Cambridge Secondary 2

Cambridge IGCSE

Learner Guide

Cambridge IGCSE® (9–1)

Mathematics **0626**

CAMBRIDGE
International Examinations

Contents

About this guide

This guide introduces you to your Cambridge IGCSE® (9–1) Mathematics (0626) course and how you will be assessed. You should use this guide alongside the support of your teacher.

By the end of this guide, you should:

- ✓ understand how to reflect on your own learning
- ✓ have an overview of the course and what you will learn about
- ✓ understand the structure of the assessment that you will be taking
- ✓ be able to plan your revision
- ✓ know how to show your skills to the best of your ability.

Section 1: Getting started

Find out how to:

- reflect on your own learning
- improve your learning
- be organised
- take notes successfully

Section 2: Syllabus content

Find out what topics you will be learning about. Your teacher can give you more detail.

Section 3: How you will be assessed

Find out:

- how many examinations you will take
- how long each examination lasts
- what different question types the examination will contain
- how to tackle each examination

Section 4: What skills will be assessed

Find out what areas of knowledge, understanding and skills you will need to demonstrate throughout the course and in your examinations.

Section 5: Worked examination question

Find out:

- how to interpret the question
- how to avoid common mistakes
- how to improve your exam technique

Section 6: Revision

Discover:

- ways to help you plan your revision
- example revision planners
- some basic revision skills
- some top tips for revision
- revision checklist for each topic.

Section 7: Answers

Check your answers to the ‘Test yourself’ questions in this guide.

Section 1: Getting started

Your teacher will help you to get the best out of your course, however, you also need to take **responsibility** for your own learning.

Reflect on your learning

The methods you use to remember and understand new knowledge are how you learn. Your methods might include making lists of information, asking questions or drawing diagrams.

In order to actively **engage** in your learning, you need to think deeply about the ways you learn, and whether you can improve your learning by using different methods. This process of thinking deeply about your approach and changing it when you need to is known as **reflection**.

Reflecting on your learning in this way will help you to develop into an effective learner with **confidence** in your skills and knowledge, which in turn can lead to **innovative** thinking.

Use the *Getting started* section of this guide to help you reflect on your learning, and to find ways that you can improve your methods of learning, your organisation and your note-taking skills. Print this document to keep a record of your progress. If you prefer to work electronically, you can type in text and tick boxes directly in this pdf file, just don't forget to save it to your device each time you make changes.

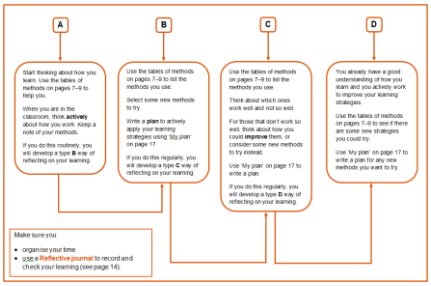
Do you think about how you learn?

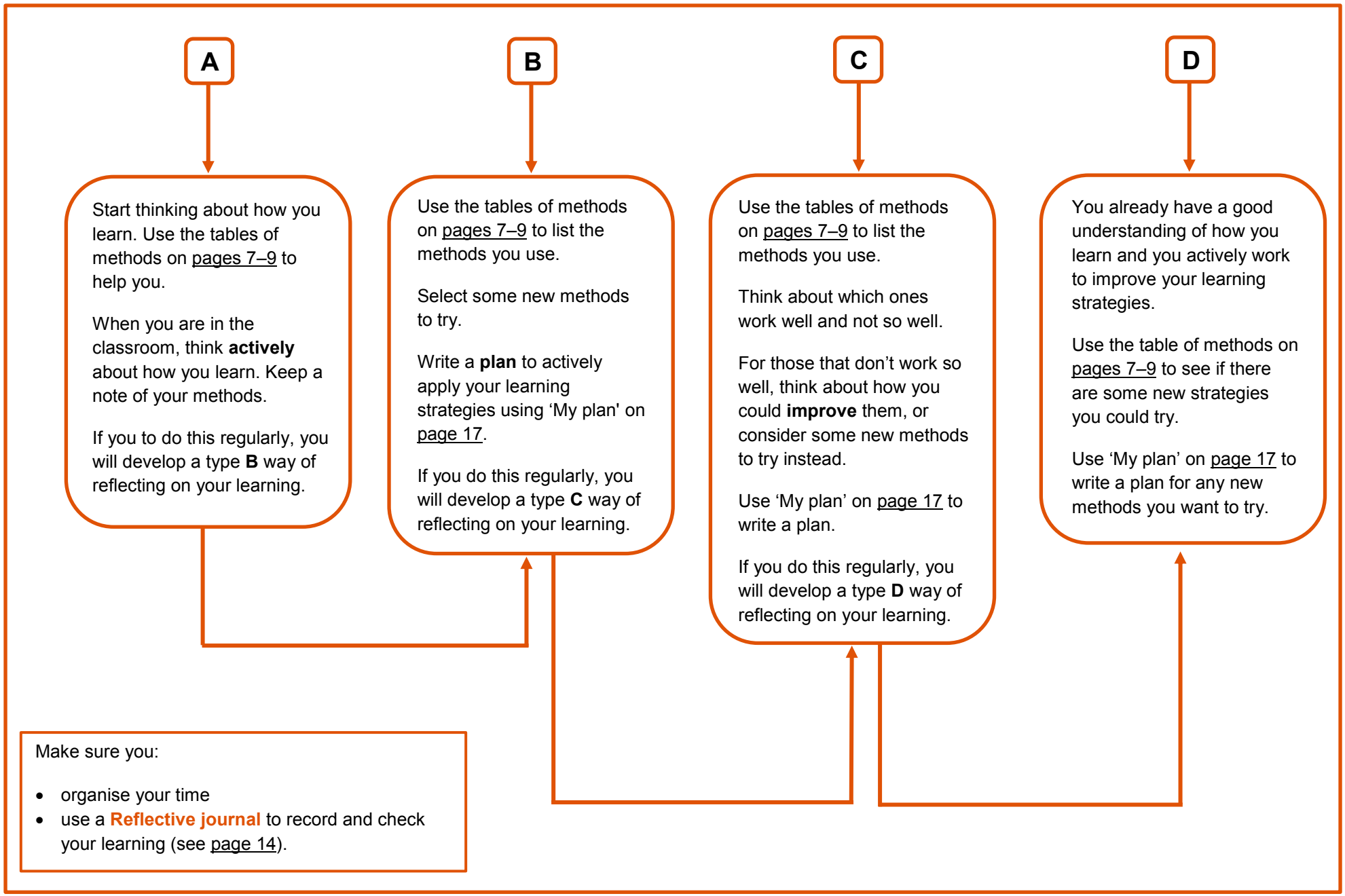
A, **B**, **C** and **D** in the list below represent different ways of reflecting on your learning. Tick the statement that best describes the way you reflect on your learning.

- ☐ **A:** I do not think about how I learn, I just accept if I know something or not.
- ☐ **B:** I am aware of some of the ways I learn, but I do not plan my learning.
- ☐ **C:** I know which methods I use to learn and I actively apply them.
- ☐ **D:** I know which methods I use to learn and I actively apply them. I also change them if I need to.

Don't forget to save this file to keep a record of your progress.

D describes a reflective process that is considered to be the most effective way to learn. Use the diagram on the next page to help you develop how you reflect on your learning.




A
Start thinking about how you learn. Use the tables of methods on pages 7–9 to help you.
When you are in the classroom, think **actively** about how you learn. Keep a note of your methods.
If you to do this regularly, you will develop a type **B** way of reflecting on your learning.
B
Use the tables of methods on pages 7–9 to list the methods you use.
Select some new methods to try.
Write a **plan** to actively apply your learning strategies using 'My plan' on page 17.
If you do this regularly, you will develop a type **C** way of reflecting on your learning.
C
Use the tables of methods on pages 7–9 to list the methods you use.
Think about which ones work well and not so well.
For those that don't work so well, think about how you could **improve** them, or consider some new methods to try instead.
Use 'My plan' on page 17 to write a plan.
If you do this regularly, you will develop a type **D** way of reflecting on your learning.
D
You already have a good understanding of how you learn and you actively work to improve your learning strategies.
Use the table of methods on pages 7–9 to see if there are some new strategies you could try.
Use 'My plan' on page 17 to write a plan for any new methods you want to try.
Make sure you:
• organise your time
• use a **Reflective journal** to record and check your learning (see page 14).

Methods to help you learn

The way you remember new information is unique to you. Some common ways to learn (known as learning styles) are:

- **SEEING** the new information
- **SPEAKING AND LISTENING** (to) the new information
- **READING AND WRITING** the new information
- **DOING** something with the new information

You might learn using just one style, or you might learn using a combination of different styles. You and your friends will probably have different styles. There is no right way, just the way that works best for you.

Which learning style(s) do you use?

The tables on the next pages list some of the methods that work well for each learning style. Some methods work for more than one style and are repeated in the different tables.

I already know which learning style(s) work best for me: go to the appropriate table to pick some new methods to try in order to improve.

I am unsure how I learn best: try different methods from different tables to see which ones work for you.

You can try as many or as few methods as you like and they don't all need to be in the same table. You might find that different styles work better for different things you are learning. Repeat this process as many times as you need to in order to feel confident in your learning. You might even develop your own methods.

Click in the empty boxes of each table to add a tick electronically. *Don't forget to save this file so you can reflect on your methods later.*

SEEING METHODS

Methods of learning	I will try	Worked well	Did not work well
Draw information in my notebook; replace words with pictures or symbols	☐	☐	☐
Highlight important details (in my notes or handouts) by colour-coding, circling, highlighting or underlining	☐	☐	☐
Make lists	☐	☐	☐
Write detailed notes	☐	☐	☐
Watch videos on the topics I am studying	☐	☐	☐
Use mind maps, systems diagrams or other organisations of information	☐	☐	☐
Think in pictures and/or form a picture in my mind to imagine the new information	☐	☐	☐

SPEAKING AND LISTENING METHODS

Methods of learning	I will try	Worked well	Did not work well
Ask if I can record my lessons so I can play them back at my own speed	☐	☐	☐
Watch videos on the topics I am studying	☐	☐	☐
Record myself reading my notes and play them back to myself	☐	☐	☐
Repeat facts and information out loud	☐	☐	☐
Read notes out loud, trying to include rhyming or other techniques to make them dramatic and varied	☐	☐	☐
Use word association, poems, rhymes, phrases or word puzzles to help me remember facts, lists or important information	☐	☐	☐
Discuss topics with my teacher and classmates	☐	☐	☐
Ask and answer questions in the classroom	☐	☐	☐
Talk about new information	☐	☐	☐

READING AND WRITING METHODS

Methods of learning	I will try	Worked well	Did not work well
Copy down information from the board	☐	☐	☐
Write summaries of what I have learned	☐	☐	☐
Use quizzes	☐	☐	☐
Write notes	☐	☐	☐
Write key information in lists	☐	☐	☐
Read my notes and rewrite them	☐	☐	☐
Write the information from books and other resources in my own words	☐	☐	☐
Write information from my teacher in my own words	☐	☐	☐

DOING METHODS

Methods of learning	I will try	Worked well	Did not work well
Ask and answer questions in the classroom	☐	☐	☐
Start and contribute to discussions	☐	☐	☐
Use large sheets of paper and large marker pens to feel more active when writing and drawing	☐	☐	☐
Use physical objects as much as possible; for example flashcards that I can hold and move around	☐	☐	☐
Use visualisation techniques to imagine the sensations I would expect in different scenarios (what would I see, hear, smell, feel?)	☐	☐	☐
Use short definitions when writing notes	☐	☐	☐
Try to apply the information to real life	☐	☐	☐

All the methods from one learning style might work best for you, or a combination of methods from different learning styles. You can summarise which methods you plan to use in the box below.

Click in the box to type in text if you are working electronically. *Don't forget to save this file so you can reflect on your methods later.*

For example:

September: I think I learn by seeing and sometimes by actively doing. So I will try: making lists, writing notes using mind maps, highlighting important details and asking and answering questions in the classroom.

October: I didn't find making lists during lessons helpful, so I will try replacing words with pictures in my notes instead.

Getting organised

Being organised has many benefits.

helps you to PRIORITISE

improves TIME MANAGEMENT

reduces STRESS

helps you to FOCUS

increases PRODUCTIVITY

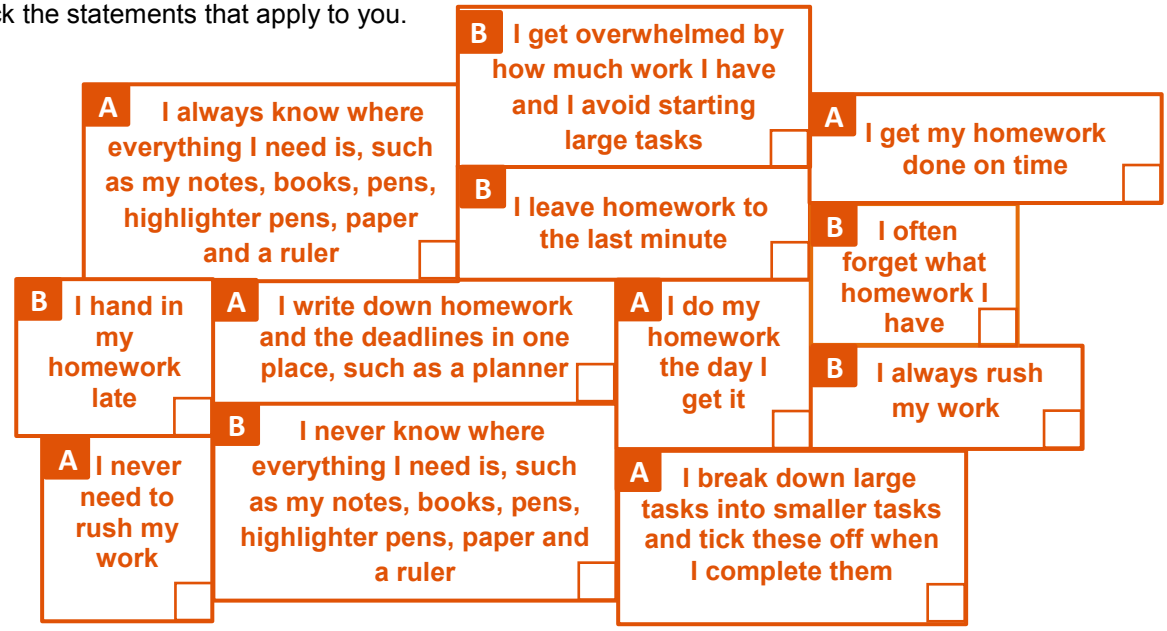
better BALANCE between work and play

increases CONFIDENCE

increases EFFICIENCY

How organised are you?

Tick the statements that apply to you.



Count the number of A statements you ticked and the number of B statements you ticked. Read the appropriate advice below. If you ticked an equal number of each, read both sets of advice.

Mostly A: You are a well-organised person who has developed strategies that work for you.

Be careful if you agreed with '*I do my homework the day I get it'* as this might not be the most efficient strategy; you need to prioritise homework according to deadline and how long it will take, and also make sure you allow time for fun and relaxation. See the table on the next page for more ideas of how to be organised.

Mostly B: You could use some support in being more organised in order to make life easier for yourself. Try some of the suggested methods for being organised in the table on the next page then return to the activity above at a later date to see if you score differently.

If you do some work each day, rather than leaving it all to the last minute, you will feel more in control.

Tick the boxes in the table to reflect on how you already work and what you will try in order to improve. Aim to try at least some of these methods. Click in the boxes if working electronically.

