always a good idea)
- a pencil (for graphs and diagrams)
- an electronic calculator
- a protractor
- a pair of compasses
- a ruler

Timing

- If you are stuck on a question, don't spend waste too much time trying to answer it – go on to the next question and come back to the one you are stuck on at the end.
- Use any time that you have left at the end of the exam to go back and check your answers and working.

Section 4: What skills will be assessed

The areas of knowledge, understanding and skills that you will be assessed on are called **assessment objectives** (AO).

The examiners take account of the following two assessment objectives in the examination papers:

Assessment Objective 1: Demonstrate knowledge and understanding of mathematical techniques

Assessment Objective 2: Reason, interpret and communicate mathematically when solving problems

The weighting of these two assessment objectives is different for each paper. In Papers 1 and 2, where you cannot use a calculator, AO1 is heavily weighted. In Papers 5 and 6, AO2 is more important.

CORE	Paper 1	Paper 3	Paper 5
AO1	80%	80%	30%
AO2	20%	20%	70%

EXTENDED	Paper 1	Paper 3	Paper 5
AO1	60%	45%	35%
AO2	40%	55%	65%

AO1 Demonstrate knowledge and understanding of mathematical techniques	
Objective	What it means
Organise, interpret and present information accurately in written, tabular, graphical and diagrammatic forms	You should be able to read and make tables, graphs and charts.
Use and interpret mathematical notation, terminology, diagrams and graphs correctly	Make sure you understand the correct mathematical notation and mathematical words. Use them in your answers.
Perform calculations and procedures by suitable methods, including using a calculator	Do calculations without a calculator in Paper 1 or Paper 2. Use your graphics display calculator in all other papers.
Understand and use measurement systems in everyday use	Know the units for distance, area, volume, time and speed. Use them in your answers.
Estimate, approximate and work to degrees of accuracy appropriate to the context and convert between equivalent numerical forms	Convert between fractions, decimals and percentages. In Paper 1 or Paper 2, estimate the answer to a calculation by rounding to simple numbers. In Papers 3 and 4 give your answers correct to three significant figures. In Paper 6 give an answer appropriate for the model.
Recognise patterns and structures	Know how to continue sequences. This is often necessary in the investigation in Paper 5 or Paper 6.
Use mathematical instruments to draw and measure to an acceptable degree of accuracy	Use a ruler for all straight lines. Measure angles to the nearest degree and distances to the nearest millimetre.
Use technology, including a graphic display calculator.	Use the graphic display calculator to draw the graphs of functions, solve equations, find minimum or maximum, calculate mean

AO2 Reason, interpret and communicate mathematically when solving problems	
Objective	What it means
Draw logical conclusions from information and demonstrate the significance of mathematical or statistical results.	
Recognise patterns and structures in a variety of situations and form generalisations.	Look for patterns, especially in the investigation in Paper 5 or Paper 6. If there are sequences, find the n th term. If a method is given, use it with different numbers or variables.
Communicate methods and results in a clear and logical form, using appropriate terminology, symbols, tables, diagrams and graphs.	Show all your working. In Paper 5 and Paper 6 there are very many marks for communication. Use tables, diagrams or graphs to show your results.
Solve unstructured problems by putting them into a structured form involving a series of processes.	Decide on a method to solve a problem and show clearly the steps you use.
Apply combinations of mathematical skills and techniques to solve a problem.	Some problems need skills from different parts of the syllabus. Be ready to use a variety of skills.
Solve a problem by investigation, analysis, the use of deductive skills and the application of an appropriate strategy.	
Use spatial awareness in solving problems.	Use your knowledge of geometry to work out answers involving diagrams and shapes in two or three dimensions
Use the concepts of mathematical modelling to describe a real-life situation and draw conclusions.	In Paper 6 you will model a real-life situation. Make sure your answers show that you understand the context. How good is your model?
Use statistical techniques to explore relationships in the real world.	Use statistical measurements (e.g. mean) to make conclusions from a set of real-life data.
Use a graphic display calculator to interpret properties of functions and to solve problems.	Use the graphic display calculator to show functions. Recognise their properties from the graph and use the graph to answer questions.
Use appropriate strategies in dealing with an investigative and a modelling task.	In an investigation, collect and organise the data, look for patterns and make generalisations. In a modelling task, find the function from given data.
Test conjectures and determine their validity	Check your generalisation to an investigation by trying out values. Decide if your generalisation is always true.
Test a mathematical model for validity and fitness for purpose.	Check your model for accuracy – does it give results close to the real-life information? Do the results from the model fit the context?

Section 5: Command words

The table below includes command words used in the assessment for this syllabus. The use of the command word will relate to the subject context.

