Cambridge Assessment International Education

Learner Guide

Cambridge IGCSE™ / IGCSE (9–1) Mathematics 0580 / 0980

For examination from 2025

Cambridge Pathway

Contents

About this guide

This guide explains what you need to know about your course and examinations. You should use this guide alongside the support of your teacher.

Download and save the document to a desktop computer to be able to explore the interactive tools including the ability to make notes and use the checklists.

The Learner Guide will help you to:

- ✓ understand how you will be assessed
- ✓ understand the skills you need to have
- ✓ prepare for your Cambridge examinations
- ✓ plan your study and revision programme
- ✓ understand how to be responsible for your own learning.

The Learner Guide gives you:

- ✓ tools and approaches to learning
- ✓ examples of exam questions and a guide on how to answer them well
- ✓ revision checklists to self-assess your own understanding and knowledge of the subject.

The course will help you to build your skills and knowledge across a range of mathematical techniques. You will be able to develop your problem solving and reasoning skills in a variety of situations.

The Extended course will provide you with a strong foundation to continue to study mathematical qualifications beyond Cambridge IGCSE. The Core course will equip you with skills needed to support your learning in other subjects and in your general working life.

The course will encourage you to be:

- **confident**, in using mathematical language and techniques to ask questions, explore ideas and communicate
- **responsible**, by taking ownership of your learning, and applying your mathematical knowledge and skills to reason, problem solve and work collaboratively
- **reflective**, by making connections within mathematics and across your other subjects, and in evaluating methods and checking solutions
- **innovative**, by applying your knowledge and understanding to solve unfamiliar problems creatively, flexibly and efficiently
- **engaged**, by the beauty, patterns and structure of mathematics, becoming curious to learn about its many applications in society and the economy.

1. What you need to know

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 there is a very basic idea of what each topic covers. Highlighted sections show Extended content only.

If you are taking the **Extended** course, you will need to know all the Core content as well as some extra content. This extra content helps you to explore topics of the Core syllabus in more detail, to cover some more complex techniques and to learn new skills.

Topic	Overview
Number	Types of numbers, sets and Venn diagrams, powers and roots, fractions, decimals and percentages, ordering, 'four rules', estimation, ratio, proportion, rates, percentage, time and money
	Exponential growth and decay, surds **(Extended only)**
Algebra and graphs	Basic algebra, algebraic manipulation, equations, formula, sequences, drawing, sketching and interpreting graphs of functions
	Algebraic fractions, proportion, differentiation, functions, harder simultaneous equations **(Extended only)**
Coordinate geometry	Straight-line graphs
Geometry	Geometrical terms, construction, similarity, symmetry, angle properties, circle theorems
Mensuration	Units of measure, perimeter, area, volume
Trigonometry	Pythagoras theorem, trigonometry in right-angle triangles
	Sine rule, cosine rule, trigonometric graphs, solving simple trig equations **(Extended only)**
Transformations and Vectors	Transformations
	Vectors in 2-dimensions **(Extended only)**
Probability	Probability
	Conditional probability **(Extended only)**
Statistics	Interpreting statistical data, statistical diagrams, averages and range
	Cumulative frequency diagrams, histograms **(Extended only)**

The course is made up of two compulsory components, Paper 1 and Paper 3 for the **Core** course and Paper 2 and Paper 4 for the **Extended** course.

Always check the syllabus for the year you are taking the examination which is available at www.cambridgeinternational.org

How you will be assessed

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

- Paper 1 (Core) or Paper 2 (Extended)
- Paper 3 (Core) or Paper 4 (Extended)

This table summarises the key information about each examination paper.

Component		Time and marks	Skills assessed	Percentage of qualification
Core	Paper 1 Calculator not allowed	1 hour 30 minutes 80 marks	Mathematics techniques as listed in the Core syllabus, and applying those techniques to solve problems.	50%
	Paper 3 Scientific calculator required	1 hour 30 minutes 80 marks		50%
Extended	Paper 2 Calculator not allowed	2 hours 100 marks	Mathematics techniques as listed in the Core and Extended syllabus and applying those techniques to solve problems.	50%
	Paper 4 Scientific calculator required	2 hours 100 marks		50%

2. What will be assessed

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

The examiners take account of the following skills areas (**assessment objectives**) in the examination papers

- Knowledge and understanding of mathematical techniques
- Analyse, interpret and communicate mathematically

It is important that you know the different weightings (%) of the assessment objectives, as this affects how the examiner will assess your work. For example, assessment objective 1 (AO1: Knowledge and understanding of mathematical techniques) is worth 40–50% of the total marks in Papers 2 and 4, but 60–70% of the total marks in Papers 1 and 3.