Ways to be organised	I already do this	I will try this
Keep all my pens, paper and other equipment together in one place so I always know where everything is	☐	☐
Keep my notes together and ordered by date as I go along; I will file them as soon as they are completed	☐	☐
Use one place such as a planner to record each homework or assignment deadline as soon as I get it	☐	☐
Include all activities in my planner so that I know what time I have available to work	☐	☐
Estimate how long a given task will take me, then work backwards from the deadline and include some extra time to give me the date that I should start the work	☐	☐
Be realistic about what I have time for	☐	☐
Keep my planner up to date and check it every day	☐	☐
Have a set time each day or week for completing homework or study so that it becomes part of my routine	☐	☐
Prioritise homework or study according to which needs to be done first and not just which I like doing best	☐	☐
Rank my homework as 1 (do it now), 2 (do it tomorrow), 3 (do it later in the week) and update the rank each day	☐	☐
Break down any large assignments into smaller, more manageable tasks; each task will have its own deadline	☐	☐
Tick off each homework or task once I have completed it	☐	☐

Don't forget to save this file so you can reflect on your methods later.

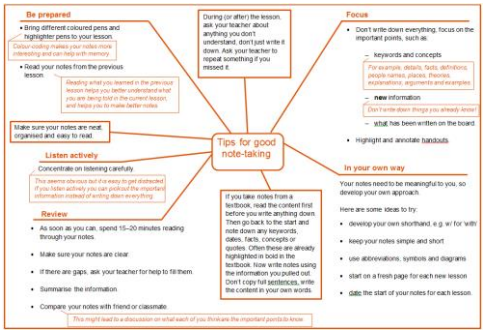
Taking notes

The process of writing and reviewing your classroom or lesson notes helps you to remember the information. Making notes as you go along, little and often, will make it easier when you come to revise later (see *Section 6: Revision* on page 35).

It is also really important to ask your teacher or classmates questions if you are unsure about anything or if you have missed something. Do this during the lesson or at the end of the lesson.

Tips for good note-taking

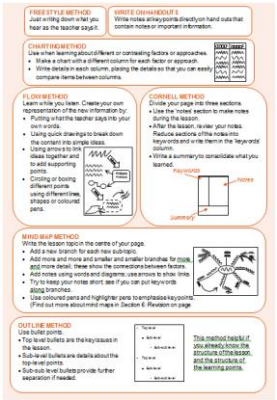
Note-taking is a skill that can be developed and improved. Look at the tips for good note-taking on page 12.



Formatting your notes

If you are unsure how best to write notes, try some of the suggested methods on page 13.

You might find that different methods work better for different types of task.



Tips for good note-taking

Be prepared

- Bring different coloured pens and highlighter pens to your lesson.

Colour-coding makes your notes more interesting and can help with memory.

- Read your notes from the previous lesson.

Reading what you learned in the previous lesson helps you better understand what you are being told in the current lesson, and helps you to make better notes.

Make sure your notes are neat, organised and easy to read.

Listen actively

Concentrate on listening carefully.

This seems obvious but it is easy to get distracted. If you listen actively, you can pick out the important information instead of writing down everything.

Review

- As soon as you can, spend 15–20 minutes reading through your notes.
- Make sure your notes are clear.
- If there are gaps, ask your teacher for help to fill them.
- Summarise the information.
- Compare your notes with friend or classmate.

This might lead to a discussion on what each of you think are the important points to know.

During (or after) the lesson, ask your teacher about anything you don't understand, don't just write it down. Ask your teacher to repeat something if you missed it.

If you take notes from a textbook, read the content first before you write anything down. Then go back to the start and note down any keywords, dates, facts, concepts or quotes. Often these are already highlighted in bold in the textbook. Now write notes using the information you pulled out. Don't copy full sentences, write the content in your own words.

Focus

- Don't write down everything, focus on the important points, such as:
  - keywords and concepts

For example, definitions, examples, formulae, symbols, methods, etc .

  - **new** information

Don't write down things you already know!

  - what has been written on the board.
- Highlight and annotate handouts.

In your own way

Your notes need to be meaningful to you, so develop your own approach.

Here are some ideas to try:

- develop your own shorthand, e.g. w/ for 'with'
- keep your notes simple and short
- use abbreviations, symbols and diagrams
- start on a fresh page for each new lesson
- date the start of your notes for each lesson.

Here are some useful ways to format your notes:

FREESTYLE METHOD

Just write down what you hear as the teacher says it.

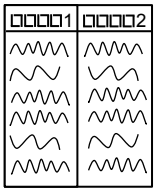
WRITE ON HANDOUTS

Write notes at key points directly on handouts that contain notes or important information.

CHARTING METHOD

Use when learning about different or contrasting factors or approaches.

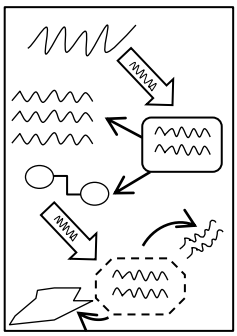
- Make a chart with a different column for each factor or approach.
- Write details in each column, placing the details so that you can easily compare items between columns.



FLOW METHOD

Learn while you listen. Create your own representation of the new information by:

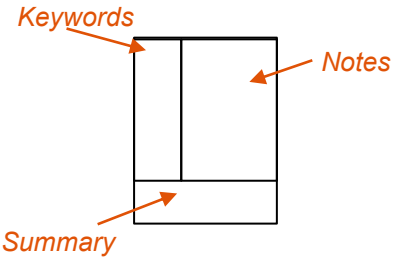
- putting what the teacher says into your own words
- using quick drawings to break down the content into simple ideas
- using arrows to link ideas together and to add supporting points
- circling or boxing different points using different lines, shapes or coloured pens.



CORNELL METHOD

Divide your page into three sections.

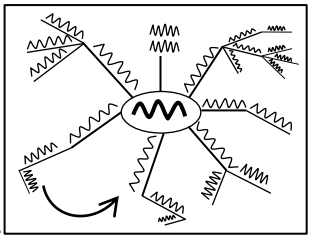
- Use the 'notes' section to make notes during the lesson.
- After the lesson, review your notes. Reduce sections of the notes into keywords and write them in the 'keywords' column.
- Write a summary to consolidate what you learned.



MIND MAP METHOD

Write the lesson topic in the centre of your page.

- Add a new branch for each new sub-topic.
- Add extra smaller and smaller branches for more detail; these show the connections between facts or ideas.
- Add notes using words and diagrams; use arrows to show links.
- Keep your notes short and put key words along branches.
- Use coloured pens and highlighter pens to emphasise key points.



(Find out more about mind maps in *Section 6: Revision* on page 40.

OUTLINE METHOD

Use bullet points.

- Top level bullets are the key issues in the lesson.
- Sub-level bullets are details about the top-level points.
- Sub-sub level bullets provide more separation if needed.

- Top level
  - Sub-level
    - Sub-sub level
- Top level
  - Sub-level
    - Sub-sub level

This method is helpful if you already know the structure of the lesson and the structure of the learning points.

Reflective journal

Keeping a reflective journal is a useful way to record, analyse and reflect on how you learn.
Here are some questions to get you thinking.
Write in the orange boxes below, or create your own journal somewhere else.

Don't forget to save this file to keep a record of your progress.

I am studying IGCSE (9–1) Mathematics because: (*Think about what you want to achieve by taking this course.*)

I like mathematics because: (*What did you like about this subject when you have taken it in the past*?)

This is a good subject to learn because: (*What skills will it will help you develop. Are there any uses in the real world?)*

Useful skills for studying this subject are: (*What skills are useful to this course? For example, 'remembering formulae', 'interpreting graphs', 'performing calculations'. Ask your teacher for help creating this list.)*

These skills are also useful for: (*Think of the other subjects you are studying*.)

I am good at: (*Think about the skills relevant to this course.)*

I need to improve: (*What skills do you need to work on?)*

I learn best in: (*Think about the kind of environment you work best in, for example quiet, noisy, alone, with friends. You might like working with friends in a café, but do you learn best in this environment?)*

Other thoughts:

My plan

Based on the work you have done in this section, write a summary plan for your learning. Include *what* skills you want to develop and *how* you hope to do this. You could include your thoughts on your approach to learning, your learning style and a plan of which learning and organisation strategies you will try.

Write your plan in the box below, or you could create your plan somewhere else. Make sure you date your entries and include a date for review.

Don't forget to save this file to keep a record of your progress.

For example …
October 1:
I have a type B approach to reflecting on my learning, I will try to develop a type C approach by actively applying the learning strategies I know work for me: making detailed notes; visualising the information I am being told; using rhymes; answering questions in the classroom; and copying down information from the board. I also want to try the speaking and listening technique where I discuss topics with classmates after some lessons. I need to ensure I write all homework down and split large tasks into smaller ones, and tick each one off as I complete it. I will try using more mind maps and the charting method when I'm taking notes in class. Check progress on November 1.

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 top-level 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 of 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.

Ask your teacher for more detail about each topic, including the differences between the Core and Extended courses. You can also find more detail in the Revision checklists of this guide (page 45).

Topic	Overview
Number	Number, sets, roots and powers, directed numbers, fractions, decimals and percentages, ordering, indices, 'four rules', estimates, bounds, ratio, proportion, rate, percentage, time, money and finance
	Exponential growth and decay, surds **(Extended only)**
Algebra and graphs	Basic algebra, algebraic manipulation, equations, sequences, graphs of functions, functions
	Linear programming, proportion, iterations, differentiation **(Extended only)**
Geometry	Language, constructions, symmetry, angle properties, loci
Mensuration	Measures, mensuration
Co-ordinate geometry	Straight-line graphs
	Equation of a circle **(Extended only)**
Trigonometry	Bearings, trigonometry
Matrices and transformations	Vectors, transformations
	Matrices **(Extended only)**
Probability	Probability
Statistics	Statistics, sampling

As well as demonstrating skill in the techniques listed in the syllabus, you also need to apply them to the solution of problems and make connections between different areas of mathematics.

Section 3: How you will be assessed

You will be assessed using three components:

- Paper 1 (Core) or Paper 2 (Extended)
- Paper 3 (Core) or Paper 4 (Extended)
- Paper 5 (Core) or Paper 6 (Extended).

Your teacher will advise you which papers are best for you, depending on your progress and strengths.

Core ☐

You will take **three** examinations at the **end** of the course:

- Paper 1 – Short-answer and structured questions
- Paper 3 – Short-answer and structured questions
- Paper 5 – Structured questions

Extended ☐

You will take **three** examinations at the **end** of the course:

- Paper 2 – Short-answer and structured questions
- Paper 4 – Short-answer and structured questions
- Paper 6 – Structured questions

Components at a glance

The tables summarise the key information about each component for each syllabus. You can find details and advice on how to approach each component on the following pages.

	Component	How long and how many marks	Skills assessed	Details	Percentage of the qualification
Core	Paper 1	1 hour 60 marks	Use mathematical techniques, reason, interpret and communicate mathematically when solving problems	You will answer short-answer questions and structured questions on the Core syllabus content	25%
	Paper 3	1 hour 30 minutes 84 marks	Use mathematical techniques, reason, interpret and communicate mathematically when solving problems	You will answer short-answer questions and structured questions on the Core syllabus content	35%
	Paper 5	2 hours 96 marks	Use mathematical techniques, reason, interpret and communicate mathematically when solving problems	You will answer structured questions on the Core syllabus content	40%

	Component	How long and how many marks	Skills assessed	Details	Percentage of the qualification
Extended	Paper 2	1 hour 60 marks	Use mathematical techniques, reason, interpret and communicate mathematically when solving problems	You will answer short-answer questions and structured questions on the Extended syllabus content	25%
	Paper 4	1 hour 30 minutes 84 marks	Use mathematical techniques, reason, interpret and communicate mathematically when solving problems	You will answer short-answer questions and structured questions on the Extended syllabus content	35%
	Paper 6	2 hours 96 marks	Use mathematical techniques, reason, interpret and communicate mathematically when solving problems	You will answer structured questions on the Extended syllabus content	40%

About the components

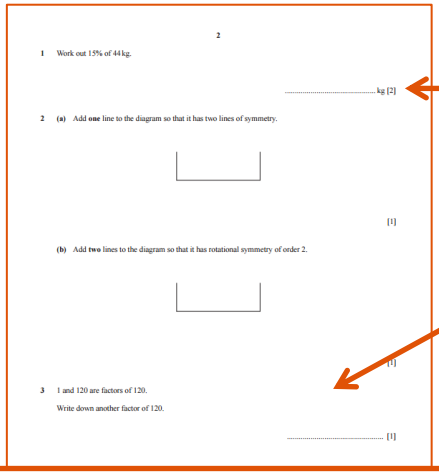
It is important that you understand the different types of question in each component and how you should approach them.

Core: Paper 1 and Paper 3 (Short-answer)

These papers assess your use of mathematical techniques and your reasoning, interpretation and communication when solving mathematical problems, with slightly more marks allocated to mathematical techniques.

You need to answer **all** questions on each paper.

Paper 1


2

1 Work out 15% of 44 kg.

..... kg [2]

2 (a) Add **one** line to the diagram so that it has two lines of symmetry.

[1]

(b) Add **two** lines to the diagram so that it has rotational symmetry of order 2.

[1]

3 1 and 120 are factors of 120.

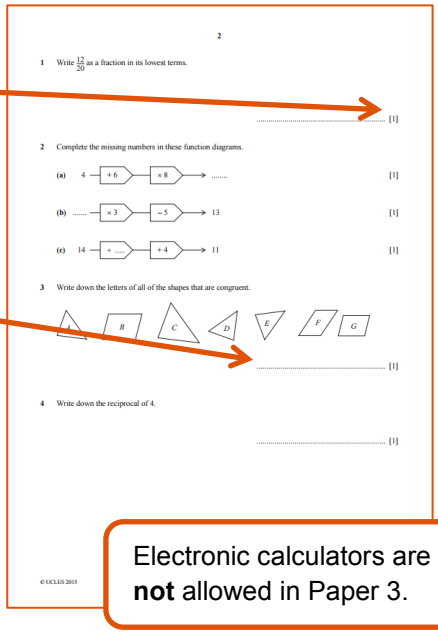
Write down another factor of 120.

..... [1]

The number of marks for each part is shown.

Write your working and answers in the spaces provided.

Paper 3


2

1 Write $\frac{12}{20}$ as a fraction in its lowest terms.

..... [1]

2 Complete the missing numbers in these function diagrams.

(a) 4 → +6 → ×8 → ..... [1]

(b) ..... → ×3 → −5 → 13 [1]

(c) 14 → + ... → +4 → 11 [1]

3 Write down the letters of all of the shapes that are congruent.

A B C D E F G

..... [1]

4 Write down the reciprocal of 4.

..... [1]

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You **can** use an electronic calculator in Paper 1. You are **not** allowed algebraic or graphical calculators. Ask your teacher to recommend a calculator.

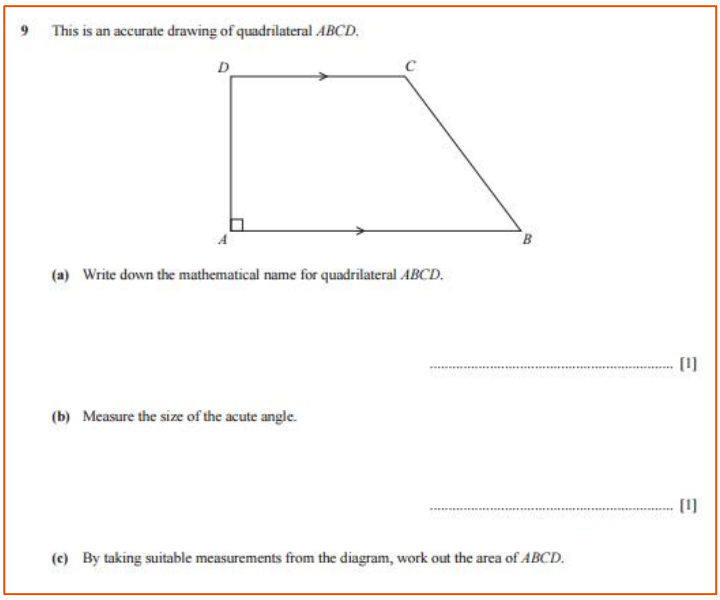
Electronic calculators are **not** allowed in Paper 3.


1 Write $\frac{12}{20}$ as a fraction in its lowest terms.

..... [1]

In Paper 1 and Paper 3, the questions are short-answer and structured.

Short-answer questions have only one or two parts.


9 This is an accurate drawing of quadrilateral *ABCD*.

(a) Write down the mathematical name for quadrilateral *ABCD*.