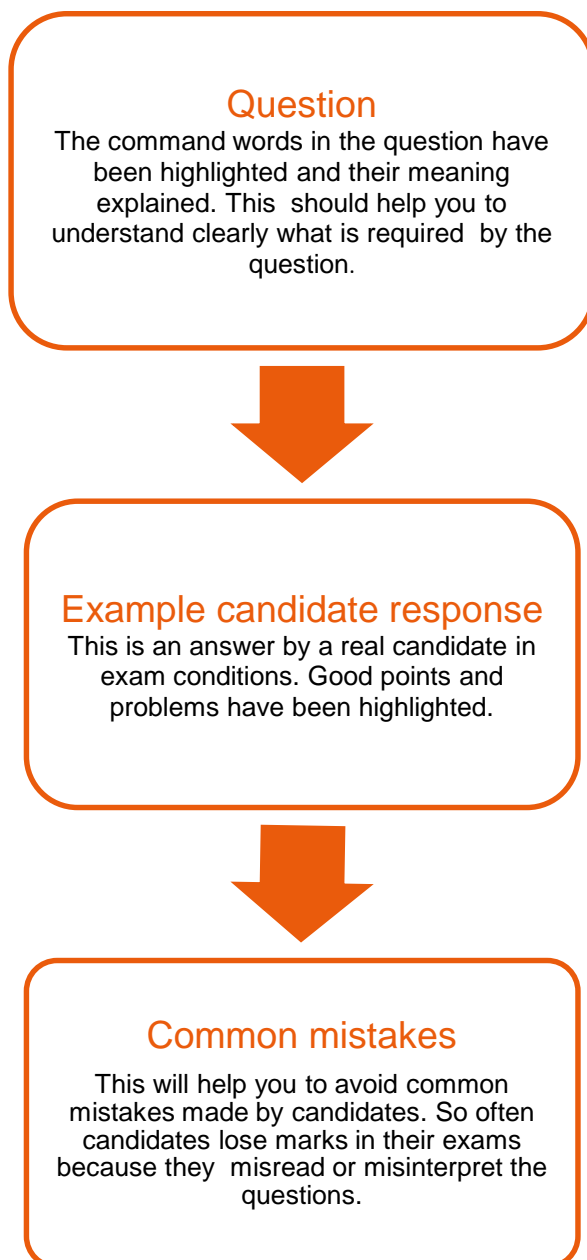
Command word	What it means
Calculate	Work out from given facts, figures or information, generally using a calculator
Compare	Write about similarities and differences
Describe	Write down the general type and the main characteristics
Explain	Give purposes and reasons. Make clear the relationships between things Answer why and/or how and support with relevant evidence.
Give	Provide an answer from memory or from a given source.
Investigate	Use available information to search systematically for results
Plot	Mark point(s) on a graph
Revise	Change to take account of further information
Show (that)	Provide structured evidence that leads to a given result
Sketch	Make a simple freehand drawing showing the key features
Work out	Calculate from given facts, figures or information with or without the use of a calculator
Write	Give an answer in a particular form
Write down	Give an answer without doing significant working

Section 6: Example candidate response

This section takes you through a question and model learner response from a Cambridge IGCSE Additional Mathematics past paper. It will help you to see how to identify command words within questions and to understand what is required in your response. A command word is the part of the question that tells you what you need to do with your knowledge. For example, you might need to describe something, explain something, argue a point of view or list what you know.

All information and advice in this section is specific to the example question and response being demonstrated. It should give you an idea of how your responses might be viewed by an examiner but it is not a list of what to do in all questions. In your own examination, you will need to pay careful attention to what each question is asking you to do.

This section is separated as follows.



Question

In Paper 5 and Paper 6, you will be awarded marks for providing full reasons, examples and steps in your working to communicate your mathematics clearly and precisely. The example below is from Paper 5.

Let's look at what the command words for this question mean for the answer.

2

Answer **all** the questions.

INVESTIGATION

SUMS OF CONSECUTIVE INTEGERS

This investigation looks at the results when the terms of a sequence of consecutive positive integers are added together.

1 Here are four sequences of consecutive positive integers.

The sequence 5, 6, 7, 8, 9, 10, 11 has 7 terms. The median (the middle term) is 8.

The sequence 7, 8 has only 2 terms. The median is 7.5 .

The sequence 20, 21, 22, 23, 24, 25 has 6 terms. The median is 22.5 .

The sequence 20, 21, 22, , 40 has 21 terms. The median is 30.

For a sequence of consecutive integers,

(a) give an example to **show that** the number of terms is calculated using the rule

last term – first term + 1

'Show that' means you need to provide evidence that leads to the result being asked for. So this means writing down each step in your method to show how you get to the result.

(b) **describe** how to calculate the median using only the first term and the last term.

.....

.....

Show clearly what method you would use.

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3

- 2 (a) Complete the table of sequences of consecutive positive integers.

Sequence	Number of terms	Median	Sum of all the terms
3, 4, 5, 6, 7, 8, 9	7		
7, 8	2		
20, 21, 22, , 40	21		
5, 6, 7			
2, 3, 4, 5, 6, 7, 8, 9	8		
	6		
	5	7	

Write your answers in the table. Read the column and row headings carefully to make sure you understand what you're being asked to do. There is space in each cell to show your working, e.g. $31 \times 25 = 775$. In Paper 5 you should always communicate what you are doing, so here you would be expected to write down for working, as well as each final answer.

[9]

- (b) Explain how to calculate the sum of all the terms using

Here, you need to write a method for how you would do the required calculation.

- (c) What is always true about the number of terms when the median is an integer?

[1]

- (d) What is always true about the median when the number of terms is even?

[1]

4

3 Use your answer to question 2(b) to help you complete the table of sequences of two or more consecutive positive integers.

Sequence	N	Sum
	4	34
		49

[7]

4 Use your answers to question 1 and question 2(b) to help you find the sum of this sequence.

15, 16, 17, , 985.

Here, you are being told to use your answer from another part. You must show in your working that you have used the method you described in **2(b)**. If you are told to use a certain method or value, you **must** do so.

Again, you need to show evidence that you have used your answers from the two previous questions. You can do this by writing your working clearly so the examiner can see you have used the appropriate methods.

5 Sequences have 2 or more terms.

Find all the sequences of consecutive positive integers that have a sum of 77.

6 (a) Use the factors of 16 to show why the sum of a sequence of consecutive positive integers cannot equal 16.

(b) Find a number larger than 20 that cannot be written as the sum of consecutive positive integers.

[3]

You must show in your working, that you have used the factors of 16.

Example candidate response

Below is a model candidate response from an examination. As this is a model answer, each answer was awarded full marks. The rounded orange boxes provide an examiner's comments on the candidate's answer, explaining where marks have been awarded. The rectangular boxes provide tips from the examiner.

INVESTIGATION SUMS OF CONSECUTIVE INTEGERS

This investigation looks at the results when the terms of a sequence of consecutive positive integers are added together.

- 1 Here are four sequences of consecutive positive integers.