Assessment objectives (AO)	What do you need to be able to do?
AO1 Knowledge and understanding of mathematical techniques	• Remember and use mathematical knowledge and techniques • Carry out routine procedures in mathematical and everyday situations • Understand and use mathematical notation and terminology • Perform calculations both with and without a calculator • Understand, organise, process, and present information in written form, tables, graphs and diagrams • Estimate, approximate and work to degrees of accuracy appropriate to the context, for example 3 significant figures, and convert between equivalent numerical forms, for example between fractions, decimals and percentages or between standard form and normal numbers • Understand and use measurements systems in everyday use • Measure and draw using geometrical instruments, for example a pair of compasses, a protractor or a ruler, to an appropriate degree of accuracy • Recognise and use spatial relationships in two and three dimensions
AO2 Analyse, interpret and communicate mathematically	• Analyse a problem and identify a suitable strategy to solve it. This may involve a combination of mathematical processes if appropriate • Make connections between different areas of mathematics • Recognise patterns in a variety of different situations and make and justify generalisations • Make logical inferences and draw conclusions from mathematical data or results • Communicate methods and results in a clear and logical form • Interpret information in different forms and change from one form of representation to another

3. Example exam questions

Command and key words

This section will help you to understand how to identify command words and key words within exam questions, and to understand what is required in your response.

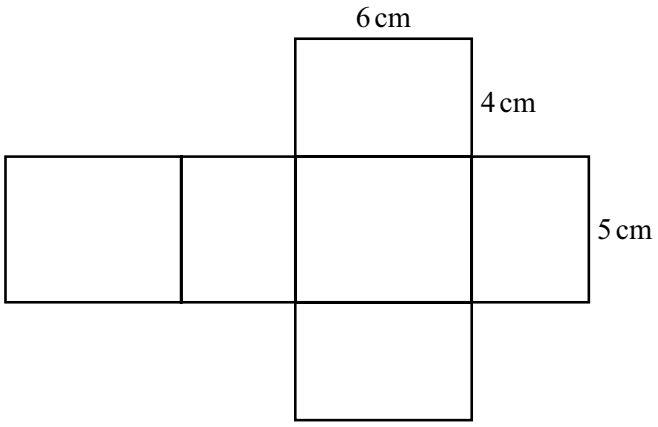
A command word is the part of the question that tells you what you need to do with your knowledge. For example, you might need to describe something, explain something, or argue a point of view. It is important that you understand the command words which indicate the approach you should take to answer the questions. Command words may be listed in the syllabus. The context of the whole question will affect the explicit meaning of the command words.

The information and advice given below, is specific to these example exam questions. In your exam, you need to pay careful attention to what each question is asking you to do.

Now let's look more closely at some example exam questions.

The command and key words in the questions have been highlighted and their meanings explained. This should help you to understand clearly what is required.

14 (a)



NOT TO SCALE

The diagram shows the net of a cuboid.

(ii) **Show** that the total surface area of the cuboid is 148 cm^2.

[2 marks]

This means that the examiner is expecting you to produce a structured solution using the information provided in the question with the relevant mathematical techniques clearly presented. It is important not to leave any workings out as the answer has been given.

The straight line $y = 2x + 1$ intersects the curve $y = x^2 + 3x - 4$ at the points A and B.

Find the coordinates of A and B.

Give your answers correct to 2 decimel places. **[6 marks]**

This means that you have to decide on the appropriate mathematical approach to use to obtain the required information, here the coordinates of both points A and B. There may be some approaches that are more efficient, but the examiner will not be giving additional marks for these.