..... [1]

(b) Measure the size of the acute angle.

..... [1]

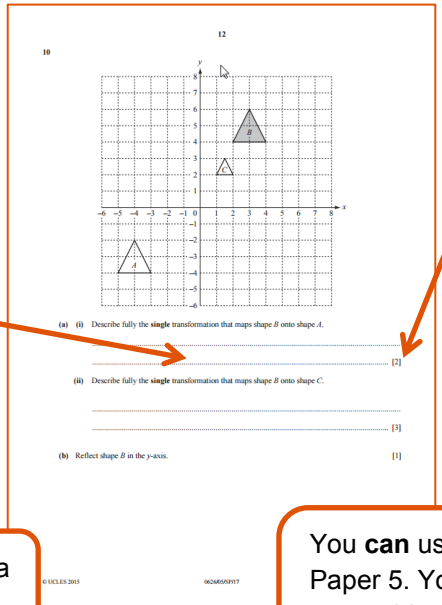
(c) By taking suitable measurements from the diagram, work out the area of *ABCD*.

Structured questions are split into parts. Sometimes, later parts of the question will relate to earlier parts of the question.

Core: Paper 5 (Structured)

This paper assesses your use of mathematical techniques and your reasoning, interpretation and communication when solving mathematical problems, with slightly more marks allocated to solving mathematical problems.

You need to answer **all** questions.


10

(a) (i) Describe fully the **single** transformation that maps shape *B* onto shape *A*.

..... [2]

(ii) Describe fully the **single** transformation that maps shape *B* onto shape *C*.

..... [3]

(b) Reflect shape *B* in the *y*-axis. [1]

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The number of marks for each question part is shown.

Write your working and answers in the spaces provided.

Each question on the paper is a structured question.

You **can** use an electronic calculator in Paper 5. You are **not** allowed algebraic or graphical calculators. Ask your teacher to recommend a calculator.

Advice for Core Papers

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 ✗

   - or 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.

   1 kg of apples costs... ...£1.20 ✓ ...1.20 ✗

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

   ~~Wrong working~~
   ~~Wrong answer~~
   Right working
   Right answer

In **Paper 1** and **Paper 5** use the value of π from your calculator, if it gives one. Or use **3.142**, which is given on the front page of the question paper.

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, others ask for an answer in the form $a + b\sqrt{2}$.

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

If you make a mistake, draw a line through the incorrect working and answer so that it is clear you do not want this to be marked.

If you need more space, ask for another sheet of paper.

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 (for Papers 1 and 5)
- a protractor
- a pair of compasses
- a ruler.

Timing

- If you are stuck on a question, don't 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.

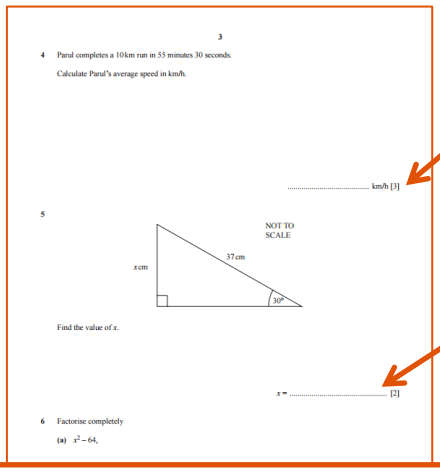
- Use any time that you have left at the end of the exam to go back and check your answers and working.

Extended: Paper 2 and Paper 4

These papers assess your use of mathematical techniques and your reasoning, interpretation and communication when solving mathematical problems, with roughly the same number of marks allocated to each.

You need to answer **all** questions.

Paper 2


3

4 Parul completes a 10 km run in 55 minutes 30 seconds.
Calculate Parul's average speed in km/h.
..... km/h [3]

5

Find the value of x.
x = ... [2]

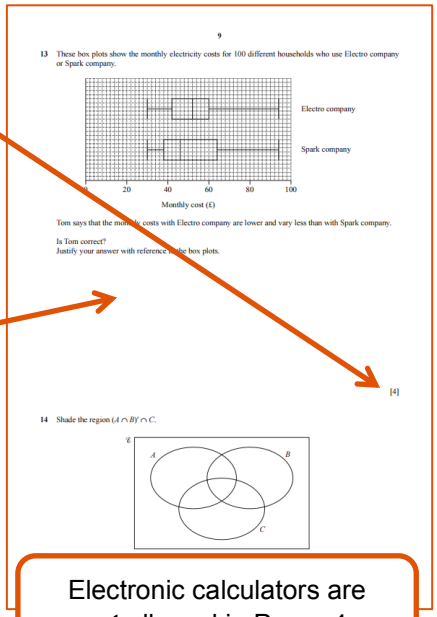
6 Factorise completely
(a) $x^2 - 64$,

The number of marks for each part is shown.

Write your working and answers in the spaces provided.

You **can** use an electronic calculator in Paper 2. You are **not** allowed algebraic or graphical calculators. Ask your teacher to recommend a calculator.

Paper 4

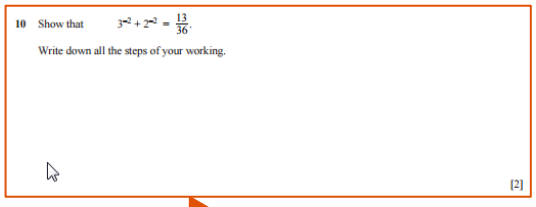

9

13 These box plots show the monthly electricity costs for 100 different households who use Electro company or Spark company.

Tom says that the monthly costs with Electro company are lower and vary less than with Spark company.
Is Tom correct?
Justify your answer with reference to the box plots.
[4]

14 Shade the region $(A \cap B)' \cap C$.

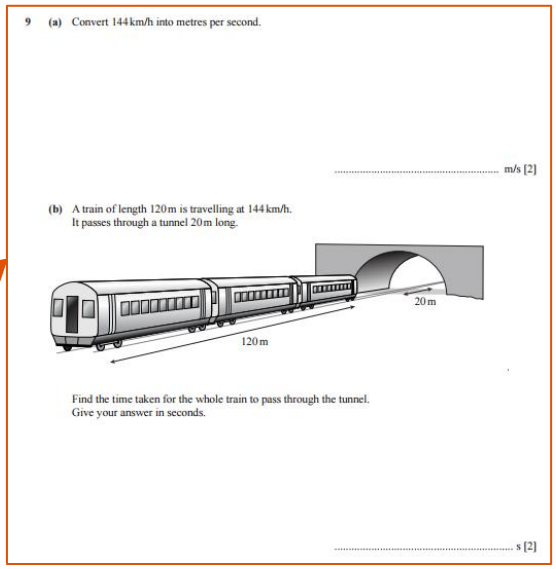
Electronic calculators are **not** allowed in Paper 4.


10 Show that $3^{-2} + 2^{-2} = \frac{13}{36}$.
Write down all the steps of your working.
[2]

In Paper 2 and Paper 4, the questions are short-answer and structured.

Short-answer questions have only one or two parts.

Structured questions are split into parts. Sometimes, later parts of the question will relate to earlier parts of the question.


9 (a) Convert 144 km/h into metres per second.
..... m/s [2]

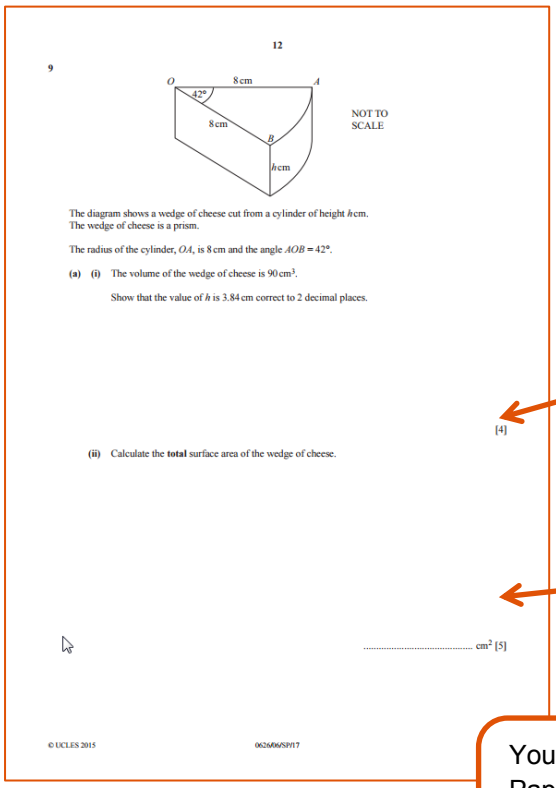
(b) A train of length 120 m is travelling at 144 km/h.
It passes through a tunnel 20 m long.

Find the time taken for the whole train to pass through the tunnel.
Give your answer in seconds.
..... s [2]

Extended: Paper 6 (Structured)

This paper assesses your use of mathematical techniques and your reasoning, interpretation and communication when solving mathematical problems, with the focus on solving mathematical problems.

You need to answer **all** questions.



12

9

NOT TO SCALE

The diagram shows a wedge of cheese cut from a cylinder of height h cm.
The wedge of cheese is a prism.

The radius of the cylinder, OA, is 8 cm and the angle $AOB = 42°$.

(a) (i) The volume of the wedge of cheese is 90 cm^3.

Show that the value of h is 3.84 cm correct to 2 decimal places.

[4]

(ii) Calculate the **total** surface area of the wedge of cheese.

..... cm^2 [5]

In Paper 6, questions are structured.

The number of marks for each question part is shown.

Write your working and answers in the spaces provided.

You **can** use an electronic calculator in Paper 6. You are **not** allowed algebraic or graphical calculators. Ask your teacher to recommend a calculator.

Advice for Extended Papers

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 ✗

   - or 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.

   1 kg of apples costs... ...£1.20 ✓ ...1.20 ✗

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

   ~~Wrong working~~

   ~~Wrong answer~~

   Right working

   Right answer

In **Paper 2** and **Paper 6** use the value of π from your calculator, if it gives one. Or use **3.142**, which is given on the front page of the question paper.

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, others ask for an answer in the form $a + b\sqrt{2}$.

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

If you make a mistake, draw a line through the incorrect working and answer so that it is clear you do not want this to be marked.

If you need more space, ask for another sheet of paper.

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 (for Papers 2 and 6)
- a protractor
- a pair of compasses
- a ruler.

Timing

- If you are stuck on a question, don't 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.

Test yourself

Use the following questions to see how well you understand how you will be assessed. You can check your answers in *Section 7 Answers*. *Don't forget to save this file to keep a record.*

1. How many papers will you take for Cambridge IGCSE (9–1) Mathematics (0626)? _____

2. Which papers will a candidate taking the Core examinations take? (Tick the correct answer.)

- ☐ Papers 1, 2 and 3
- ☐ Papers 1, 3 and 5
- ☐ Papers 2, 4 and 6

3. Extended candidates have a completely different syllabus to Core candidates.
(Tick the correct answer.)

☐ True ☐ False

4. Complete the table by entering the correct letter (A–C). (You can type directly into each box if working electronically.)

Component	How long	How many marks
	2 hours	96 marks
	1 hour	60 marks
	1 hour 30 minutes	84 marks

A: Papers 1 and 2
B: Papers 3 and 4
C: Papers 5 and 6

5. You are allowed a calculator for all Cambridge IGCSE (9–1) Mathematics (0626) papers.
(Tick the correct answer.)

☐ True ☐ False

Section 4: What skills will be assessed

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

AO1	AO2
Use mathematical techniques	**Reason, interpret and communicate mathematically when solving problems**

The tables explain what each assessment objective means and what percentage of the whole qualification is assessed using that objective. Your teacher will be able to give you more information about how each of the assessment objectives are tested in each component.

AO1	What this means	Where
Candidates should be able to recall and apply mathematical knowledge, terminology and definitions in order to carry out routine procedures or straightforward tasks. These tasks may include single or multi-step solutions in mathematical or everyday situations, and include: • organising, processing and presenting information accurately in written, tabular, graphical and diagrammatic forms • using and interpreting mathematical notation correctly • performing calculations and procedures using suitable methods, including use of a calculator • understanding systems of measurement in everyday use and making use of these • estimating, approximating and working to degrees of accuracy appropriate to the context and converting between equivalent numerical forms • using geometrical instruments to measure and to draw to an acceptable degree of accuracy • recognising and using spatial relationships in two and three dimensions.	**Use mathematical techniques** This is all about demonstrating that you can accurately use mathematical techniques. use tables, graphs and diagrams degrees of accuracy, e.g. decimal places or significant figures equivalent numerical forms, e.g. between fractions, decimals and percentages, or between normal numbers and standard form geometrical instruments, e.g. a pair of compasses, a protractor and a ruler	**Core assessment** Paper 1 (33–39 marks) Paper 3 (42–50 marks) Paper 5 (34–43 marks) Percentage of IGCSE: 45–55% **Extended assessment** Paper 2 (27–33 marks) Paper 4 (34–42 marks) Paper 6 (24–34 marks) Percentage of IGCSE: 35–45%

AO2	What this means	Where
Candidates should be able to analyse a problem, select a suitable strategy and apply appropriate techniques to obtain its solution, including: • making logical deductions, making inferences and drawing conclusions from given mathematical data • recognising patterns and structures in a variety of situations and forming generalisations • presenting arguments and chains of reasoning in a logical and structured way • interpreting and communicating information accurately and changing from one form of presentation to another • assessing the validity of an argument and critically evaluating a given way of presenting information • solving unstructured problems by putting them into a structured form involving a series of processes • apply combinations of mathematical skills and techniques using connections between different areas of mathematics to solve problems • interpreting results in the context of a given problem and evaluating the methods used and solutions obtained.	**Reason, interpret and communicate mathematically when solving problems** This is all about demonstrating your skills when you solve problems. recognise and extend patterns write your working out clearly and with appropriate structure assessing the validity of an argument e.g. deciding if the argument is true or not and providing evidence to support your decision evaluate how information has been presented: is it clear? take information and organise it to answer a problem	**Core assessment** Paper 1 (21–27 marks) Paper 3 (34–42 marks) Paper 5 (53–62 marks) Percentage of IGCSE: 45–55% **Extended assessment** Paper 2 (27–33 marks) Paper 4 (42–50 marks) Paper 6 (62–72 marks) Percentage of IGCSE: 55–65%

Your teacher will be able to give you more information about how each of the assessment objectives is tested in the examination papers.

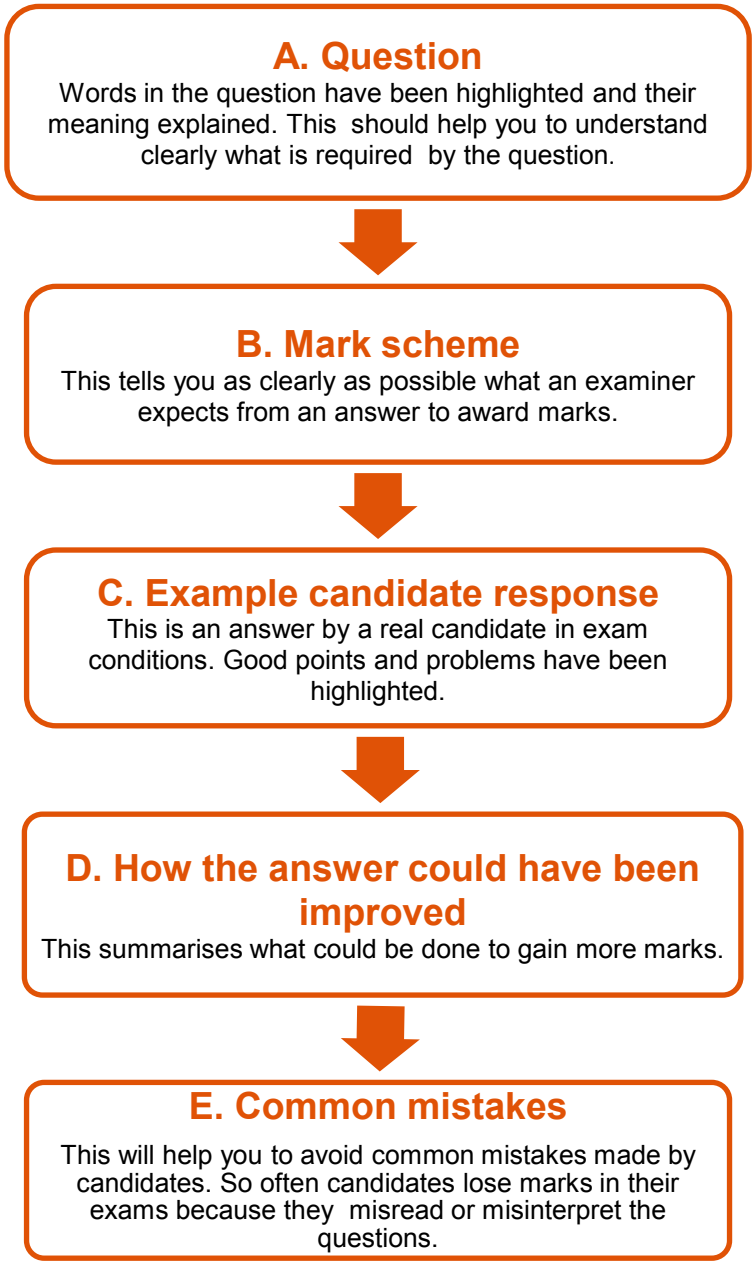
Section 5: Worked examination question

This section takes you through a worked example for one specimen exam question for the Cambridge IGCSE (9–1) Mathematics (0626) course. This question has not been used in a real examination but it is written in the same way and at the same level as a real question.