Make sure you understand what the statements mean by checking the numbers

The sequence 5, 6, 7, 8, 9, 10, 11 has 7 terms. The median (the middle term) is 8.

The sequence 7, 8 has only 2 terms. The median is 7.5 .

The sequence 20, 21, 22, 23, 24, 25 has 6 terms. The median is 22.5 .

The sequence 20, 21, 22, , 40 has 21 terms. The median is 30.

For a sequence of consecutive integers,

This answer is awarded 1 out of 1 marks. The one mark is awarded for showing the working and using a correct example. They show which sequence they used and how many terms there are, so that the examiner knows they've selected an appropriate example. Then they show the calculation being used for their example.

- (a) give an example to show that the number of terms is calculated using the rule

last term – first term + 1

5 6 7 8 9 10 11 has 7 terms

Last term – first term + 1 = 11 – 5 + 1 = 7

[1]

(b) describe how to calculate the median using only the first term and the last term.

Add the first term to the last term and half the answer
For example the middle term of 5 6 7 8 9 10 11 is 8 and

$$\frac{\text{first} + \text{last}}{2} = \frac{5 + 11}{2} = 8 \quad [2]$$

Showing each step of your method and using an example to demonstrate it, shows good mathematical communication.

This answer is awarded 2 out of 2 marks. One mark is awarded for the correct description, i.e. $\frac{\text{first} + \text{last}}{2}$ and one mark is awarded for using an example to show what you mean. You must make it clear which sequence you have used.

2 (a) Complete the table of sequences of consecutive positive integers.

Sequence	Number of terms	Median	Sum of all the terms
3, 4, 5, 6, 7, 8, 9	7	6	42
7, 8	2	7.5	15
20, 21, 22,, 40	21	30	630
5, 6, 7	3	6	18
2, 3, 4, 5, 6, 7, 8, 9	8	$\frac{2 + 9}{2} = 5.5$	44
2, 3, 4, 5, 6, 7	6	4.5	27
5, 6, 7, 8, 9	5	7	35

[9]

This answer is awarded 9 out of 9 marks. 8 marks are awarded for correctly filling in each space in the table. By showing how the values are calculated, another mark is awarded for communication. Here, the candidate only needed to show one calculation to get the communication mark, but they could have shown other calculations.

- (b) Explain how to calculate the sum of all the terms using only the number of terms and the median.

Multiply the median by the number of terms.

[1]

Often the number of marks and the size of the answer space can give you a clue as to how much work is needed.

The answer is awarded 1 out of 1 mark. Only a simple statement is needed here.

- (c) What is always true about the number of terms when the median is an integer?

The number of terms is 7, 21, 3, 5, which are odd numbers

[1]

The answer is awarded 1 out of 1 mark. The mark is awarded for saying that they are odd numbers. Here, the candidate has also provided evidence to support this, by listing the number of terms for each of the sequences in the table, whose median is an integer, this doesn't get marks, but is good practice to do so.

- (d) What is always true about the median when the number of terms is even?

It is a decimal ending in .5

[1]

Always give as much detail as you can in your answers.

The answer is awarded 1 out of 1 mark. The mark is awarded for stating that they end in 0.5; it would not be enough just to say that they are a decimal.

- 3 Use your answer to **question 2(b)** to help you complete the table of sequences of two or more consecutive positive integers.

Don't ignore this instruction, you must follow it. It is there to help you.

Sequence	Number of terms	Median	Sum
<i>4, 5, 6</i>	3	5	15
<i>7, 8, 9, 10</i>	4	<i>8.5</i>	34
<i>4, 5, 6, 7, 8, 9, 10</i>	7	7	49

$$15/5 = 3$$

$$34/4 = 8.5$$

$$49 = 7 \times 7$$

[7]

This candidate makes good use of the space under the table to show working. You could also show your working inside the table, or to the right of the table – so long as it's clear to the examiner.

This answer is awarded 7 out of 7 marks. 6 marks are awarded for correctly filling in the table. 1 mark is awarded for showing at least one calculation. Note that for the bottom row, an acceptable alternative answer would have been '24, 25' for the sequence, giving the number of terms as '2' and the median as '24.5'.

Don't ignore this instruction, you must follow it.
It is there to help you.

- 4 Use your answers to **question 1** and **question 2(b)** to help you find the sum of this sequence.

15, 16, 17, , 985.

Using question 1(a): Number of terms = last term - 1st term + 1

$$= 985 - 15 + 1 = 971$$

This calculation is awarded 1 mark.

Using question 1(b): Median = $\frac{1st\ term + last\ term}{2} = \frac{15 + 985}{2} = \frac{1000}{2} = 500$

This calculation is awarded 1 mark.

Using question 2(b) Sum = median \times number of terms = $500 \times 971 = 485\ 000$

If the candidate had not shown their working, they would only have been awarded 3 out of 5 marks, even though their final answer is correct. This is why it is so important to show **all** of your working.

485500

[5]

This answer was awarded 5 out of 5 marks. The final answer is awarded 3 marks. 2 marks are available for communication, which means they needed to show their working in order to be awarded full marks.

5 Sequences have 2 or more terms.

Find all the sequences of consecutive positive integers that have a sum of 77.

$77 = 7 \times 11$ gives a sequence with 7 terms and median 11

8, 9, 10, 11, 12, 13, 14

$77 = 11 \times 7$ gives a sequence with 11 terms and median 7

2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12

$77 = 2 \times 38.5$ gives a sequence of 2 terms with median 38.5 38, 39

[4]

Here there are three sequences to find. A mark was awarded for each sequence. The fourth mark was for giving at least one of the multiplications that show how 77 can be made.

This answer was awarded 4 out of 4 marks. The candidate gains 1 mark for each sequence. They show all the calculations that help them to find the sequences; sign of any one of these calculations gains the candidate the 1 mark for communication. Candidates who just try out sequences without any sign of calculations, would not be awarded the 1 communication mark.