This means that your answer will need to either meet specific conditions or include specific information. Here, the examiner is expecting your final answer to be rounded to 2 decimal places, and not to 3 significant figures as is usually expected.

(i) Write $x^2 - 8x + 10$ in the form $(x - p)^2 - q$. **[2 marks]**

This means that your answer must be given in a specific form. This is often so that it will be helpful in the next part of the question.

(ii) Sketch the graph of y=x^2-8x+10.

On the sketch, **labe**l the coordinates of the turning points and y-intercept. **[3 marks]**

This means that you must clearly show the coordinates of these particular points on your sketch. You could either place the values on the axes of the sketch or write the coordinates on the sketch by each point.

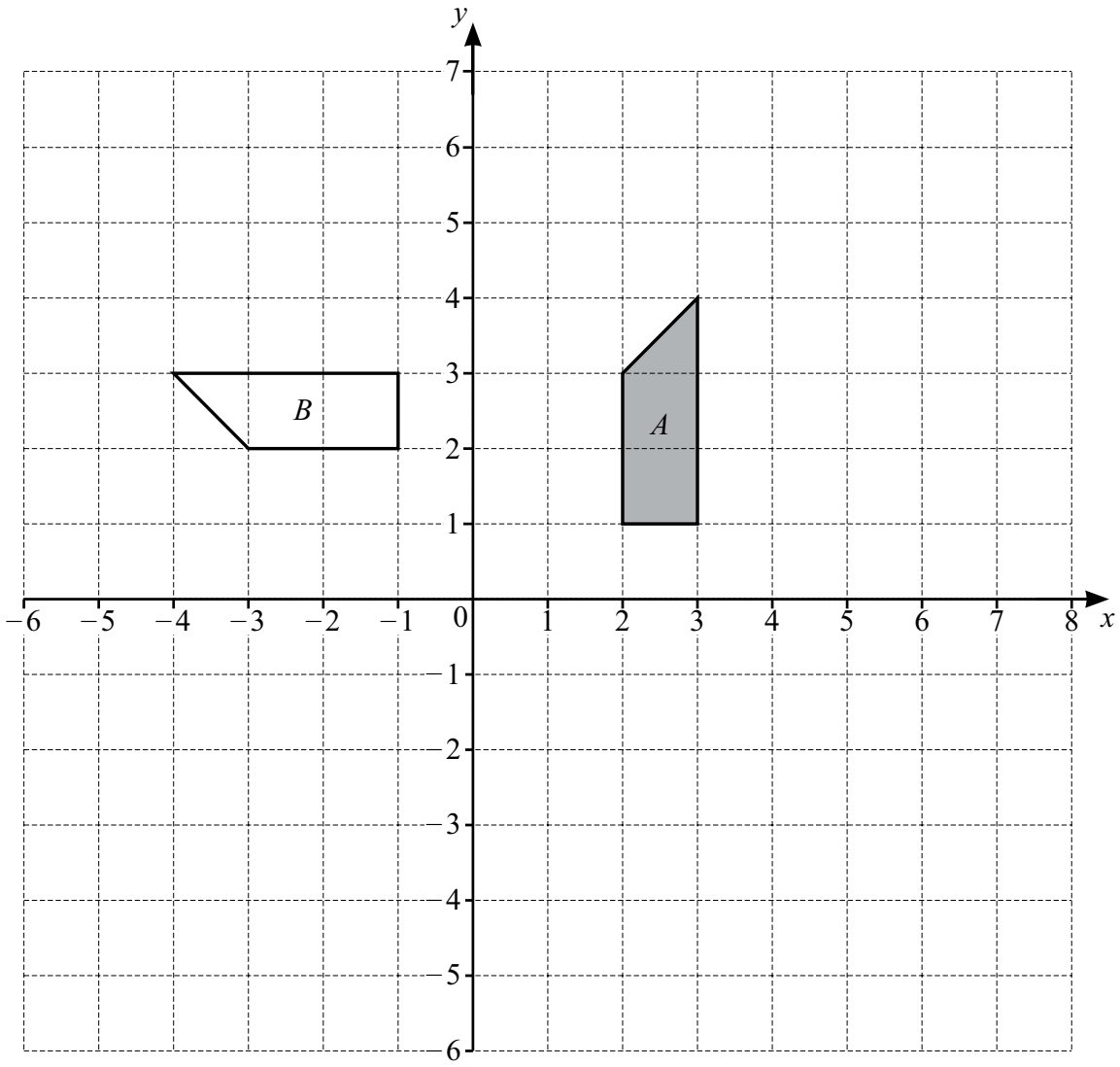
This means that your answer does not need to be drawn accurately, and that a simple freehand drawing which shows the main features is expected. The examiner will not be awarding credit for working out accurately a large number of coordinate points which are then plotted.