This section will help you to see how to identify words within questions and to understand what is required in your response. Understanding the questions will help you to know what you need to do with your knowledge, for example, you might need to describe something, explain something, argue a point of view, apply the knowledge in a different way, 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.

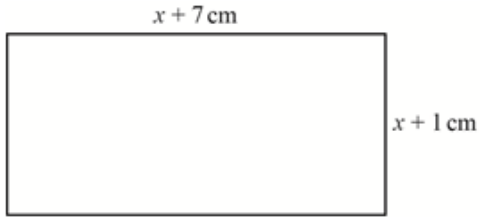
This section is structured as follows.



A. Question

The question used in this worked example was taken from a specimen Core paper. However, the information and advice applies to the Extended papers as well.

8



NOT TO SCALE

NOT TO SCALE means that you cannot find the answer by measuring the diagram.

The area of the rectangle is 55 cm^2.

(a) Show that $x^2 + 8x - 48 = 0$.

Show that … means that you need to show, step by step, how you get to the given result. Here, you are expected to show how you use the information in the diagram to create the given equation. Make sure you include every step in your working and check it thoroughly for errors.

(b) **(i)** Solve $x^2 + 8x - 48 = 0$.

Solve … means that you need to find the values of the unknown (x) for the equation given.

$x =$ ..... or $x =$ ..... **[3]**

(ii) Work out the perimeter of the rectangle.

Work out … is another word for 'calculate', so you need to give a numerical answer. Make sure you show your working, especially if there is more than one step to the calculation.

..... cm **[2]**

B. Mark scheme

Your examination papers will be marked and the overall number of marks for each paper will be recorded. Your marks will then be converted to a grade. The mark scheme provides the final answers for each sub-part of a question and, when appropriate, the required lines of working to reach that answer.

Answer	Mark	Notes
(a) $(x + 7)(x + 1) = 55$ $x^2 + 7x + x + 7 = 55$ $x^2 + 8x + 7 = 55$ $x^2 + 8x + 7 – 55 = 55 – 55$ $x^2 + 8x – 48 = 0$	3	1 mark is awarded for multiplying the expression for length and the expression for width and making it equal to the given area (55): $(x + 7)(x + 1) = 55$ 1 mark is awarded for the correct expansion of brackets: $x^2 + 7x + x + 7$ [=55] OR $x^2 + 8x + 7$ [= 55] 1 mark is awarded for correctly obtaining $x^2 + 8x – 48 = 0$ with no errors. This mark can only be awarded if the other 2 marks have been awarded.
(b)(i) $x = –12$ and $x = 4$	3	Full marks (3) are awarded for the correct factorisation and the correct solutions: $(x + 12)(x – 4)$ --> $x = –12$ and $x = 4$ If candidates do not have the fully correct answer, then they can obtain **method marks** for their working: 2 **method marks** can be awarded for correctly factorising the expression but failing to give the correct final answer: $(x + 12)(x – 4)$ [= 0] OR 1 **method mark** can be awarded for an attempt at factorising the expression so that when the brackets are expanded, either the x term is correct ($8x$) or the constant is correct ($–48$). For example, $(x – 12)(x + 4)$, which is $x^2 – 8x – 48$, or $(x + 7)(x + 1)$, which is $x^2 + 8x + 7$, would both be awarded 1 method mark.
(b)(ii) 32	2	Full marks (2) are awarded for 32. If the candidate's answer was incorrect, they could be awarded: Full marks (2) if they correctly calculated the perimeter using the positive x value from their answer to (b)(i) but their answer to (b)(i) was incorrect, as this demonstrates the required understanding to calculate the perimeter. OR 1 **method mark** for a correct calculation of the perimeter of the rectangle using the correct positive x value from b(i) but with an incorrect final answer.

The question is a 'show that' question, so the answer is the working. There are three marks available for this question and each mark relates to a particular part of the working. The final mark is for accuracy, i.e. no errors, and can only be awarded if the other 2 marks have been awarded.

Sometimes marks can be awarded for correct lines or steps of the working in a calculation even if the final answer is incorrect. This is why it's so important to always **show your working.**

If you use a correct method that is not included in the mark scheme, then method marks can still be awarded.

Sometimes a candidate demonstrates the correct mathematical understanding in their answer but their answer is incorrect due to an error in an earlier part of the question. If it is clear that the **required** mathematical understanding has been demonstrated, the candidate might still get awarded the marks even if their answer is wrong.

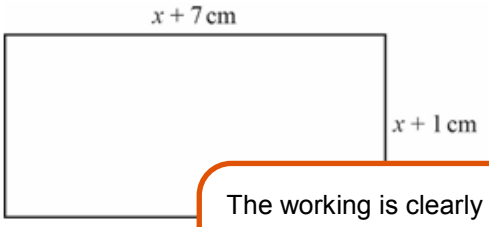
Sometimes the answer has to be exactly as given in the mark scheme. Other times there will be a range of acceptable answers.

Now let's look at the worked solution to the question.

C. Worked solution and examiner comments

This solution represents the 'ideal' answer that is fully accurate and shows best practice when writing answers to questions in a maths examination. The examiner's comments are in the orange boxes.

8



The area of the rectangle is 55 cm².

(a) Show that $x^2 + 8x - 48 = 0$.

$(x + 7)(x + 1) = 55$

$x^2 + 7x + x + 7 = 55$

$x^2 + 8x + 7 = 55$

$x^2 + 8x + 7 - 55 = 55 - 55$

$x^2 + 8x - 48 = 0$

[3]

(b) **(i)** Solve $x^2 + 8x - 48 = 0$.

$(x + 12)(x - 4) = 0$

$x =$ ..−12.. or $x =$ ..4.. [3]

(ii) Work out the perimeter of the rectangle.

$x = 4$ as $x = -12$ would give negative lengths

Length $= x + 7 = 4 + 7 = 11$

Width $= x + 1 = 4 + 1 = 5$

Perimeter $= 11 \times 2 + 5 \times 2 = 32$

..32.. cm [2]

The working is clearly written and laid out. 2 out of the 3 available marks are awarded for specific lines of working. This neat layout makes it easier to see the steps involved in the calculation.

When you are asked to 'show that …', your working has to be fully correct to get **full marks**. It is important that you check your working carefully for minor errors.

Always include your working even if you're not asked to. This could mean you are awarded method marks, even if your answer is wrong.

Clearly written and laid out working helps the candidate to demonstrate their understanding, and could mean they get awarded some marks even if their answer is wrong. If you just wrote the final answer with no working, and your answer was wrong, you would score no marks.

D. Common mistakes made in mathematics examinations

Degree of accuracy

- Some questions will specify the accuracy of rounding required; a common error is to ignore this instruction. You **must** follow these instructions or you will not be awarded full marks for the question.

- If a question does not specify a degree of rounding accuracy and the answer is not exact, you must round to three significant figures as per the instructions on the **front of the exam paper**. Failing to do this is another common rounding error.

Misinterpreting the question

- A common mistake for candidates is either that they do not read the question carefully or they misunderstand what is required.

For example: for part (a), the question asks the candidate to 'show that $x^2 + 8x - 48 = 0$' based on the information provided on the diagram and in the question text. Common errors for this type of question are candidates not taking note of all the available information, so they might write an expression for the perimeter (using the lengths given) because they missed that they are given the area in the question text and that this should also be used to form their equation.

Lack of knowledge

- If you don't know all of the syllabus content thoroughly, you are likely to miss out on marks.

- Make sure you know the correct mathematical terms, including the names and properties of different shapes, as this is often where candidate lose marks; although their response shows they understand what is required of the answer, without the accurate name they will not be awarded the mark.

For example:

- In part (a), a lack of knowledge might mean that candidates do not realise that they need to make an equation that links the algebra and the geometry given in the question.

- In the first part of (b), the candidate is expected to factorise the quadratic equation in order to find the solutions.

  - Common errors for this type of question include completely incorrect attempts such as collecting the x^2 term together with the x terms leading to a linear equation to solve.

  - Other mistakes might be where candidates attempt to factorise into a pair of brackets but they use the incorrect signs, so that when the brackets are expanded they would only get the x term correct or the constant term correct, e.g. $8x$ or -48, but not both. Common sign errors might include $(x - 12)(x + 4)$, $(x - 12)(x - 4)$ or $(x + 12)(x + 4)$.

  - Another common error would be to not understand how to get from the factorised expression to the solutions, and incorrectly giving $x = 12$ and $x = -4$ as the final answers.

- In the second part of (b), you are expected to use the context of the problem to determine which solution from (b)(i) to use; the length or width of a shape cannot be negative, so you can only use the value of 4 obtained in part (b)(i) to find the perimeter of the rectangle.

- Some candidates might incorrectly use –12.

- Other common errors might include errors in substitution, finding the area of the shape rather than the perimeter of the shape, or finding the length + width rather than the full perimeter of the shape.

Not checking answers

- Quite often the working shown indicates that the candidate understands the maths required but they make silly mistakes and errors that lead them to the incorrect answer. Always check your working and your answers.

For example:

- In a 'show that' question like part (a), candidates often make minor slips in their working, such as an error in multiplying out the brackets that leads to missed terms or incorrect terms; writing x rather than x^2 in one line of working; or missing out '= 55' or '= 0' at the end of a line of working. To be awarded full marks for a 'show that …' question there must be no errors, so it is important that you check your working carefully to avoid minor errors or omissions in any of the steps.

- In part (b)(ii), candidates might show the correct calculation for perimeter but make an error when working out the final answer.

General advice

In order to do your best when answering a question in a maths exam paper, make sure you:

- revise all of the topics for the syllabus you are studying (Core or Extended) before the exam and make sure you understand what all the relevant terms mean
- read the question carefully and make sure that you answer the question that is being asked
- leave time to look through the paper at the end to check that you have answered all questions
- show your working; this is particularly important for questions where you are asked to 'show that …'
- set your working out clearly so that it is easy to follow, this makes it easier to keep track of what you have done and makes checking back through your work easier; try to write it in a logical order in the answer space
- write your working and answers clearly; if you want to change an answer then you should cross the answer out and write the replacement above, trying to change numbers on the answer line can lead to unclear figures
- check your working and answers to avoid errors
- give your answer to the appropriate level of accuracy; either the accuracy indicated in the question or the accuracy given on the front of the paper
- avoid rounding values part way through your calculation; round when you get the answer, if appropriate
- check that the answer that you have given is sensible and realistic for what is being asked
- use a pencil when drawing diagrams or completing graphs; this means that you can change your answer more easily if you decide you have made a mistake
- take care when reading scales
- if you are asked for reasons for your answer then use the correct mathematical terms.

Section 6: Revision

It is important that you plan your revision in plenty of time for the examinations and that you develop a revision technique that works for you.

Planning your revision

A well-structured revision plan can give you the best chance of success in your examinations. As early as possible (at least six weeks before the examinations for each subject) identify the time you will spend revising and **schedule** slots for revision of this subject alongside your other subjects.

To create a revision schedule, you could use an overall planner for the weeks leading up to the examinations. You could then create weekly revision plans at the start of each week, which include the detail of which subjects you will revise and when. There are some example planners on the next page but there are lots of other ways you can do this. Planning takes time but will help you be more productive.

Use the following as a checklist to help you create your schedule.

- ☐ Write down the dates and times of each of the examinations you are taking, in a calendar, diary or planner.
- ☐ Work out how much time you have before each examination, so you can leave yourself plenty of time to revise each subject.

For each subject make sure you:

- ☐ know how long each examination paper is
- ☐ know what each examination paper is going to assess
- ☐ work out how much time you can spend on each topic so that you revise all topics.

It is important to have breaks in order to stay alert and productive, so make sure you:

- ☐ include one rest day per week, or break this up into shorter rest breaks across a week
- ☐ include at least two hours of rest before bed time; working too late is unlikely to be productive
- ☐ take regular breaks during revision; revising for hours without a break will overload you
- ☐ have short revision sessions and short breaks between each session
- ☐ know ways to relax during your breaks; for example, physical exercise can be good during breaks.

It is important to be flexible and realistic, so make sure you:

- ☐ include most days leading up to the exams **and** include any days or times when you are not able to revise (for example due to attending school, eating meals, participating in sports and hobbies)
- ☐ are honest with yourself about how much time you can really spend on each subject and topic
- ☐ don't get upset about plans that did not work – think of new plans that are easier to achieve.

It might help to:

- ☐ include a mixture of subjects each day
- ☐ break up the material in your subjects into manageable chunks.

- ☐ Plan to **return** to topics and **review** them; revisiting a topic means that you can check that you still remember the material and it should help you to recall more of the topic.

- ☐ Include doing past paper examinations in your plan.

Revision planners

There are many different planners, calendars and timetables you could use to plan your revision. The ones provided in this section are just examples. They range from an overview of all the weeks leading up to the first examination, to the detail of what you will be revising each day.

Use colour-coding for different subjects, time off, examinations and so on. Plan which subjects you are going to revise in which slots. You could then add more detail such as topics to be covered. The planner can be as detailed and large and colourful as you like. Remember to tick off sections as you complete them and to review your plans if needed.

Overview planner

In the example below, the first examination is on 1 June. Here, the box has just been highlighted but you should write down the paper number, the subject and the time of the examination. You would do this for **all the examinations** you have. This helps you to visualise how much time you have before each examination. You can use this to block out whole or half days when you can't revise. You can also include as much or as little detail about your daily or weekly revision plan as you like.

Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
17	18	19	20	21	22	23
24	25	26	27	28	29	30
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31	1	2	3	4

Weekly planner

This allows you to input greater detail about what you will revise each week. In the example below, each day is split into three.

	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
Morning							
Afternoon							
Evening							

In the example below, each day has been split into 1 hour slots so you can include even more detail.

	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
08:00 – 09:00							
09:00 – 10:00							
10:00 – 11:00							
11:00 – 12:00							
12:00 – 13:00							
13:00 – 14:00							
14:00 – 15:00							
15:00 – 16:00							
16:00 – 17:00							
17:00 – 18:00							
18:00 – 19:00							
19:00 – 20:00							
20:00 – 21:00							

General revision advice

Here are some useful tips to help you with your revision. Use this as a checklist.

- [ ] Make accurate notes during the course.
- [ ] Look at the revision checklists in this guide and be really clear what topics you need to know.
- [ ] Check that your notes are complete and make sense.