- 6 (a) Use the factors of 16 to show why the sum of a sequence of consecutive positive integers cannot equal 16.

The candidate must use factor pairs of 16. It is usually helpful to pair them off so you don't miss any. The pairs of factors already gained 2 marks.

If $16 = 4 \times 4$ or 2×8 or 8×2 or 16×1 then the number of terms is even, so the median should end in .5, which is not true here.

If $16 = 1 \times 16$ there is only one term, which is not a sequence.

If $16 = 32 \times 0.5$ then there are 32 terms and some must be negative if the median is 0.5

This answer was awarded 3 out of 3 marks. The use of the factor pairs of 16 is awarded 2 marks. Stating the contradiction with question 2(b) – that the median should end in 0.5 – gains the 1 communication mark.

[3]

Read the question! Only numbers over 20 are important.

- (b) Find a number larger than 20 that cannot be written as the sum of consecutive positive integers.

Because 16 has factors 1, 2, 4, 8, 16 there is only an even number of terms: 2, 4, 8 or 16. So the median should end in .5 which is not so.

For 32 terms the median is 0.5 but then there are negative terms.

Similarly, 32 only has factors that are powers of 2 so there are 2, 4, 8, 16 or 32 terms. So median should end in .5, which is not so.

For 64 terms the median is 0.5 but then there are negative terms.

Check that the others are possible.

$$21 = 10 + 11 \qquad 23 = 11 + 12 \qquad 25 = 12 + 13$$

And so on for odd numbers

$$22 = 4 + 5 + 6 + 7 \qquad 24 = 7 + 8 + 9 \qquad 26 = 5 + 6 + 7 + 8$$

$$28 = 1 + 2 + 3 + 4 + 5 + 6 + 7 \qquad 30 = 6 + 7 + 8 + 9$$

The last question in an investigation may be more open-ended, like this one. So expect to have to think harder. Even if you can't get the full answer write down all your working. This candidate did well in checking that every number up to 32 worked.

32

..... [2]

This answer is awarded for 2 out of 2. 1 mark is awarded for 32. The candidate's checks show attempts to find the answer, and eventually leads to the answer. Sight of a couple of these checks is enough for the 1 communication mark. Not all checks have to be seen, nor do they all have to be correct. It's communication of the method that gains the 1 communication mark.

Section 7: Revision

This advice will help you revise and prepare for the examinations. It is divided into general advice for all papers and more specific advice for Paper 1 & 2, Paper 3 & 4, Paper 5 & 6 (investigation) and Paper 6 (modelling)

Use the tick boxes ☐ to keep a record of what you have done, what you plan to do or what you understand.

For more advice on revision, see the [Cambridge Learner Revision Guide](#) on our website.

General advice

Before the examination

- ☐ Find out when the examinations are and plan your revision so you have enough time to revise. Create a revision timetable and divide it into sections to cover each topic.
- ☐ Make revision notes. Try different styles of notes.
- ☐ Work for short periods then have a break. Revise small sections of the syllabus at a time.
- ☐ Know the meaning of the command words used in questions and how to apply them to the information given. Look at past examination papers, highlight the command words and check what they mean.
- ☐ Make your own dictionary of key mathematical terms.
- ☐ Make sure you know the meaning of mathematical terms. For example, in algebra, know the difference between an *equation*, an *expression* and a *formula* and, in geometry, understand when *translation* is the correct term for a particular type of *transformation*.
- ☐ Learn to spell mathematical terms correctly.
- ☐ Have a look at past questions so that you are clear about what to expect in an examination.
- ☐ Look at mark schemes to help you to understand how the marks are awarded for each question.
- ☐ Find out how long each paper is and how many marks it has.

In the examination

- ☐ Read the instructions on the front page carefully.
- ☐ Plan your time according to the marks for each question. A simple rule for Papers 1 to 4 is 1 mark should take 1 minute, so you have roughly 7 minutes to complete a question worth 7 marks.
- ☐ The answer line and working space tells you how much work is necessary to answer the question.
If only one line is given for an explanation you know to give a short answer, probably only one reason.
- ☐ Do not leave out questions or parts of questions. Remember, no answer means no mark.
- ☐ It may be useful to
 - identify the command words – you could underline or highlight them
 - identify the other key words and perhaps underline them too.
- ☐ Read the question carefully. Every year examiners comment on how many marks were lost unnecessarily because candidates did not read the question correctly.
- ☐ Give clear answers that show your working.
- ☐ Use correct mathematical terms in your answers.
- ☐ Graphs can be used to support your answer. Use them if possible, for example in solving equations,
- ☐ Make sure your writing is clear and easy to read. It is no good writing a brilliant answer if the examiner cannot read it
- ☐ Only score out work when you have something better. Do not erase unwanted work completely – put a single line through it.
- ☐ Give your answer in the form that's wanted in the question.

Papers 1 & 2 advice

- ☐ Check your numerical skills. In this paper you won't have a calculator. Can you do fractions?
- ☐ For questions worth more than one mark always show your working.
- ☐ Work steadily through the paper. Roughly 1 mark should take one minute

Papers 3 & 4 advice

- ☐ Make sure your graphic display calculator works. Does it need new batteries?
- ☐ Never give answers to less than three-figure accuracy, unless instructed to do so in the question.
- ☐ Always give the full calculator display for terms in a sequence.
- ☐ In money questions give your answers to the nearest cent.
- ☐ Copy any required graph carefully from your calculator: Is it straight or does it curve in one direction? Does it have turning points? Does it cross the axes, if so where?
- ☐ Show your working. There are many marks to be gained through showing the use of a correct method.