Answering examination questions

In pairs, groups or individually

- think about what points to include in each answer
- think about how long your answer should be – look at the marks and the space available on the question paper. Do not write too much or too little
- now, write an example answer to the following questions.

Specimen Paper 1A – Question 18



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

.....

..... [3]

(b) On the grid, draw the image of

(i) shape A after a translation by the vector $\begin{pmatrix} -5 \\ -6 \end{pmatrix}$. [2]

(ii) shape A after an enlargement by scale factor 3, centre (1, 4). [2]

Specimen Paper 1B – Question 19

19 Work out.

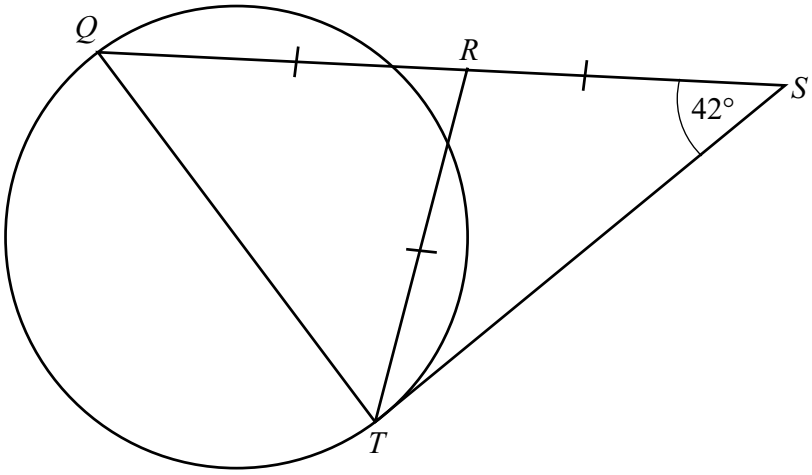
$$4000 \times 70$$

Give your answer in standard form.

..... [2]

Specimen Paper 3B – Question 14

14



NOT TO SCALE

Q and T are points on a circle.
QRS is a straight line.
ST is a tangent to the circle at T.
$QR = RS = RT$ and angle $RST = 42°$.

(a) Find angle RTS.

Angle RTS = ... [1]

(b) Show that angle $QRT = 84°$.

[2]

(c) Explain why the line QT is a diameter of the circle.
You must show all your working, giving geometrical reasons.

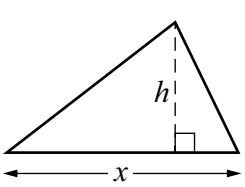
.....

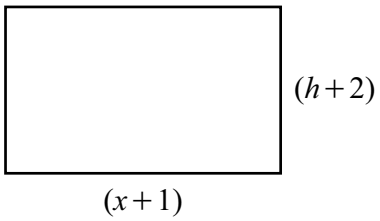
.....

..... [3]

Specimen Paper 2A – Question 21

21 In this question, all measurements are in centimetres.





NOT TO SCALE

The height of the triangle is h and the height of the rectangle is $(h + 2)$.
The length of the base of the triangle is x and the length of the rectangle is $(x + 1)$.
The area of the triangle is 11 cm^2 and the area of the rectangle is 39 cm^2.

(a) Write down an expression, in terms of x, for the height of the rectangle.

..... [1]

(b) Show that $2x^2 - 15x + 22 = 0$.