If you need to improve your notes, you could:

- [ ] ask your teacher for help, especially if you don't understand some of your notes
- [ ] ask a friend if you can copy missed work, but make sure you understand it
- [ ] find more information on topics using your teacher, textbook, the library or the internet; your teacher will have a full copy of the syllabus
- [ ] use different note-taking methods such as colour-coded notes, tables, spider-diagrams and mind maps; Venn diagrams can be very useful when you need to compare and contrast things
- [ ] Make lots of new notes: they don't have to be neat, you can use scrap paper or a digital notepad; remember that the process of writing and reviewing your notes helps you to remember information.
- [ ] Be organised: keep your notes, textbooks, exercise books and websites to hand.
- [ ] Find a revision method that works for you; this might be working alone, with friends, with parents, online, at school, at home or a mixture of many different methods.
- [ ] Have a clear revision plan, schedule or timetable for each subject you are studying.
- [ ] Vary your revision activities: your revision programme should do more than remind you what you can and cannot do – it should help you to improve.
- [ ] Use revision checklists to analyse how confident you feel in each topic.
- [ ] Try doing some past examination papers; use the mark schemes to assess yourself.
- [ ] Use plenty of pens, colours, paper and card of different sizes to make your notes more fun.

Test yourself in different ways, for example by:

- [ ] playing 'Teach the topic' (see page 41)
- [ ] using Question and Answer cards (see page 41)
- [ ] answering real exam questions (see page 42)
- [ ] Buy a good revision guide.

You might also find it helpful to:

- ☐ Target single issues such as correcting those little things you always get wrong, or reminding yourself about any facts/issues/skills that you have never been too sure of.
- ☐ Spend most of your time on specific skills, knowledge or issues that you have found more difficult when practising them, either during revision or earlier in the course during tests or mock exams.
- ☐ Spend some time focussing on your strengths as well, so that you can improve.

Top tips for revision of Cambridge IGCSE (9–1) Mathematics

1. Summarise, recall and apply

Make sure that you can **recall** and **apply** the key information and mathematical techniques on each topic that you need for the exam.

i) Write a summary of the key information of a topic.

ii) Collect together some questions that test the knowledge and skills of this topic. Ask your teacher for practice questions or suitable past examination questions, or use practice books or textbooks.

iii) Test your recall by covering over the summary and trying to remember the details, or use the summary as part of the 'Teach the topic' (Tip 3) or 'Question and answer cards' (Tip 4) activities.

iv) After you have spent some time revising and practising the knowledge and skills, answer the questions that you collected together on the topic. You might do this later on the same day as revising, or a few days later. Answer as many questions as you can in order to practise applying your knowledge.

v) Try creating your own questions by adapting existing ones and use these for practice when you return to a topic.

2. Mind maps

Mind maps are a great way to revise the links between different factors or to explore a larger topic. They can also be used to brainstorm your ideas.

i) Use a blank sheet of paper and turn it on its side (landscape).

ii) Put the topic title in the middle of the page and build the mind map outwards using lines called 'branches'.

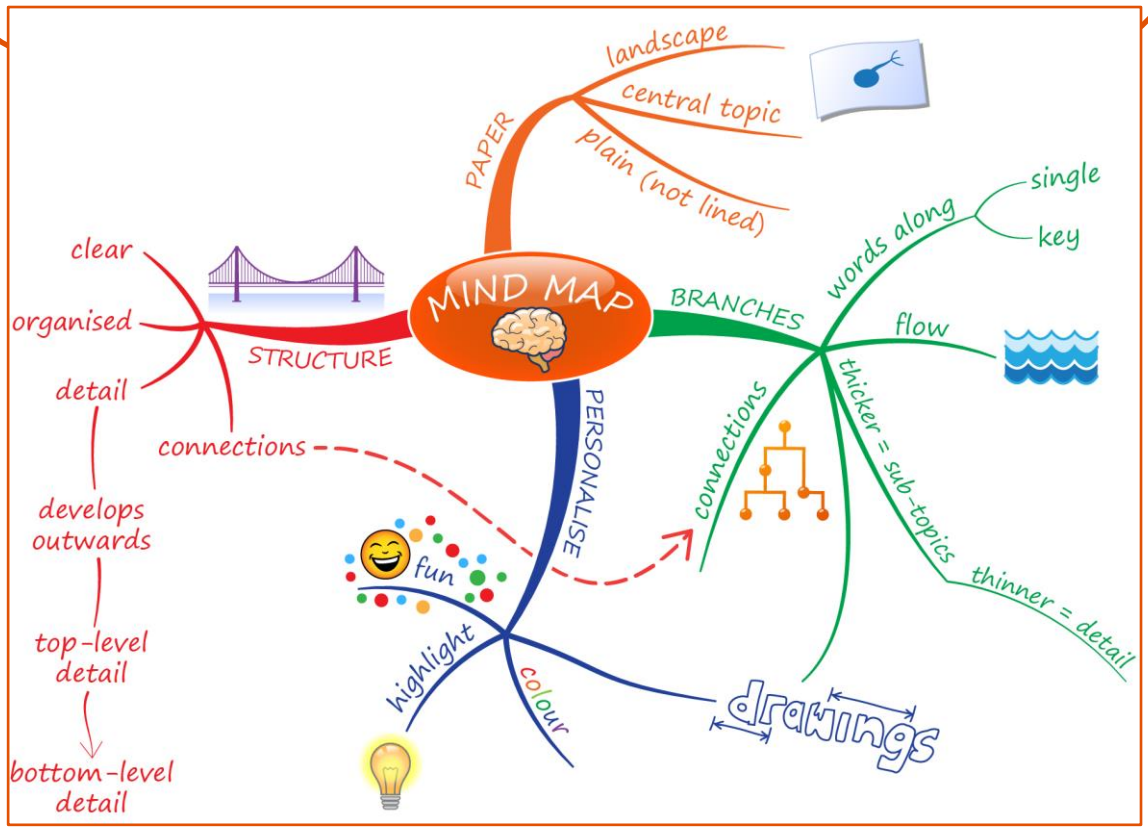
- The first branches are from the central topic to sub-topics; draw these as thick lines.
- Add new branches from the sub-topics to include more detail; draw these as thinner lines.
- Add even more detail to a point by adding more branches.

This creates a hierarchy of information from 'overview' (the thick branches) to 'fine detail' (thinnest branches).

iii) Write single key words or phrases along a branch and add drawings for visual impact.

iv) Use different colours, highlighter pens, symbols and arrows to highlight key facts or issues.

It is a good idea to use a large piece of plain A3 (or larger) paper and lots of coloured pens.



3. Teach the topic

This is a very simple but effective technique that focusses on knowledge recall. It tests the brain and rehearses the information you need to know for a certain topic and will help your revision.

i) Create some topic cards with key bullet points of information on. Leave space for ticks.

ii) Give these to your parents, family, friend or whoever you want.

iii) Give yourself 10 minutes maximum to teach your audience the main points of the topic. You could use a mini-whiteboard or flipchart to help.

iv) Your audience tick off all the points you mention in your presentation and give you a final score.

The brain loves competition, so if you do not score full marks, you can try again the next day, or compete against friends. This system of repeat and rehearsal is very effective, especially with more complex topics and doesn't take much preparation.

4. Question and answer (Q & A) cards

This is very similar to 'Teach the topic' but less formal and less public for those who dislike performing in front of others. It tests knowledge recall and rehearses the information you need to know for a certain topic.

i) Pick a topic and create two sets of cards: question cards and answer cards. You might find it helpful to make the question cards a different size or use different coloured card for answers.

ii) Make sure you have the topic, or something appropriate depending on what you are focussing on, as a heading on each card. The questions should test your knowledge and understanding of key areas of the course.

iii) A friend or family member uses the cards to test you in short 5 or 10 minute periods at any time during the day.

iv) You could also do this alone by reading the questions to yourself, giving the answer and then checking the correct answer card.

v) This game can be adapted by using the cards to find matching pairs: turn all cards face down across the space in front of you. Turn over two cards, leaving them where they are. If they match (one is a question card and the other is the corresponding answer card) pick up the pair and put them to one side. If they don't match, try to remember where they are and what is on each card, then turn them back over. Turn over two other cards. Continue until you have matched all pairs.

5. Question papers and mark schemes

Looking at past question papers and the mark scheme helps you to familiarise yourself with what to expect and what the standard is.

i) Ask your teacher for past paper questions with mark schemes for the course. Ask your teacher for help to make sure you are answering the correct questions and to simplify the mark scheme.

ii) Look at the revision checklist and identify which topic or unit a given question relates to; you might need to ask your teacher to help you do this.

iii) Once you have finished revising a topic or unit, time yourself answering some appropriate exam questions. Check the mark schemes to see how well you would have scored or give the answers to your teacher to check.

iv) Add details or notes to the mark scheme where you missed out on marks in your original answers using a different coloured pen. Use these notes when you revise and try the question again later.

You can find plenty of past exam papers (or specimen papers if past paper are not available) and mark schemes on the Cambridge website www.cie.org.uk/programmes-and-qualifications/cambridge-igcse-mathematics-9-1-england-0626/past-papers/

Don't forget …

… the advice given earlier in this Learner Guide about how to improve your learning approach, organisation skills and note-taking. Methods that you tried to help you learn during the course can also be applied to your revision.

For example, if you find the listening learning style useful, you could record yourself reading your revision notes out loud. You could read out particular topics that you find difficult, or specific information such as definitions, dates, facts or formulas. Play the recording back again and again. You can pause the recording and repeat certain parts, or try to guess what comes next. You could even make up songs, poems, phrases or rhymes and record these to help you remember.

Other useful revision advice for Cambridge IGCSE (9–1) Mathematics

- Before the exam, make sure that you are familiar with your calculator, and confident in using it.
- Ask your teacher for Example Candidate Responses from maths examinations (if available). Can you identify the strengths of the response and where they have made mistakes or lost marks?
- When you are attempting a past paper/specimen paper (or questions from a past paper/specimen paper), complete it **without** referring to your notes so that you get a true idea of your strengths and

weaknesses. Then, go back through the paper using your notes and a different coloured pen to make corrections and changes. After you have done as much as you can on the paper, mark it using the mark scheme. Take notes of any points that you lost marks on.

- Don't just revise the topics that you enjoy and are confident on. If you identify an area that you are weaker on then try to revisit the topic by reviewing your notes and doing some practice questions, then use exam questions to check whether you now understand.

- Return to topics later in your revision to check that you still remember and understand the topic, and to help to ensure that you recall more of the material when you get to the examination.

Test yourself

Before you start your revision, answer the questions below to see how well you understand how you will be assessed. You can check your answers in *Section 7: Answers*.

Don't forget to save this file for your records.

1. What are the two levels that Cambridge IGCSE (9–1) Mathematics (0626) can be taken at? (Tick the correct answer.)

   ☐ Foundation and Higher
   ☐ Standard and Additional
   ☐ Core and Extended
   ☐ Common and Extra

---

2. Which papers will a candidate taking the Extended examinations take? (Tick **all** of the correct answers.)

   ☐ Paper 1
   ☐ Paper 2
   ☐ Paper 3
   ☐ Paper 4
   ☐ Paper 5
   ☐ Paper 6

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3. What question types(s) are on each of the Cambridge IGCSE (9–1) Mathematics (0626) papers? (Add the correct letter to the table (A–D). You can type directly into the table if working electronically). **The same letter can be used more than once**.)

Paper	Question type
1	
2	
3	
4	
5	
6	

A multiple-choice questions

B short-answer questions only

C structured questions only

D short-answer and structured questions

4. Which of these are the assessment objectives for Cambridge IGCSE (9–1) Mathematics (0626)? (Tick **all** the correct answers.)

- ☐ AO1 Use mathematical techniques
- ☐ AO2 Problem questions
- ☐ AO2 Using a calculator efficiently
- ☐ AO1 Mental arithmetic
- ☐ AO2 Reason, interpret and communicate mathematically when solving problems

---

5. If you are not told the accuracy to use in the question, and the answer is not exact, …

a. … what accuracy should you give your answers to? (Tick the correct answer.)

nearest whole number
- ☐ 2 significant figures
- ☐ 3 significant figures
- ☐ 1 decimal place
- ☐ 2 decimal places
- ☐ 3 decimal places

b. … which of the following is correct for an answer in degrees? (Tick the correct answer.)

- ☐ 23°
- ☐ 23.1°
- ☐ 23.12°

---

6. Which of these is **not** one of the nine main topic areas that your paper is divided into? (Tick the correct answer.)

- ☐ Co-ordinate geometry
- ☐ Algebra and graphs
- ☐ Calculus
- ☐ Number
- ☐ Statistics
- ☐ Probability

---

7. Even if the final answer in a calculation is wrong you can still score marks if you have shown your working. (Tick the correct answer.)

☐ True ☐ False

Use the appropriate revision checklist on the following pages to help guide your revision.

Revision checklists for Cambridge IGCSE(9–1) Mathematics

The tables that follow provide an outline of the syllabus that can be used as a revision checklist. **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.

You can use the tick boxes in the checklists to show when you have revised a topic and are happy that you do not need to return to it. Tick the 'R', 'A', and 'G' column to record your progress. The 'R', 'A' and 'G' represent different levels of confidence, as follows:

- R = **RED:** means you are really unsure and lack confidence in a topic; you might want to focus your revision here and possibly talk to your teacher for help
- A = **AMBER:** means you are reasonably confident in a topic but need some extra practice
- G = **GREEN:** means you are very confident in a topic

As your revision progresses, you can concentrate on the **RED** and **AMBER** topics, in order to turn them into **GREEN** topics. You might find it helpful to highlight each topic in red, orange or green to help you prioritise.

You can use the 'Comments' column to:

- add more information about the details for each point
- include a reference to a useful resource
- add learning aids such as rhymes, poems or word play
- highlight areas of difficulty or things that you need to talk to your teacher about.

Click on the correct link to go directly to the appropriate checklist.

Core syllabus content

Core: Number

Sub-topic	You should be able to	R	A	G	Comments
Number	Identify and use: • natural numbers • integers (positive, negative and zero) • prime numbers • write a number as a product of its prime factors • square numbers • common factors and highest common factor (HCF) of two or more numbers • common multiples and lowest common multiple (LCM) of two or more numbers • rational numbers • irrational numbers (e.g. π, $\sqrt{2}$) • real numbers • reciprocals	☐	☐	☐	
Sets and Venn diagrams	Understand notation of Venn diagrams Definition of sets, e.g. • $A = \{x: x \text{ is a natural number}\}$ • $B = \{a, b, c, \ldots\}$ Notation, e.g. • number of elements in set A $n(A)$ • the universal set $\mathscr{E}$ • union of A and B $A \cup B$ • intersection of A and B $A \cap B$	☐	☐	☐	

Sub-topic	You should be able to	R	A	G	Comments
Squares, square roots, cubes and cube roots	Calculate with: • squares of numbers • square roots of numbers • cubes of numbers • cube roots of numbers • other powers of numbers • other roots of number e.g. evaluate expressions such as, $3^2 \times \sqrt[4]{16}$	☐	☐	☐	
Directed numbers	Use directed numbers in practical situations e.g. temperature changes, flood levels	☐	☐	☐	
Fractions, decimals and percentages	Use the language and notation of simple, vulgar and decimal fractions and percentages in appropriate contexts Recognise equivalent fractions, decimals and percentages Convert between fractions, decimals and percentages	☐	☐	☐	
Ordering	Order quantities by magnitude and demonstrate familiarity with the symbols =, $\neq$, >, <, $\geqslant$, $\leqslant$	☐	☐	☐	

Sub-topic	You should be able to	R	A	G	Comments
Indices and standard form (links to *Algebraic manipulation*)	Understand the meaning and rules of indices (fractional, negative and zero), e.g. $5^{\frac{1}{2}} = \sqrt{5}$	☐	☐	☐	
	Including evaluating indices such as, 5^{-2}, $100^{\frac{1}{2}}$, 7^0 and working out calculations such as $2^{-3} \times 2^4$, $(2^3)^2$ and $(2^{-3} \div 2^4)$	☐	☐	☐	
	Use the rules of indices for:				
	• multiplication (addition of indices), e.g. $4^3 \times 4^5$	☐	☐	☐	
	• division (subtraction of indices), e.g. $5^7 \div 5^3$	☐	☐	☐	
	• index numbers raised to an index, e.g. $(4^3)^2$	☐	☐	☐	
	Use the standard form $A \times 10^n$ where n is a positive or negative integer and $1 \leqslant A < 10$	☐	☐	☐	
	• convert numbers into and out of standard form	☐	☐	☐	
	• calculate with numbers in standard form	☐	☐	☐	
Four rules (+ ÷)	Use the four rules for calculations with:				
	• whole numbers	☐	☐	☐	
	• decimals	☐	☐	☐	
	• vulgar and mixed fractions	☐	☐	☐	
	• correct ordering of operations (BIDMAS / BODMAS) and use of brackets	☐	☐	☐	
Estimates	Make estimates of numbers, quantities and lengths	☐	☐	☐	
	Give approximations to a specified number of:				
	• significant figures	☐	☐	☐	
	• decimal places	☐	☐	☐	
	Round off answers to reasonable accuracy in the context of a given problem	☐	☐	☐	