Papers 5 & 6 (investigation) advice

- ☐ You have plenty of time for thinking and persevering. Make good use of that time. The last question will probably require you to think mathematically. You may need to check all the possible answers.
- ☐ Take especial care with the first questions. They are usually very straightforward and set up the investigation. Check you have the correct answers so that you can see any patterns.
- ☐ If you have been given, or find, a generalisation, does it fit with answers that you have written earlier? If not, check back and find out where you have made an error.
- ☐ Make sure you know how to continue sequence and find its n th term.
- ☐ Do not guess a pattern when you only have three numbers to go on. Work out some more terms.
- ☐ Revise how to derive and rearrange formulae.

Paper 6 (modelling) advice

- ☐ You have plenty of time for thinking and persevering. Make good use of that time.
- ☐ When commenting on the suitability of a model, do not look at individual points on a graph of the model but consider how the graph as a whole fits the data – when is it more, when is it less, is the difference between the model and the data increasing or decreasing.
- ☐ Do your answers make sense? The model should describe real life.
- ☐ Remember to put units on all answers that are measurements.
- ☐ Show all your working. Do not miss out any steps!
- ☐ Remember to put a simple scale on any graphs
- ☐ Make sure you know the shape of different functions
- ☐ If your calculator does not plot the graph, check you have entered the function correctly (extra brackets may be useful).
If the graph still does not appear change the window until it does.
- ☐ Revise how to derive and rearrange formulae
- ☐ Copy any graph carefully from your calculator: Is it straight or does it curve in one direction? Does it have turning points? Does it cross the axes, if so where?
- ☐ Make sure you know how transformations affect the equation of a graph.
- ☐ Know the different models for direct and inverse variation

Revision checklists

In the next part of this guide we have provided some revision checklists. These include information from the syllabus that you should revise. They don't contain all the detailed knowledge you need to know, just an overview. For more detail see the syllabus and talk to your teacher.

The table headings are explained below:

Content	What you should be able to do	R	A	G	Comments
These are the general titles for items in the syllabus	Content in the syllabus you need to cover	<p>You can use the tick boxes to show when you have revised an item and how confident you feel about it.</p> <p>R = RED means you are really unsure and lack confidence; you might want to focus your revision here and possibly talk to your teacher for help</p> <p>A = AMBER means you are reasonably confident but need some extra practice</p> <p>G = GREEN means you are very confident.</p> <p>As your revision progresses, you can concentrate on the RED and AMBER items in order to turn them into GREEN items. You might find it helpful to highlight each topic in red, orange or green to help you prioritise.</p>			<p>You can:</p> <ul style="list-style-type: none"> • Add further information of your own, such as names of case studies needed. • add learning aids, such as rhymes, poems or word play • pinpoint areas of difficulty you need to check further with your teacher or textbooks • include reference to a useful resource

Note: the tables below cannot contain absolutely everything you need to know, but it does use examples wherever it can.

CORE SYLLABUS**Core Number**

Content	What you should be able to	R	A	G	Comments
Number	<p>Vocabulary and notation for different sets of numbers: natural numbers \mathbb{N}, primes, squares, cubes, integers \mathbb{Z}, rational numbers \mathbb{Q}, irrational numbers, real numbers \mathbb{R}, triangle numbers</p> <p>Use of the four operations and brackets</p> <p>Highest common factor (HCF), lowest common multiple (LCM)</p> <p>Estimating, rounding, decimal places and significant figures</p> <p>Ratio & Proportion e.g. Map scales</p>				
Percentages	<p>Equivalences between decimals, fractions and percentages</p> <p>Use percentages for</p> <ul style="list-style-type: none"> profit & loss simple & compound interest 				
Exponents	<p>Calculation of powers and roots</p> <p>Meaning of exponents (powers, indices) in</p> <p>Standard Form, $a \times 10^n$ where $1 \leq a < 10$ and $n \in \mathbb{Z}$</p> <p>Rules for exponents</p>				
Time	<p>Calculations involving time: seconds (s), minutes (min), hours (h), days, months, years including the relation between consecutive units, 1 year = 365 days</p> <p>Problems involving speed, distance and time</p>				

Core Algebra

Content	What you should be able to	R	A	G	Comments
Inequalities	Writing, showing and interpretation of inequalities, including those on the real number line Solution of simple linear inequalities				
Equations	Solution of linear equations Solution of simultaneous equations in two variables				
Formulae	Derivation, rearrangement and evaluation of simple formulae				
Brackets	Expansion of brackets e.g. $(x - 5)(2x - 1)$ Common factor e.g. $6x^2 + 9x = 3x(2x + 3)$ Expansion				
Algebraic fractions	Simplification e.g. $\frac{2x^2}{6x}$ Addition or subtraction of fractions with integer denominators e.g. $\frac{2x}{3} - \frac{y}{5}$ Multiplication or division of two simple fractions e.g. $\frac{p}{q} \div \frac{2t}{3q}$				
Indices	Simple indices: multiplying and dividing e.g. $8x^5 \div 2x^3$				
Graphic display calculator	Use of a graphic display calculator to solve equations, including those which may be unfamiliar. e.g. $2x = x^2$				

Sequences	Continuation of a sequence of numbers or patterns Determination of the n th term Use a difference method to find the formula for <ul style="list-style-type: none"> a linear sequence a simple quadratic sequence 				
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Core Functions

Content	What you should be able to	R	A	G	Comments
Basic ideas	Notation Domain and range domain is \mathbb{R} unless stated otherwise Mapping diagrams				
Graphic display calculator	Use a graphic display calculator to <ul style="list-style-type: none"> sketch the graph of a function, including unfamiliar functions not mentioned explicitly in this syllabus produce a table of values find zeros, local maxima or minima including the vertex of a quadratic find the intersection of the graphs of functions 				
Asymptotes	Understanding of the concept of asymptotes and graphical identification of simple examples parallel to the axes				
Transformations	Description and identification, using the language of transformations, of the changes to the graph when $y = f(x)$ when $y = f(x) + k$, $y = f(x + k)$ (k an integer)De				