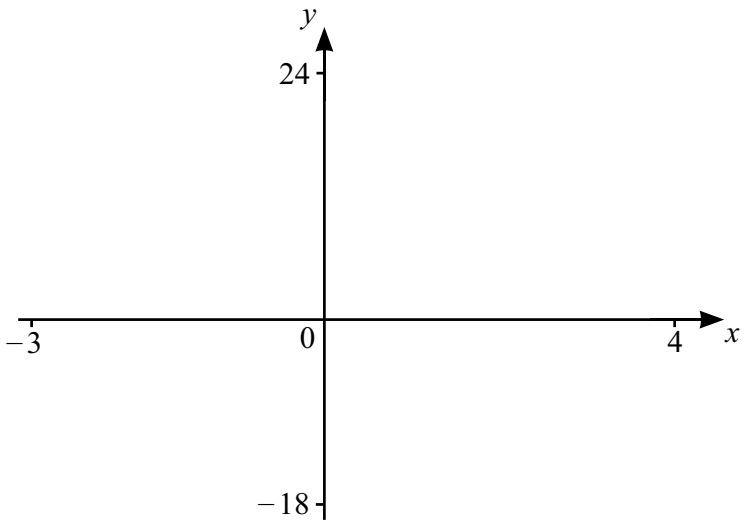
[3]

(c) By factorising and solving $2x^2 - 15x + 22 = 0$, find the two possible heights of the triangle.

h = ... or h = ... [5]

Specimen Paper 2A – Question 26

26



$f(x) = x(x + 2)(x – 3)$

(a) On the diagram, sketch the graph of $y = f(x)$ for $–3 \leqslant x \leqslant 4$.
Show the values of the intersections with the axes. [3]

(b) Expand and simplify.

$x(x + 2)(x – 3)$

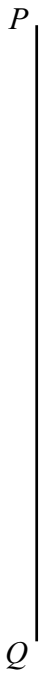
..... [3]

(c) A is the point $(1, –6)$.
The tangent to the graph of $y = f(x)$ at A meets the y-axis at B.

Find the coordinates of B.

Specimen Paper 4A – Question 2

2



In triangle PQR, $QR = 10$ cm and $PR = 11$ cm.

Using a ruler and compasses only, construct triangle PQR.
The line PQ has been drawn for you. [2]

Ask your teacher for the mark scheme for the specimen papers and mark your answers to see how well you have done.

Advice and tips for the examination

- Read the instructions carefully and answer the right number of questions from the correct sections of the exam paper.
- Do not answer more questions than are needed. This will not gain you more marks.
- Plan your time according to the marks for each question. For example, a question worth 3 marks requires less time and a shorter answer, than a question worth 10 marks.
- Do not leave out questions or parts of questions. No answer means no mark.
- Read each question very carefully.
- Identify the command words in the question – underline or highlight them.
- Identify and underline the other key words in the question.
- Read all parts of a question before starting your answer. Think carefully about what is needed for each part. You will not need to repeat information.
- Look very carefully at the resource material / insert / diagrams, you are given.
- **Answer the question.** This is very important!
- Use your knowledge and understanding.
- Do not just write all you know, only write what is needed to answer the question.
- Make sure your writing is clear and easy to read. It is no good writing a brilliant answer if the examiner cannot read it.

4. Study skills

A 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.

Which subjects are you studying? Think about what you want to achieve by studying each subject.

I am studying the subject because:

What did you like about the subject when you have studied them in the past? Or what about a new subject interested you?

I like because:

What skills will each subject help you develop? Are there any uses in the real world?

is a good subject to learn because:

Being organised

Being organised has many benefits – circle the statements which are important for you:

helps you to PRIORITISE

improves TIME MANAGEMENT

reduces STRESS

helps you to FOCUS

increases CONFIDENCE

increases PRODUCTIVITY

gives a better BALANCE between works and play

increases EFFICIENCY

How organised are you?

Tick the statements that apply to you.

A
I always know where everything I need is, such as my notes, books, pens, highlighter pens, paper and a ruler. ☐

B
I get overwhelmed by how much work I have and I avoid starting large tasks. ☐

A
I get my homework done on time. ☐

B
I leave homework to the last minute. ☐

B
I often forget what homework I have. ☐

A
I do my homework the day I get it. ☐

A
I write down homework and the deadlines in one place, such as a planner. ☐

B
I never know where everything I need is, such as my notes, books, pens, highlighter pens, paper and a ruler. ☐

A
I always rush my work. ☐

B
I hand in my homework late. ☐

A
I never need to rush my work. ☐

B
I break down large tasks into smaller tasks and tick these off when I complete them. ☐

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.