Sub-topic	You should be able to	R	A	G	Comments
Bounds	Give upper and lower bounds for data given to a specified accuracy, e.g. measured lengths	☐	☐	☐	
Ratio, proportion, rate	Understand ratio and proportion	☐	☐	☐	
	Divide a quantity in a given ratio	☐	☐	☐	
	Understand direct and inverse proportion	☐	☐	☐	
	Solve numerical problems involving direct and inverse proportion	☐	☐	☐	
	Use ratios and scales in practical situations	☐	☐	☐	
	Calculate average speed	☐	☐	☐	
	Use other common measures of rate (*formulae for other rates will be given in the question, e.g. pressure and density*)	☐	☐	☐	
Percentages	Calculate a given percentage of a quantity	☐	☐	☐	
	Express one quantity as a percentage of another quantity	☐	☐	☐	
	Calculate percentage increase or decrease	☐	☐	☐	
Use of an electronic calculator	Use a calculator efficiently	☐	☐	☐	
	Check accuracy of calculations	☐	☐	☐	
Time	Calculate times in terms of the 24-hour and 12-hour clock	☐	☐	☐	
	Read:				
	• clocks	☐	☐	☐	
	• dials	☐	☐	☐	
	• timetables	☐	☐	☐	

Core: Number

Sub-topic	You should be able to	R	A	G	Comments
Money	Calculate using money	☐	☐	☐	
	Convert from one currency to another	☐	☐	☐	
Personal and household finance	Use given data to solve problems on personal and household finance:	☐	☐	☐	
	• earnings	☐	☐	☐	
	• simple interest	☐	☐	☐	
	• compound interest	☐	☐	☐	
	• discount	☐	☐	☐	
	• profit and loss	☐	☐	☐	
	Extract data from tables and charts	☐	☐	☐	

Core: Algebra and graphs

Sub-topic	You should be able to	R	A	G	Comments
Basic algebra	Use letters to express generalised numbers	☐	☐	☐	
	Express basic arithmetic processes algebraically	☐	☐	☐	
	Substitute numbers for words and letters in formulae	☐	☐	☐	
	Construct simple expressions and set up simple equations	☐	☐	☐	
	Transform simple formulae	☐	☐	☐	

Sub-topic	You should be able to	R	A	G	Comments
Algebraic manipulation	Manipulate directed numbers	☐	☐	☐	
	Use brackets:	☐	☐	☐	
	• expand a single bracket e.g. $3x(2x - 4y)$	☐	☐	☐	
	• expand a pair of brackets e.g. $(x - 4)(x - 7)$	☐	☐	☐	
	Extract common factors, e.g. factorise $9x^2 + 15xy$	☐	☐	☐	
	Factorise, where possible, expressions of the form:				
	• $x^2 + bx + c$	☐	☐	☐	
	• $x^2 - b^2$	☐	☐	☐	
Rules of indices	Use and interpret positive, negative and zero indices	☐	☐	☐	
	Use the rules of indices, e.g. to simplify algebra such as	☐	☐	☐	
	• $3x^4 \times 5x$	☐	☐	☐	
	• $10x^3 \div 2x^2$	☐	☐	☐	
	• $(x^6)^2$	☐	☐	☐	
Equations and inequalities	Derive and solve simple linear equations in one unknown	☐	☐	☐	
	Derive and solve simultaneous linear equations in two unknowns	☐	☐	☐	
	Derive and solve simple quadratic equations (of the form $x^2 + bx + c = 0$ and $x^2 - b^2 = 0$) by factorisation	☐	☐	☐	
	Derive and solve simple linear inequalities, e.g. $x + 2 \leqslant 5$, $-2 \leqslant 2x \leqslant 3$	☐	☐	☐	
	Including representing and interpreting inequalities on a number line, and interpretation of results	☐	☐	☐	

Sub-topic	You should be able to	R	A	G	Comments
Number sequences (links to *Squares, square roots, cubes and cube roots*)	Continue a given number sequence	☐	☐	☐	
	Recognise patterns in sequences, including the term-to-term rule	☐	☐	☐	
	Recognise sequences of square, cube and triangular numbers	☐	☐	☐	
	Recognise sequences of the powers of 2, 3, 4 and 5	☐	☐	☐	
	Recognise relationships between difference sequences	☐	☐	☐	
	Find and use the *n*th term of sequences for:				
	• linear sequences	☐	☐	☐	
	• simple quadratic sequences	☐	☐	☐	
	• cubic sequences	☐	☐	☐	
Practical graphs (links to *Co-ordinate geometry*)	Interpret and use graphs in practical situations including:	☐	☐	☐	
	• travel graphs	☐	☐	☐	
	• conversion graphs	☐	☐	☐	
	Interpret the gradient of a straight line graph as a rate of change	☐	☐	☐	
	Draw graphs from given data	☐	☐	☐	

Core: Algebra and graphs

Sub-topic	You should be able to	R	A	G	Comments
Graphs of functions (links to *Co-ordinate geometry*)	Construct tables of values for functions of the form (where a and b are integer constants): • $ax + b$ • $\pm x^2 + ax + b$ • $\frac{a}{x}$ $(x \neq 0)$	☐	☐	☐	
	Draw and interpret such graphs	☐	☐	☐	
	Solve linear and quadratic equations approximately, including finding and interpreting roots, by graphical methods	☐	☐	☐	
	Recognise, sketch and interpret graphs of functions (linear, quadratic, cubic and reciprocal)	☐	☐	☐	
Functions	Interpret simple expressions as functions with inputs and outputs	☐	☐	☐	
	Find simple inverse functions	☐	☐	☐	

Core: Geometry

Sub-topic	You should be able to	R	A	G	Comments
Geometrical language	Use and interpret the geometrical terms:				
	• point	☐	☐	☐	
	• line	☐	☐	☐	
	• parallel	☐	☐	☐	
	• perpendicular	☐	☐	☐	
	• bearing	☐	☐	☐	
	• right angle, acute, obtuse and reflex angles	☐	☐	☐	
	• similarity	☐	☐	☐	
	• congruence	☐	☐	☐	

Sub-topic	You should be able to	R	A	G	Comments
Geometrical language, *continued*	Use and interpret the vocabulary of: • triangles; right-angled, scalene, isosceles, equilateral • quadrilaterals • circles • polygons • simple solid figures including nets	☐ ☐ ☐ ☐ ☐	☐ ☐ ☐ ☐ ☐	☐ ☐ ☐ ☐ ☐	
Geometrical constructions	Measure lines and angles Construct a triangle given the three sides, using a ruler and a pair of compasses only Construct other simple geometrical figures from given data using a ruler and a protractor as necessary Construct, using a straight edge and a pair of compasses only: • angle bisectors • perpendicular bisectors Know that the perpendicular distance from a point to a line is the shortest distance to the line Construct the perpendicular line as described above	☐ ☐ ☐ ☐ ☐ ☐ ☐	☐ ☐ ☐ ☐ ☐ ☐ ☐	☐ ☐ ☐ ☐ ☐ ☐ ☐	
Scale drawings	Read and make scale drawings	☐	☐	☐	
Similarity	Calculate lengths of similar figures	☐	☐	☐	
Congruence	Recognise congruent shapes	☐	☐	☐	

Sub-topic	You should be able to	R	A	G	Comments
Symmetry	Recognise symmetry properties for triangles, quadrilaterals and circles	☐	☐	☐	
	Recognise line symmetry in two dimensions	☐	☐	☐	
	Recognise and find the order of rotational symmetry in two dimensions	☐	☐	☐	
Angle properties	Calculate unknown angles using the following geometrical properties (you **must** use the correct geometrical terminology when giving reasons for your answers):				
	• angles at a point	☐	☐	☐	
	• angles at a point on a straight line and intersecting straight lines	☐	☐	☐	
	• angles formed within parallel lines	☐	☐	☐	
	• angle properties of triangles	☐	☐	☐	
	• angle properties of quadrilaterals	☐	☐	☐	
	• angle properties of regular polygons	☐	☐	☐	
	• angle in a semi-circle	☐	☐	☐	
	• angle between tangent and radius of a circle	☐	☐	☐	
Loci	Use the following loci and the method of intersecting loci for sets of points in two dimensions which are:				
	• at a given distance from a given point	☐	☐	☐	
	• at a given distance from a given straight line	☐	☐	☐	
	• equidistant from two given points	☐	☐	☐	
	• equidistant from two given intersecting straight lines	☐	☐	☐	

Core: Mensuration

Sub-topic	You should be able to	R	A	G	Comments
Measures	In practical situations use current units of: • mass • length • area • volume • capacity	☐ ☐ ☐ ☐ ☐	☐ ☐ ☐ ☐ ☐	☐ ☐ ☐ ☐ ☐	
	Express quantities in terms of smaller or larger units, including units of area and volume	☐	☐	☐	
	Convert between units, including units of area and volume	☐	☐	☐	
Mensuration (links to *Geometrical constructions*)	Carry out calculations involving: • perimeter and area of a rectangle • perimeter and area of a triangle • perimeter and area of parallelogram • perimeter and area of a trapezium • perimeter and area of compound shapes made by combining rectangles, triangles, parallelograms and/or trapeziums	☐ ☐ ☐ ☐ ☐	☐ ☐ ☐ ☐ ☐	☐ ☐ ☐ ☐ ☐	
Circles	Carry out calculations involving circumference and area of a circle	☐	☐	☐	
	Solve simple problems involving the arc length and sector area as fractions of the circumference and area of a circle (the sector angle will be a factor of 360)	☐	☐	☐	
	Give answers in multiples of π	☐	☐	☐	

Sub-topic	You should be able to	R	A	G	Comments
3D shapes	Carry out calculations involving:				
	• volume of a cuboid, prism and cylinder	☐	☐	☐	
	• surface area of a cuboid and cylinder	☐	☐	☐	
	• volume of a sphere, pyramid and cone (formulae will be given in the question)	☐	☐	☐	
	• surface area of a sphere, pyramid and cone (formulae will be given in the question)	☐	☐	☐	
	• volume of a sphere, pyramid and cone (formulae will be given in the question)	☐	☐	☐	
	Give answers in multiples of π	☐	☐	☐	
Combining 3D shapes	Carry out calculations involving:				
	• area of a compound shape made by combining solids	☐	☐	☐	
	• volume of a compound shape made by combining solids	☐	☐	☐	
	Give answers in multiples of π	☐	☐	☐	

Core: Co-ordinate geometry

Sub-topic	You should be able to	R	A	G	Comments
Straight line graphs (links to *Practical graphs*)	Work with Cartesian co-ordinates in two dimensions	☐	☐	☐	
	Solve geometrical problems on co-ordinate axes	☐	☐	☐	
Gradient	Find the gradient of a straight line	☐	☐	☐	
	Calculate the gradient of a straight line from the co-ordinates of two points on it	☐	☐	☐	
Equation of a straight line	Interpret and obtain the equation of a straight line graph in the form $y = mx + c$	☐	☐	☐	
	Solve problems involving finding the equation where the graph is given	☐	☐	☐	
	Solve problems involving finding the equation when two co-ordinates are given with one being of the form $(0, c)$	☐	☐	☐	
Equation of a parallel line	Determine the equation of a straight line parallel to a given line e.g. find the equation of a line parallel to $y = 4x - 1$ that passes through $(0, -3)$	☐	☐	☐	

Core: Trigonometry

Sub-topic	You should be able to	R	A	G	Comments
Bearings	Use and interpret three-figure bearings measured clockwise from the North, i.e. 000°–360°	☐	☐	☐	
Trigonometry	Find unknown sides and/or angles in right-angled triangles by applying:				
	• Pythagoras' theorem	☐	☐	☐	
	• sine, cosine and tangent ratios for acute angles	☐	☐	☐	
	Give your answers in degrees to one decimal place when the answer is a decimal	☐	☐	☐	

Core: Matrices and transformations

Sub-topic	You should be able to	R	A	G	Comments
Vectors in two dimensions (links to *Trigonometry*)	Describe a translation by using a vector represented by, e.g. $\begin{pmatrix} x \\ y \end{pmatrix}$, $\overrightarrow{}$ or **a**	☐	☐	☐	
	Add and subtract vectors	☐	☐	☐	
	Multiply a vector by a scalar	☐	☐	☐	
Transformations	Reflect simple plane figures in horizontal or vertical lines	☐	☐	☐	
	Rotate simple plane figures through multiples of 90° about:				
	• the origin	☐	☐	☐	
	• their vertices	☐	☐	☐	
	• the midpoints of their sides	☐	☐	☐	
	Construct translations of simple plane figures	☐	☐	☐	
	Construct enlargements of simple plane figures (positive and fractional scale factors)	☐	☐	☐	
	Recognise and describe				
	• reflections	☐	☐	☐	
	• rotations	☐	☐	☐	
	• translations	☐	☐	☐	
	• enlargements (positive and fractional scale factors)	☐	☐	☐	

Core: Probability

Sub-topic	You should be able to	R	A	G	Comments
Calculate probability (links to *Four rules*)	Calculate the probability of a single event as a fraction, decimal or percentage Solve problems involving probability by extracting and using information from tables or graphs	☐ ☐	☐ ☐	☐ ☐	
Probability scale	Understand and use the probability scale from 0 to 1	☐	☐	☐	
Event probability	Understand that the probability of an event occurring = 1 – the probability of the event **not** occurring	☐	☐	☐	
Relative frequency	Understand relative frequency as an estimate of probability	☐	☐	☐	
Combined events	Calculate the probability of simple combined events using: • possibility diagrams • tree diagrams • Venn diagrams (limited to two sets)	 ☐ ☐ ☐	 ☐ ☐ ☐	 ☐ ☐ ☐	
Conditional probability	Calculate simple conditional probability using: • Venn diagrams • tree diagrams • tables	 ☐ ☐ ☐	 ☐ ☐ ☐	 ☐ ☐ ☐	

Core: Statistics

Sub-topic	You should be able to	R	A	G	Comments
Data collection	Collect, classify and tabulate statistical data	☐	☐	☐	
Data analysis	Read, interpret and draw simple inferences from tables and statistical diagrams	☐	☐	☐	
	Compare sets of data using:				
	• tables	☐	☐	☐	
	• graphs	☐	☐	☐	
	• statistical measures, e.g. mean, median, mode and range	☐	☐	☐	
	Understand limitations and restrictions when drawing conclusions from given data	☐	☐	☐	
Sampling	Understand and use sampling, including:	☐	☐	☐	
	• random sampling	☐	☐	☐	
	• systematic sampling	☐	☐	☐	
	Know the limitations of sampling	☐	☐	☐	
Data analysis diagrams	Construct and interpret:				
	• bar charts	☐	☐	☐	
	• pie charts	☐	☐	☐	
	• pictograms	☐	☐	☐	
	• stem and leaf diagrams	☐	☐	☐	
	• simple frequency distributions	☐	☐	☐	
	• histograms with equal intervals	☐	☐	☐	
	• scatter diagrams (with lines of best fit)	☐	☐	☐	

Core: Statistics

Sub-topic	You should be able to	R	A	G	Comments
Mean, median, mode and range	Calculate, for individual and discrete data • mean • median • mode • range and distinguish between the purpose for which they are used	☐	☐	☐	
Correlation	Understand what is meant by positive, negative and zero correlation with reference to a scatter diagram	☐	☐	☐	
Line of best fit	Draw, interpret and use a straight line of best fit by eye	☐	☐	☐	

Extended syllabus content (includes required Core content)