Core Coordinate geometry

Content	What you should be able to	R	A	G	Comments
Graph	Plotting of points and reading from a graph				
Distance	Distance between two points				
Mid-point	Mid-point of a line segment				
Gradient	Gradient of a line segment Gradient of parallel lines				
Equation	Equation of straight line as $y = mx + c$ or $x = k$				
Symmetry	Symmetry of diagrams or graphs				

Core Geometry

Content	What you should be able to	R	A	G	Comments
Vocabulary	Use and interpret the geometrical terms: acute, obtuse, right angle, reflex, parallel, perpendicular, congruent, similar Use and interpret vocabulary of triangles, quadrilaterals, polygons and simple solid figures e.g. pyramids including tetrahedrons				
Symmetry	Line symmetry Rotational symmetry				

Angles	<p>Measurement in degrees</p> <p>Angles round a point, on a straight line, vertically opposite angles</p> <p>Alternate and corresponding angles on parallel lines</p> <p>Angle sum of a triangle, quadrilateral and polygons</p> <p>Interior and exterior angles of a polygon including regular polygons</p>				
Similarity	Calculation of lengths of similar figures				
Pythagoras	<p>Pythagoras' Theorem in two dimensions</p> <p>Chord length & distance of a chord from the centre of a circle</p> <p>Distances on a grid</p>				
Circles	<p>Use and interpret the vocabulary of circles, including sector and segment</p> <p>Properties of circles</p> <ul style="list-style-type: none"> tangent perpendicular to radius at the point of contact tangents from a point are equal angle in a semicircle is 90° 				

Core Vectors and transformations

Content	What you should be able to	R	A	G	Comments
Notation	<p>Vector <i>a</i> and directed line segment \overrightarrow{AB}</p> <p>Component form $\begin{pmatrix} x \\ y \end{pmatrix}$</p>				
Transformations	<p>Transformations of the Cartesian plane:</p> <ul style="list-style-type: none"> • translation • reflection • rotation • enlargement (reduction) <p>Description of a transformation</p>				

Core Mensuration

Content	What you should be able to	R	A	G	Comments
Units	Convert between units: <ul style="list-style-type: none"> • mm, cm, m, km • mm^2, cm^2, m^2, ha, km^2 • mm^3, cm^3, m^3 • ml, cl, l • g, kg, t 				
Perimeter & Area	Perimeter and area of <ul style="list-style-type: none"> • rectangle • triangle formula given • compound shapes derived from rectangles and triangles Circumference and area of circle formula given Arc length and area of sector				
Volume & surface area	Surface area & volume <ul style="list-style-type: none"> • prism and pyramid (in particular cuboid, cylinder and cone) • sphere and hemisphere Note that in the examination the formulae will be given for the curved surface areas of cylinder, cone and sphere the volume of prism, pyramid, cylinder, cone and sphere Areas and volumes of simple compound shapes				

Core Trigonometry

Content	What you should be able to	R	A	G	Comments
Trigonometry	Right-angled triangle trigonometry Three-figure bearings, and North, East, South, West Problems in two dimensions				

Core Sets

Content	What you should be able to	R	A	G	Comments
Notation	Notation and meaning for <ul style="list-style-type: none"> number of elements in A, $n(A)$ is an element of (\in), is not an element of (\notin) empty set (\emptyset or $\{ \}$), universal set (U) complement of A, (A') is a subset of (\subseteq), is a proper subset of (\subset) Sets in descriptive form: $\{x \mid \quad\}$ or as a list				
Combining sets	Venn diagrams of at most two sets Intersection and union of sets				

Core Probability

Content	What you should be able to	R	A	G	Comments
Probability	Probability $P(A)$ as a fraction, decimal or percentage Significance of the value of probability Relative frequency as an estimate of probability Expected frequency of occurrences				
Combining events	Tree diagrams including successive selection with and without replacement Probabilities from Venn diagrams and tables				

Core Statistics

Content	What you should be able to	R	A	G	Comments
Diagrams	Reading and interpretation of graphs or tables of data Discrete or continuous data Pictogram Bar graph (Compound) bar chart Pie chart Line graph Scatter diagram Stem-and-leaf diagram				

Mean, mode, median	<p>Mean, mode, median, quartiles and range from lists of discrete data</p> <p>Mean, mode, median and range from grouped discrete data</p> <p>Mean from continuous data</p>				
Cumulative frequency	<p>Cumulative frequency table and curve</p> <p>Median, quartiles and interquartile range (read from curve)</p>				
Graphic display calculator	<p>Use of a graphics display calculator to calculate</p> <ul style="list-style-type: none"> mean, median, quartiles for discrete data mean for grouped data 				
Correlation	<p>Understanding and description of correlation (positive, negative or zero) with reference to a scatter diagram. The coefficient of correlation is not required.</p> <p>Straight line of best fit (by eye) through the mean on a scatter diagram</p>				

EXTENDED SYLLABUS**Extended Number**

Content	What you should be able to	R	A	G	Comments
Number	<p>Vocabulary and notation for different sets of numbers: natural numbers, primes, squares, cubes, integers, rational numbers, irrational numbers, real numbers, triangle numbers</p> <p>Use of the four operations and brackets</p> <p>Highest common factor (HCF), lowest common multiple (LCM)</p> <p>Estimating, rounding, decimal places and significant figures</p> <p>Ratio & Proportion e.g. Map scales</p>				
Percentages	<p>Equivalences between decimals, fractions and percentages</p> <p>Use percentages for</p> <ul style="list-style-type: none"> profit & loss simple & compound interest 				
Exponents & Surds	<p>Calculation of powers and roots</p> <p>Meaning of exponents (powers, indices) in</p> <p>Standard Form, $a \times 10^n$ where $1 \leq a < 10$ and $n \in \mathbb{Z}$</p> <p>Rules for exponents</p> <p>Surds (radicals), simplification of square root expressions</p> <p>Rationalisation of the denominator e.g. $\frac{1}{\sqrt{3}-1}$</p>				

Content	What you should be able to	R	A	G	Comments
Absolute value	The meaning of $ x $				
Time	<p>Calculations involving time: seconds (s), minutes (min), hours (h), days, months, years including the relation between consecutive units, 1 year = 365 days</p> <p>Problems involving speed, distance and time</p>				

Extended Algebra

Content	What you should be able to	R	A	G	Comments
Inequalities	<p>Writing, showing and interpretation of inequalities, including those on the real number line</p> <p>Solution of linear and quadratic inequalities e.g. $2x^2 + 5x - 3 < 0$</p> <p>Solution of inequalities using a graphic display calculator</p>				
Equations	<p>Solution of linear equations including those with fractional expressions</p> <p>Solution of simultaneous equations in two variables</p> <p>Solution of quadratic equations: by factorisation</p> <p> using a graphics display calculator</p> <p> using the formula formula given</p>				
Formulae	Derivation, rearrangement and evaluation of formulae				

Brackets	<p>Expansion of brackets, including the square of a binomial</p> <p>Factorisation: common factor e.g. $6x^2 + 9x = 3x(2x + 3)$</p> <p> difference of squares e.g. $9x^2 - 16y^2 = (3x - 4y)(3x + 4y)$</p> <p> trinomial e.g. $6x^2 + 11x - 10 = (3x - 2)(2x + 5)$</p> <p> four term e.g. $xy - 3x + 2y - 6 = (x + 2)(y - 3)$</p>				
Algebraic fractions	<p>Simplification, including use of factorisation</p> <p>Addition or subtraction of fractions with linear denominators or single term</p> <p> e.g. $\frac{1}{x} + \frac{1}{x^2}$ or $\frac{2}{x} - \frac{1}{xy^2}$</p> <p>Multiplication or division and simplification of two fractions</p>				
Indices	Rules for indices				
Graphic display calculator	<p>Use of a graphic display calculator to solve equations, including those which may be unfamiliar.</p> <p> e.g. $2x - 1 = \frac{1}{x^3}$</p>				
Sequences	<p>Continuation of a sequence of numbers or patterns</p> <p>Determination of the nth term</p> <p>Use a difference method to find the formula for</p> <ul style="list-style-type: none"> • a linear sequence • a simple quadratic sequence • a simple cubic sequence <p>Identify a simple geometric sequence and find its formula</p>				

Variation	<p>Direct variation (proportion) $y \propto x$, $y \propto x^2$, $y \propto x^3$, $y \propto \sqrt{x}$</p> <p>Inverse variation $y \propto \frac{1}{x}$, $y \propto \frac{1}{x^2}$, $y \propto \frac{1}{\sqrt{x}}$</p> <p>Best variation model for given data</p>				
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Extended Functions

Content	What you should be able to	R	A	G	Comments
Basic ideas	<p>Notation</p> <p>Domain and range</p> <p>Mapping diagrams</p>				
Recognition	<p>Recognise these functions from their graphs</p> <ul style="list-style-type: none"> linear $f(x) = ax + b$ quadratic $f(x) = ax^2 + bx + c$ cubic $f(x) = ax^3 + bx^2 + cx + d$ reciprocal $f(x) = \frac{a}{x}$ exponential $f(x) = a^x$ ($0 < a < 1$ or $a > 1$) includes compound interest absolute value $f(x) = ax + b$ trigonometric $f(x) = a\sin(bx)$, $f(x) = a\cos(bx)$, $f(x) = \tan(x)$ includes period and amplitude <p>Find at most two of a, b, c or d in simple cases of these functions</p>				

Quadratic function	<p>Finding the quadratic function given</p> <ul style="list-style-type: none"> vertex and another point, $y = a(x - h)^2 + k$ has a vertex of (h, k) x-intercepts and a point vertex or x-intercepts with $a = 1$ 				
Graphic display calculator	<p>Use a graphic display calculator to</p> <ul style="list-style-type: none"> sketch the graph of a function, including unfamiliar functions not mentioned explicitly in this syllabus produce a table of values find zeros, local maxima or minima including the vertex of a quadratic find the intersection of the graphs of functions 				
Asymptotes	<p>Understanding of the concept of asymptotes and graphical identification of simple examples parallel to the axes e.g. $f(x) = \tan x$ asymptotes at 90°, 270°, etc.</p>				
Combination & inverse	<p>Simplify expressions such as $f(g(x))$ where $g(x)$ is a linear function</p> <p>Inverse function f^{-1}</p>				
Logarithmic Function	<p>Logarithmic function as inverse of the exponential function: $y = a^x$ equivalent to $x = \log_a y$</p> <p>Rules for logarithms corresponding to rules for exponents</p> <p>Solution to $a^x = b$ as $x = \frac{\log b}{\log a}$</p>				
Transformations	<p>Description and identification, using the language of transformations, of the changes to the graph when $y = f(x)$ when $y = f(x) + k$, $y = f(x + k)$ (k an integer)</p>				

Extended Coordinate geometry

Content	What you should be able to	R	A	G	Comments
Graph	Plotting of points and reading from a graph				
Distance	Distance between two points				
Mid-point	Mid-point of a line segment				
Gradient	Gradient of a line segment Gradient of parallel and perpendicular lines				
Equation	Equation of a straight line as $y = mx + c$ $ax + by = d$ (a , b and d integer)				
Symmetry	Symmetry of diagrams or graphs				

Extended Geometry

Content	What you should be able to	R	A	G	Comments
Vocabulary	Use and interpret the geometrical terms: acute, obtuse, right angle, reflex, parallel, perpendicular, congruent, similar Use and interpret vocabulary of triangles, quadrilaterals, polygons and simple solid figures e.g. pyramids including tetrahedrons				
Symmetry	Line symmetry Rotational symmetry				