Extended: Number

Sub-topic	You should be able to	R	A	G	Comments
Number	Identify and use:				
	• natural numbers	☐	☐	☐	
	• integers (positive, negative and zero)	☐	☐	☐	
	• prime numbers	☐	☐	☐	
	• write a number as a product of its prime factors	☐	☐	☐	
	• square numbers	☐	☐	☐	
	• common factors and highest common factor (HCF) of two or more numbers	☐	☐	☐	
	• common multiples and lowest common multiple (LCM) of two or more numbers	☐	☐	☐	
	• rational numbers	☐	☐	☐	
	• irrational numbers (e.g. π, $\sqrt{2}$)	☐	☐	☐	
	• real numbers	☐	☐	☐	
	• reciprocals	☐	☐	☐	
Set notation and language	Use language, notation and Venn diagrams to describe sets and represent relationships between sets.	☐	☐	☐	
	Definition of sets, e.g.	☐	☐	☐	
	$A = \{x: x \text{ is a natural number}\}$	☐	☐	☐	
	$B = \{(x,y): y = mx + c\}$	☐	☐	☐	
	$C = \{x: a \leq x \leq b\}$	☐	☐	☐	
	$D = \{a, b, c, \ldots\}$	☐	☐	☐	

Sub-topic	You should be able to	R	A	G	Comments
Set notation and language, *continued*	Notation, e.g.	☐	☐	☐	
	number of elements in set A $n(A)$	☐	☐	☐	
	'is an element of' $\in$	☐	☐	☐	
	'is not an element of' $\notin$	☐	☐	☐	
	Complement of set A A'	☐	☐	☐	
	The empty set $\varnothing$	☐	☐	☐	
	The universal set $\mathscr{E}$	☐	☐	☐	
	A is a subset of B $A \subseteq B$	☐	☐	☐	
	A is a proper subset of B $A \subset B$	☐	☐	☐	
	A is not a subset of B $A \not\subseteq B$	☐	☐	☐	
	A is not a proper subset of B $A \not\subset B$	☐	☐	☐	
	Union of A and B $A \cup B$	☐	☐	☐	
	Intersection of A and B $A \cap B$	☐	☐	☐	
Squares, square roots, cubes and cube roots	Calculate with:				
	• squares of numbers	☐	☐	☐	
	• square roots of numbers	☐	☐	☐	
	• cubes of numbers	☐	☐	☐	
	• cube roots of numbers	☐	☐	☐	
	• other powers of numbers	☐	☐	☐	
	• other roots of numbers	☐	☐	☐	
	Evaluate expressions such as $3^2 \times \sqrt[4]{16}$	☐	☐	☐	

Sub-topic	You should be able to	R	A	G	Comments
Directed numbers	Use directed numbers in practical situations, e.g. temperature changes, flood levels	☐	☐	☐	
Fractions, decimals and percentages	Use the language and notation of simple, vulgar and decimal fractions and percentages in appropriate contexts	☐	☐	☐	
	Recognise equivalent fractions, decimals and percentages	☐	☐	☐	
	Convert between fractions, decimals and percentages	☐	☐	☐	
	Convert recurring decimals (e.g. $0.\dot{7}$) to fractions	☐	☐	☐	
Ordering	Order quantities by magnitude and demonstrate familiarity with the symbols $=, \neq, >, <, \geqslant, \leqslant$	☐	☐	☐	
Indices and standard form (links to *Algebraic manipulation*)	Understand the meaning and rules of indices (fractional, negative and zero), e.g. $5^{\frac{1}{2}} = \sqrt{5}$	☐	☐	☐	
	Including evaluating indices such as, 5^{-2}, $100^{\frac{1}{2}}$, $8^{-\frac{2}{3}}$ and working out calculations such as $2^{-3} \times 2^4$, $(2^3)^2$ and $(2^{-3} \div 2^4)$	☐	☐	☐	
	Use the rules of indices for:				
	• multiplication (addition of indices), e.g. $4^3 \times 4^5$	☐	☐	☐	
	• division (subtraction of indices), e.g. $5^7 \div 5^3$	☐	☐	☐	
	• index numbers raised to an index, e.g. $(4^3)^2$	☐	☐	☐	
	Use the standard form $A \times 10^n$ where n is a positive or negative integer and $1 \leqslant A < 10$	☐	☐	☐	
	• convert numbers into and out of standard form	☐	☐	☐	
	• calculate with numbers in standard form	☐	☐	☐	

Sub-topic	You should be able to	R	A	G	Comments
Four rules (+, −, ×, ÷)	Use the four rules for calculations (for positive and negative integers) with: • whole numbers • decimals • vulgar and mixed fractions • correct ordering of operations (BIDMAS / BODMAS) and use of brackets	☐ ☐ ☐ ☐	☐ ☐ ☐ ☐	☐ ☐ ☐ ☐	
Estimates	Make estimates of numbers, quantities and lengths Give approximations to a specified number of: • significant figures • decimal places Round off answers to reasonable accuracy in the context of a given problem Estimate powers and roots of any given positive number	☐ ☐ ☐ ☐ ☐	☐ ☐ ☐ ☐ ☐	☐ ☐ ☐ ☐ ☐	
Bounds	Give upper and lower bounds for data given to a specified accuracy, e.g. measured lengths Obtain appropriate upper and lower bounds to solutions of simple problems given data to a specified accuracy, e.g. calculate the lower and upper bounds for the area and perimeter of a rectangle	☐ ☐	☐ ☐	☐ ☐	

Sub-topic	You should be able to	R	A	G	Comments
Ratio, proportion, rate (links to *Direct and inverse proportion*)	Understand ratio	☐	☐	☐	
	Divide quantities in a given ratio	☐	☐	☐	
	Increase and decrease a quantity by a given ratio	☐	☐	☐	
	Understand direct and inverse proportion	☐	☐	☐	
	Solve numerical problems involving direct and inverse proportion	☐	☐	☐	
	Use ratio and scales in practical situations	☐	☐	☐	
	Calculate average speed	☐	☐	☐	
	Use other common measures of rate (*formulae for other rates will be given in the question, e.g. pressure and density*)	☐	☐	☐	
Percentages	Calculate a given percentage of a quantity	☐	☐	☐	
	Express one quantity as a percentage of another quantity	☐	☐	☐	
	Calculate percentage increase or decrease	☐	☐	☐	
	Calculate reverse percentages, e.g. finding the cost price given the selling price and the percentage profit	☐	☐	☐	
Use of an electronic calculator	Use a calculator efficiently	☐	☐	☐	
	Check accuracy of calculations	☐	☐	☐	
Time	Calculate times in terms of the 24-hour and 12-hour clock	☐	☐	☐	
	Read clocks, dials and timetables	☐	☐	☐	

Sub-topic	You should be able to	R	A	G	Comments
Money	Calculate using money	☐	☐	☐	
	Convert from one currency to another	☐	☐	☐	
Personal and household finance	Use given data to solve problems on personal and household finance such as:	☐	☐	☐	
	• earnings	☐	☐	☐	
	• simple interest	☐	☐	☐	
	• compound interest	☐	☐	☐	
	• discount	☐	☐	☐	
	• profit and loss	☐	☐	☐	
	Extract data from tables and charts	☐	☐	☐	
Exponential growth and decay	Use exponential growth and decay in relation to population and finance, e.g. depreciation, bacteria growth	☐	☐	☐	
Surds	Calculate with surds	☐	☐	☐	
	Simplify expressions written in terms of surds	☐	☐	☐	
	Rationalise the denominator	☐	☐	☐	

Extended: Algebra and graphs

Sub-topic	You should be able to	R	A	G	Comments
Basic algebra	Use letters to express generalised numbers	☐	☐	☐	
	Express basic arithmetic processes algebraically	☐	☐	☐	
	Substitute numbers for words and letters in complicated formulae	☐	☐	☐	
	Construct complicated formulae and equations	☐	☐	☐	
	Transform complicated equations and formulae, e.g. formulae where the subject appears twice	☐	☐	☐	
Algebraic manipulation	Manipulate directed numbers	☐	☐	☐	
	Use brackets:	☐	☐	☐	
	• expand a single bracket, e.g. $3x(2x - 4y)$	☐	☐	☐	
	• expand a pair of brackets, e.g. $(x - 4)(x - 7)$	☐	☐	☐	
	• expand multiple brackets, e.g. $(x + 4)(x - 7)(x + 2)$	☐	☐	☐	
	Extract common factors, e.g. factorise $9x^2 + 15xy$	☐	☐	☐	
	Expand products of algebraic expressions	☐	☐	☐	
	Factorise, where possible, expressions of the form:				
	• $ax + bx + kay + kby$	☐	☐	☐	
	• $a^2x^2 - b^2y^2$	☐	☐	☐	
	• $a^2 + 2ab + b^2$	☐	☐	☐	
	• $ax^2 + bx + c$	☐	☐	☐	

Sub-topic	You should be able to	R	A	G	Comments
Algebraic fractions	Manipulate algebraic fractions, e.g.	☐	☐	☐	
	• $\frac{x}{3}+\frac{x-4}{2}$	☐	☐	☐	
	• $\frac{2x}{3}-\frac{3(x-5)}{2}$	☐	☐	☐	
	• $\frac{3a}{4}\times\frac{9a}{10}$	☐	☐	☐	
	• $\frac{3a}{4}\div\frac{9a}{10}$	☐	☐	☐	
	• $\frac{1}{x-2}+\frac{2}{x-3}$	☐	☐	☐	
	Factorise and simplify rational expressions (algebraic fractions) such as $\frac{x^2-2x}{x^2-5x+6}$	☐	☐	☐	
Rules of indices	Use and interpret positive, negative and zero indices	☐	☐	☐	
	Use and interpret fractional indices, e.g. solve $32^x = 2$	☐	☐	☐	
	Use the rules of indices, e.g. to simplify:	☐	☐	☐	
	• $3x^{-4}\times\frac{2}{3}x^{\frac{1}{2}}$	☐	☐	☐	
	• $\frac{2}{5}x^{\frac{1}{2}}\div 2x^{-2}$	☐	☐	☐	
	• $\left(\frac{2x^5}{3}\right)^3$	☐	☐	☐	

Sub-topic	You should be able to	R	A	G	Comments
Equations and inequalities	Derive and solve simple linear equations in one unknown	☐	☐	☐	
	Derive and solve simultaneous linear equations in two unknowns	☐	☐	☐	
	Derive and solve quadratic equations by:				
	• factorisation	☐	☐	☐	
	• completing the square	☐	☐	☐	
	• using the quadratic formula	☐	☐	☐	
	Derive and solve simultaneous equations where one is linear and one is quadratic, including the intersection of a line and a circle	☐	☐	☐	
	Derive and solve simple linear inequalities	☐	☐	☐	
	Represent inequalities on a number line	☐	☐	☐	
	Interpret inequalities shown on a number line, and interpreting results	☐	☐	☐	
Linear programming	Represent inequalities graphically, including using the conventions of	☐	☐	☐	
	• broken lines for strict inequalities	☐	☐	☐	
	• shading unwanted regions	☐	☐	☐	
	Solve simple linear programming problems using graphical representations of inequalities	☐	☐	☐	

Sub-topic	You should be able to	R	A	G	Comments
Number sequences (links to *Squares, square roots, cubes and cube roots*)	Continue a given number sequence	☐	☐	☐	
	Recognise patterns in sequences, including the term-to-term rule	☐	☐	☐	
	Recognise relationships between difference sequences	☐	☐	☐	
	Find the *n*th term of sequences for:				
	• linear sequences	☐	☐	☐	
	• quadratic sequences	☐	☐	☐	
	• cubic sequences	☐	☐	☐	
	• exponential sequences	☐	☐	☐	
	• simple combinations of the above sequences	☐	☐	☐	
	Find and use the *n*th term of for sequences that are a simple combination of the sequences listed above	☐	☐	☐	
	Recognise and understand subscript notation	☐	☐	☐	
Direct and inverse proportion (links to *Ratio, proportion, rate*)	Express direct proportion algebraically	☐	☐	☐	
	Express inverse proportion algebraically	☐	☐	☐	
	Use algebraic expressions of direct and inverse proportion to find unknown quantities	☐	☐	☐	
	Interpret graphs that represent direct and inverse proportion	☐	☐	☐	

Extended: Algebra and graphs

Sub-topic	You should be able to	R	A	G	Comments
Practical graphs (links to *Co-ordinate geometry*)	Interpret and use graphs in practical situations including:	☐	☐	☐	
	• travel graphs	☐	☐	☐	
	• conversion graphs	☐	☐	☐	
	Draw graphs from given data	☐	☐	☐	
	Apply the idea of rate of change to:				
	• distance–time graphs	☐	☐	☐	
	• speed–time graphs	☐	☐	☐	
	• acceleration and deceleration	☐	☐	☐	
	Estimation and interpretation of the gradient of a tangent at a point	☐	☐	☐	
	Calculate distance travelled as area under a linear speed–time graph	☐	☐	☐	
	Estimate distance travelled by estimating area under a non-linear speed–time graph	☐	☐	☐	

Sub-topic	You should be able to	R	A	G	Comments
Graphs of functions (links to *Co-ordinate geometry*)	Construct tables of values and draw graphs for functions of the form:				
	• ax^n where a is a rational constant and $n = -2, -1, 0, 1, 2, 3$ and simple sums of not more than three of these	☐	☐	☐	
	• a^x where a is a positive integer	☐	☐	☐	
	Solve associated equations approximately, including finding and interpreting roots, by graphical methods	☐	☐	☐	
	Draw and interpret graphs representing exponential growth and decay problems	☐	☐	☐	
	Recognise, sketch and interpret graphs of functions which are:				
	• linear	☐	☐	☐	
	• quadratic	☐	☐	☐	
	• cubic	☐	☐	☐	
	• reciprocal	☐	☐	☐	
	• exponential	☐	☐	☐	
	• trigonometric	☐	☐	☐	
	Find turning points of quadratics by completing the square	☐	☐	☐	
	Know about turning points and asymptotes	☐	☐	☐	
Gradients of curves	Estimate gradients of curves by drawing tangents	☐	☐	☐	

Sub-topic	You should be able to	R	A	G	Comments
Function notation	Interpret expressions as functions with inputs and outputs	☐	☐	☐	
	Use function notation, e.g. f(x) = 3x – 5, $f: x \mapsto 3x-5$ to describe simple functions	☐	☐	☐	
	Find inverse functions $f^{-1}(x)$	☐	☐	☐	
	Form composite functions as defined by gf(x) = g(f(x))	☐	☐	☐	
Iterations	Use iterations to find approximate solutions	☐	☐	☐	
	Understand subscript notation	☐	☐	☐	
Differentiation (links to *Equations and inequalities*, *Graphs of functions*)	Understand what is meant by a derived function	☐	☐	☐	
	Use the derivatives of functions of the form ax^n (where a is a rational constant and n = 0,1,2,3,4) and simple sums of not more than three of these	☐	☐	☐	
	Apply differentiation to gradients and turning points (stationary points)	☐	☐	☐	
	Determine whether a point is a maximum or minimum by any method	☐	☐	☐	

Extended: Geometry

Sub-topic	You should be able to	R	A	G	Comments
Geometrical language	Use and interpret the geometrical terms: • point • line • parallel • perpendicular • bearing • right angle, acute, obtuse and reflex angles • similarity • congruence Use and interpret the vocabulary of: • triangles – right-angled, scalene, isosceles, equilateral • quadrilaterals • circles • polygons • simple solid figures including nets	☐	☐	☐	
Geometrical constructions	Measure lines and angles Construct a triangle given three sides using a ruler and a pair of compasses only Construct other simple geometrical figures from given data using a ruler and protractor as necessary Construct, using a straight edge and a pair of compasses only: • angle bisectors • perpendicular bisectors	☐	☐	☐	

Sub-topic	You should be able to	R	A	G	Comments
Geometrical constructions, *continued*	Know that the perpendicular distance from a point to a line is the shortest distance to the line	☐	☐	☐	
	Construct the perpendicular line as described above	☐	☐	☐	
Scale drawings	Read and make scale drawings	☐	☐	☐	
Similarity	Calculate lengths of similar figures	☐	☐	☐	
	Use relationships between areas of similar triangles and in similar figures	☐	☐	☐	
	Use relationships between volumes and surface areas of similar solids	☐	☐	☐	
Congruence	Use the basic congruence criteria for triangles (SSS, ASA, SAS, RHS)	☐	☐	☐	
Symmetry	Recognise symmetry properties for triangles, quadrilaterals and circles	☐	☐	☐	
	Recognise line symmetry in two dimensions	☐	☐	☐	
	Recognise and find the order of rotational symmetry in two dimensions	☐	☐	☐	
	Recognise and use symmetry properties of:				
	• prism	☐	☐	☐	
	– including the cylinder	☐	☐	☐	
	• pyramid	☐	☐	☐	
	– including the cone	☐	☐	☐	

Sub-topic	You should be able to	R	A	G	Comments
Symmetry, *continued*	Use the following symmetry properties of circles: • equal chords are equidistant from the centre • perpendicular bisector of a chord passes through the centre • tangents from an external point are equal in length	☐ ☐ ☐	☐ ☐ ☐	☐ ☐ ☐	
Angle properties	Calculate unknown angles using the following geometrical properties (you **must** use the correct geometrical terminology when giving reasons for your answers): • angles at a point • angles at a point on a straight line and intersecting straight lines • angles formed within parallel lines • angle properties of triangles and quadrilaterals • angle properties of regular polygons • angle in a semi-circle • angle between tangent and radius of a circle • angles properties of irregular polygons • angle at the centre of a circle is twice the angle at the circumference • angles in the same segment are equal • angles in opposite segments are supplementary • angles in cyclic quadrilaterals • alternate segment theorem	☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐	☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐	☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐	

Sub-topic	You should be able to	R	A	G	Comments
Loci	Use the following loci and the method of intersecting loci for sets of points in two dimensions which are: • at a given distance from a point • at a given distance from a straight line • equidistant from two points • equidistant from two intersecting straight lines	☐	☐	☐	

Extended: Mensuration

Sub-topic	You should be able to	R	A	G	Comments
3D shapes	Carry out calculations involving: • volume of a cuboid, prism and cylinder • surface area of a cuboid and cylinder Carry out calculations involving *(Formulae will be given in the question for the surface area and volume of the sphere, pyramid and cone)*: • surface area and volume of a sphere • surface area and volume of a pyramid • surface area and volume of a cone Give answers in multiples of π.	☐ ☐ ☐ ☐ ☐ ☐	☐ ☐ ☐ ☐ ☐ ☐	☐ ☐ ☐ ☐ ☐ ☐	
Combining 3D shapes	Carry out calculations involving: • area of a compound shape made by combining cuboids, prisms and/or cylinders • volume of a compound shape made by combining cuboids, prisms and/or cylinders Give answers in multiples of π.	☐ ☐ ☐	☐ ☐ ☐	☐ ☐ ☐	

Extended: Mensuration

Sub-topic	You should be able to	R	A	G	Comments
Measures	In practical situations use current units of:				
	• mass	☐	☐	☐	
	• length	☐	☐	☐	
	• area	☐	☐	☐	
	• volume	☐	☐	☐	
	• capacity	☐	☐	☐	
	Express quantities in terms of smaller or larger units, including units of area and volume	☐	☐	☐	
	Convert between units, including units of area and volume	☐	☐	☐	
Mensuration (links to *Geometrical constructions*)	Carry out calculations involving:				
	• perimeter and area of a rectangle	☐	☐	☐	
	• perimeter and area of a triangle	☐	☐	☐	
	• perimeter and area of parallelogram	☐	☐	☐	
	• perimeter and area of a trapezium	☐	☐	☐	
	• perimeter and area of compound shapes made by combining rectangles, triangles, parallelograms and/or trapeziums	☐	☐	☐	
Circles	Carry out calculations involving circumference and area of a circle	☐	☐	☐	
	Solve problems involving arc length and sector area of a circle as fractions of the circumference and area of a circle	☐	☐	☐	
	Give answers in multiples of π.	☐	☐	☐	

Extended: Co-ordinate geometry

Sub-topic	You should be able to	R	A	G	Comments
Co-ordinates (links to *Practical graphs*)	Work with Cartesian co-ordinates in two dimensions Solve geometrical problems on the co-ordinate axes	☐ ☐	☐ ☐	☐ ☐	
Straight lines	Find the gradient of a straight line graph Calculate the gradient of a straight line from the co-ordinates of two points on it	☐ ☐	☐ ☐	☐ ☐	
Length and midpoint	Calculate the length and the co-ordinates of the midpoint of a straight line from the co-ordinates of its end points	☐	☐	☐	
Equation of a straight line	Interpret and obtain the equation of a straight line graph	☐	☐	☐	
Equation of a parallel line	Determine the equation of a straight line parallel to a given line, e.g. find the equation of a line parallel to $y = 4x - 1$ that passes through (0, –3)	☐	☐	☐	
Gradients of related lines	Find the gradient of parallel and perpendicular lines, e.g. • find the gradient of a line perpendicular to $y = 3x + 1$ • find the equation of a line perpendicular to one passing through the co-ordinates (1, 3) and (–2, –9).	☐ ☐ ☐	☐ ☐ ☐	☐ ☐ ☐	
Equation of a circle	Recognise and use the equation of a circle, centred at the origin	☐	☐	☐	
Equation of tangent	Find the equation of the tangent to a circle at a given point, using the fact that the tangent is perpendicular to the radius	☐	☐	☐	

Extended: Trigonometry

Sub-topic	You should be able to	R	A	G	Comments
Bearings	Use and interpret three-figure bearings measured clockwise from the North, i.e. 000°–360°	☐	☐	☐	
Trigonometry	Find unknown sides and/or angles in right-angled triangles by applying:				
	• Pythagoras' theorem	☐	☐	☐	
	• sine, cosine and tangent ratios for acute angles	☐	☐	☐	
	Solve trigonometric problems in two dimensions involving angles of elevation and depression	☐	☐	☐	
	Extend sine and cosine values to angles between 90º and 180º	☐	☐	☐	
	Give your answers in degrees to one decimal place when the answer is a decimal	☐	☐	☐	
Trigonometric functions	Know the exact values for the sine and cosine ratios of 0°, 30°, 45°, 60° and 90°	☐	☐	☐	
	Know the exact values for the tangent ratios of 0°, 30°, 45° and 60°	☐	☐	☐	
	Extend sine and cosine and tangent values to angles between 90° and 360°	☐	☐	☐	
	Graph and know the properties of trigonometric functions	☐	☐	☐	
	Solve simple trigonometric equations e.g. $\sin x = \frac{\sqrt{3}}{2}$ for values between 0° and 360°	☐	☐	☐	

Extended: Trigonometry

Sub-topic	You should be able to	R	A	G	Comments
Trigonometric formulae	Solve problems using the sine and cosine rules for any triangle	☐	☐	☐	
	Find the area of any triangle using the formula: area of a triangle $= \frac{1}{2}ab\sin C$	☐	☐	☐	
Application to 3D	Solve simple trigonometric problems in three dimensions including angle between a line and a plane	☐	☐	☐	

Extended: Matrices and transformations

Sub-topic	You should be able to	R	A	G	Comments
Vectors in two dimensions (links to *Trigonometry*)	Describe a translation by using a vector represented by, e.g. $\begin{pmatrix} x \\ y \end{pmatrix}$, $\longrightarrow$ or **a**	☐	☐	☐	
	Add and subtract vectors	☐	☐	☐	
	Multiply a vector by a scalar	☐	☐	☐	
Transformations	Reflect simple plane figures	☐	☐	☐	
	Rotate simple plane figures through multiples of 90° about: • the origin	☐	☐	☐	
	• their vertices	☐	☐	☐	
	• the midpoints of their sides	☐	☐	☐	
	Construct given translations of simple plane figures	☐	☐	☐	

Extended: Matrices and transformations

Sub-topic	You should be able to	R	A	G	Comments
Transformations, *continued*	Construct enlargements of simple plane figures (positive, fractional and negative scale factors)	☐	☐	☐	
	Recognise and describe:				
	• reflections	☐	☐	☐	
	• rotations	☐	☐	☐	
	• translations	☐	☐	☐	
	• enlargements (positive, fractional and negative scale factors)	☐	☐	☐	
Combining vectors	Calculate the magnitude of a vector $\begin{pmatrix} x \\ y \end{pmatrix}$ as $\sqrt{x^2+y^2}$ (using Pythagoras' theorem)	☐	☐	☐	
	Understand that magnitude is denoted by modulus signs, e.g. $\lvert\overrightarrow{\ }\rvert$ or $\lvert\mathbf{a}\rvert$	☐	☐	☐	
	Represent vectors by directed line segments	☐	☐	☐	
	Use the sum and difference of two vectors to express given vectors in terms of two coplanar vectors	☐	☐	☐	
	Use position vectors	☐	☐	☐	
	Use vectors to construct geometric arguments	☐	☐	☐	
	In your answers, remember to indicate a vector in some definite way, e.g. with an arrow ($\overrightarrow{\ }$), or underling ($\underline{a}$)	☐	☐	☐	

Extended: Matrices and transformations

Sub-topic	You should be able to	R	A	G	Comments
Matrices	Display information in a matrix of any order	☐	☐	☐	
	Calculate the sum and product (where possible) of two matrices	☐	☐	☐	
	Multiply a matrix by a scalar quantity and calculate the product	☐	☐	☐	
	Use the algebra of 2×2 matrices including the:	☐	☐	☐	
	• zero matrix	☐	☐	☐	
	• identity matrix	☐	☐	☐	
	Calculate the:				
	• determinant, $\lvert\mathbf{A}\rvert$, of a matrix	☐	☐	☐	
	• inverse, $\mathbf{A}^{-1}$ of a non-singular matrix $\mathbf{A}$	☐	☐	☐	
Transformation matrices	Use the following transformations of the plane:				
	• reflection (M)	☐	☐	☐	
	• rotation (R)	☐	☐	☐	
	• translation (T)	☐	☐	☐	
	• enlargement (E)	☐	☐	☐	
	• combinations of the above transformations	☐	☐	☐	
	Identify and give precise descriptions of transformations connecting given figures	☐	☐	☐	
	Describe transformations using:				
	• co-ordinates	☐	☐	☐	
	• matrices (**not** singular matrices)	☐	☐	☐	

Extended: Probability

Sub-topic	You should be able to	R	A	G	Comments
Probability (links to *Four rules*)	Calculate the probability of a single event as a fraction, decimal or percentage Solve problems involving probability by extracting and using information from tables or graphs	☐ ☐	☐ ☐	☐ ☐	
Probability scale	Understand and use the probability scale from 0 to 1	☐	☐	☐	
Event probability	Understand that the probability of an event occurring = 1 – the probability of the event **not** occurring	☐	☐	☐	
Relative frequency	Understand relative frequency as an estimate of probability	☐	☐	☐	
Combined events	Calculate the probability of simple combined events using: • possibility diagrams • tree diagrams • Venn diagrams	 ☐ ☐ ☐	 ☐ ☐ ☐	 ☐ ☐ ☐	
Conditional probability	Calculate conditional probability using: • Venn diagrams • tree diagrams • tables	 ☐ ☐ ☐	 ☐ ☐ ☐	 ☐ ☐ ☐	

Extended: Statistics

Sub-topic	You should be able to	R	A	G	Comments
Data collection	Collect, classify and tabulate statistical data	☐	☐	☐	
Data analysis	Read, interpret and draw inferences from tables and statistical diagrams	☐	☐	☐	
	Compare sets of data using:				
	• tables	☐	☐	☐	
	• graphs	☐	☐	☐	
	• statistical measures, e.g. mean, median, mode and range	☐	☐	☐	
	Understand limitations when drawing conclusions from data	☐	☐	☐	
Sampling	Understand and use sampling, including:				
	• random sampling	☐	☐	☐	
	• stratified sampling	☐	☐	☐	
	• systematic sampling	☐	☐	☐	
	Know the limitations of sampling	☐	☐	☐	
Data analysis diagrams	Construct and interpret:				
	• bar charts	☐	☐	☐	
	• pie charts	☐	☐	☐	
	• pictograms	☐	☐	☐	
	• stem and leaf diagrams	☐	☐	☐	
	• simple frequency distributions	☐	☐	☐	
	• histograms with equal intervals	☐	☐	☐	
	• histograms with unequal intervals (areas are proportional to frequencies and vertical axis is frequency density)	☐	☐	☐	
	• scatter diagrams (with lines of best fit)	☐	☐	☐	

Extended: Statistics

Sub-topic	You should be able to	R	A	G	Comments
Mean, median, mode and range	Calculate, for individual and discrete data • mean • median • mode • range and distinguish between the purposes for which they are used	☐ ☐ ☐ ☐ ☐	☐ ☐ ☐ ☐ ☐	☐ ☐ ☐ ☐ ☐	
Grouped and continuous data	Calculate an estimate of the mean for grouped and continuous data Identify the modal class from a grouped frequency distribution	☐ ☐	☐ ☐	☐ ☐	
Cumulative frequency diagrams	Construct and use cumulative frequency diagrams Estimate and interpret from a cumulative frequency diagram: • the median • percentiles • quartiles • inter-quartile range Construct and interpret boxplots	☐ ☐ ☐ ☐ ☐ ☐	☐ ☐ ☐ ☐ ☐ ☐	☐ ☐ ☐ ☐ ☐ ☐	
Correlation	Understand what is meant by positive, negative and zero correlation with reference to a scatter diagram	☐	☐	☐	
Line of best fit	Draw, interpret and use lines of best fit by eye	☐	☐	☐	

Section 7: Answers

Section 3: How you will be assessed

Where appropriate, answers are in **bold**.

1. Three
2. Papers 1, 3 and 5

You will be assessed at the end of the course using three components:

Core course – Paper 1, Paper 3 and Paper 5
Extended course – Paper 2, Paper 4 and Paper 6

3. False

Learners taking the **Extended** course need to know all of the Core course 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.

4.

Component	How long	How many marks
C	2 hours	96 marks
A	1 hour	60 marks
B	1 hour 30 minutes	84 marks

5. False

You can use an electronic calculator **only** in **Papers 1, 2, 5** and **6**. You are **not** allowed algebraic or graphical calculators. **Ask your teacher to recommend a calculator.**

Section 6: Revision

1. Core and Extended

The Cambridge IGCSE (9–1) Mathematics (0626) syllabus is split into a Core course and an Extended course. Your teacher will advise you which course is best for you, depending on your progress and strengths.

2. Paper 2, Paper 4 and Paper 6

You will be assessed at the end of the course using three components:

Core course – Paper 1, Paper 3 and Paper 5
Extended course – Paper 2, Paper 4 and Paper 6

3.

Paper	Question type
1	**D**
2	**D**
3	**D**
4	**D**
5	**C**
6	**C**

A multiple-choice questions

B short-answer questions only

C structured questions only

D short-answer and structured questions

If you are unsure about the difference between short-answer questions and structured questions, talk to your teacher.

4. AO1 Use mathematical techniques

AO2 Reason, interpret and communicate mathematically when solving problems

There are two assessment objectives for Cambridge IGCSE (9–1) Mathematics (0626):

AO1 Use mathematical techniques: this is all about demonstrating that you can accurately use mathematical techniques.

AO2 Reason, interpret and communicate mathematically when solving problems: this is all about demonstrating your skills when you solve problems.

See pages 27–28 for more detail.

5. a. 3 significant figures

You should give your answers to the accuracy indicated in the question. If there is no degree of accuracy stated in the question and your answer is not exact, then give your answer to three significant figures.

b. 23.1°

You should give your answers to the accuracy indicated in the question. If there is no degree of accuracy stated in the question and your answer is not exact, then answers in degrees should be given to one decimal place.

6. Calculus

There are nine topic areas that you will need to be able to answer questions on:

- Number
- Algebra and graphs
- Geometry
- Mensuration
- Co-ordinate geometry
- Trigonometry
- Matrices and transformations
- Probability
- Statistics

Your papers will **not** include equal numbers of marks on the nine topic areas.

7. True

Even if the final answer in a calculation is wrong, you might still score marks if you have **shown your working**.

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