Angles	<p>Measurement in degrees</p> <p>Angles round a point, on a straight line, vertically opposite angles</p> <p>Alternate and corresponding angles on parallel lines</p> <p>Angle sum of a triangle, quadrilateral and polygons</p> <p>Interior and exterior angles of a polygon including regular polygons</p>				
Similarity	<p>Calculation of lengths of similar figures</p> <p>Use of area and volume scale factors</p>				
Pythagoras	<p>Pythagoras' Theorem in two dimensions</p> <p>Chord length & distance of a chord from the centre of a circle</p> <p>Distances on a grid</p>				
Circles	<p>Use and interpret the vocabulary of circles, including sector and segment</p> <p>Properties of circles</p> <ul style="list-style-type: none"> • tangent perpendicular to radius at the point of contact • tangents from a point are equal • angle in a semicircle is 90° • angles at the centre and at the circumference on the same arc • cyclic quadrilateral • alternate segment 				

Extended Vectors

Content	What you should be able to	R	A	G	Comments
Notation	<p>Vector \mathbf{a} and directed line segment \overrightarrow{AB}</p> <p>Component form $\begin{pmatrix} x \\ y \end{pmatrix}$</p> <p>Magnitude \mathbf{a}</p>				
Vector operations	<p>Addition and subtraction of vectors</p> <p>Negative of a vector</p> <p>Multiplication of a vector by a scalar</p>				
Transformations	<p>Transformations of the Cartesian plane:</p> <ul style="list-style-type: none"> • translation • reflection • rotation • enlargement (reduction) • stretch <p>Description of a transformation</p> <p>Combining these transformations</p> <p>Inverse of these transformations</p>				

Extended Mensuration

Content	What you should be able to	R	A	G	Comments
Units	Convert between units: <ul style="list-style-type: none"> • mm, cm, m, km • mm^2, cm^2, m^2, ha, km^2 • mm^3, cm^3, m^3 • ml, cl, l • g, kg, t 				
Perimeter & Area	Perimeter and area of <ul style="list-style-type: none"> • rectangle • triangle • compound shapes derived from rectangles and triangles Circumference and area of circle Arc length and area of sector				
Volume & surface area	Surface area & volume <ul style="list-style-type: none"> • prism and pyramid (in particular cuboid, cylinder and cone) • sphere and hemisphere Note that in the examination the formulae will be given for the curved surface areas of cylinder, cone and sphere the volume of prism, pyramid, cylinder, cone and sphere Areas and volumes of compound shapes				

Extended Trigonometry

Content	What you should be able to	R	A	G	Comments
Trigonometry	Right-angled triangle trigonometry Three-figure bearings, and North, East, South, West Problems in two and three dimensions				
Angles	Extension to the four quadrants (0° to 360°) Exact values of sine, cosine and tangent of 0° , 30° , 45° , 60° , 90°				
Graphs	Properties of the graphs of $y = \sin x$, $y = \cos x$, $y = \tan x$ (x in degrees)				
Triangle formulae	Area of triangle formula given Sine rule, including ambiguous case formula given Cosine rule for two sides and included angle given, or for three sides given formula given				

Extended Sets

Content	What you should be able to	R	A	G	Comments
Notation	Notation and meaning for <ul style="list-style-type: none"> number of elements in A, $(n(A))$ is an element of (\in), is not an element of (\notin) empty set $(\emptyset$ or $\{\}$), universal set (U) complement of A, (A') is a subset of (\subseteq), is a proper subset of (\subset) Sets in descriptive form: $\{x \mid \quad\}$ or as a list				
Combining sets	Venn diagrams of at most three sets Intersection and union of sets				

Extended Probability

Content	What you should be able to	R	A	G	Comments
Probability	Probability $P(A)$ as a fraction, decimal or percentage Significance of the value of probability Relative frequency as an estimate of probability Expected frequency of occurrences				

Combining events	<p>Tree diagrams including successive selection with and without replacement</p> <p>Probabilities from Venn diagrams and tables</p> <p>The addition rule $P(A \text{ or } B) = P(A) + P(B)$ when mutually exclusive events</p> <p>The multiplication rule $P(A \text{ and } B) = P(A) \times P(B)$ when independent events</p>				
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Extended Statistics

Content	What you should be able to	R	A	G	Comments
Diagrams	<p>Reading and interpretation of graphs or tables of data</p> <p>Discrete or continuous data</p> <p>Pictogram</p> <p>Bar graph</p> <p>(Compound) bar chart</p> <p>Pie chart</p> <p>Line graph</p> <p>Scatter diagram</p> <p>Stem-and-leaf diagram</p>				
Mean, mode, median	<p>Mean, mode, median, quartiles and range from lists of discrete data</p> <p>Mean, mode, median and range from grouped discrete data</p> <p>Mean from continuous data</p>				

Cumulative frequency	<p>Cumulative frequency table and curve</p> <p>Median, quartiles and interquartile range (read from curve)</p>				
Graphic display calculator	<p>Use of a graphics display calculator to calculate</p> <ul style="list-style-type: none"> • mean, median, quartiles for discrete data • mean for grouped data 				
Correlation	<p>Understanding and description of correlation (positive, negative or zero) with reference to a scatter diagram. The coefficient of correlation is not required.</p> <p>Straight line of best fit (by eye) through the mean on a scatter diagram</p> <p>Use a graphic display calculator to find the equation of linear regression</p>				

Section 8: Useful website

The website listed below gives useful resources to help you study for your Cambridge IGCSE International Mathematics course.

<http://www.cambridgeinternational.org/programmes-and-qualifications/cambridge-igcse-international-mathematics-0607/past-papers/>

Here you will find a complete set of past papers and their mark schemes, as well as a set of Specimen papers for this mathematics syllabus.

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