How to be organised

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

How 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	☐	☐

Tips for good notetaking

Writing and reviewing your lesson notes helps you to remember information.

Making notes as you go along, little and often, makes it easier when you revise. It is important to ask your teacher or classmates questions if you are unsure about anything or if you have missed something.

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 (this helps you understand what you are being told in the current lesson and helps you to make better notes).

Listen actively

Concentrate on listening carefully – if you listen actively, you can pick out the important information instead of writing down everything.

In your own way

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

- Develop your own shorthand, e.g. 'wi' for 'with'.
- Keep your notes simple and short.
- Use abbreviations, symbols, and diagrams.
- Start on a new page for each new lesson.
- Put a date at the start of your notes.

Focus

- Do not write down everything, focus on the important points, such as:
  - key words and concepts – for example, definitions, examples, formulae, symbols, methods, dates, events, characters, etc.
  - new information – do not write down things you already know.
- Highlight and annotate handouts.

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 (onto cards).
- Compare your notes with a friend or classmate. This might lead to a discussion on what each of you think are the important points to know.

Read the content before you write anything down

Then go back to the start and note down any keywords, dates, facts, concepts, or quotes. Now write your notes. Do not copy full sentences, write the content in your own words.

Here are some useful ways to format your notes:

Freestyle method

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

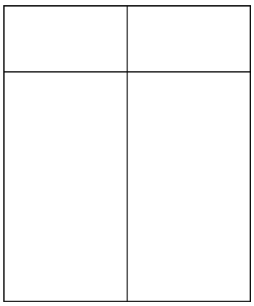
Write on handouts

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.

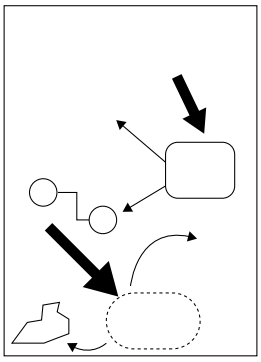
- Make a chart with a different column for each factor or approach.
- Write details in each column, placing the details so that you can easily compare items between columns.



Flow method

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

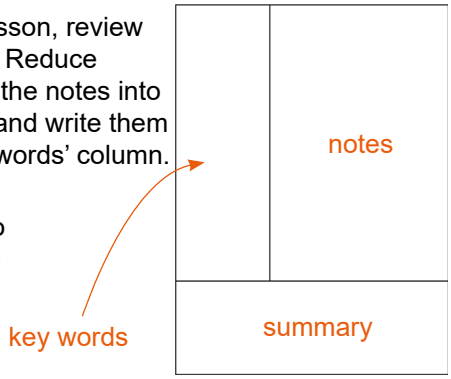
- putting what the teacher says into your own words
- using quick drawings to break down the content into simple ideas
- using arrows to link ideas together and to add supporting points
- circling or boxing different points using different lines, shapes or coloured pens.



Cornell method

Divide your page into three sections.

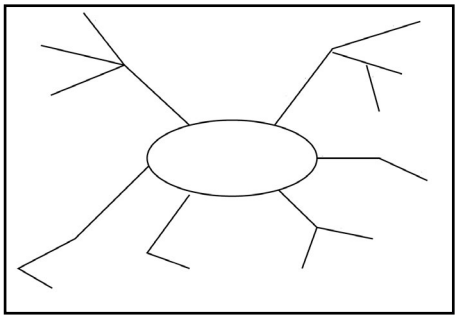
- Use the 'notes' section to make notes during the lesson.
- After the lesson, review your notes. Reduce sections of the notes into key words and write them in the 'key words' column.
- Write a summary to consolidate what you learned.



Mind map method

Write the lesson topic in the centre of your page.

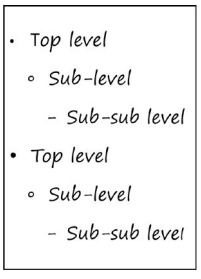
- Add a new branch for each new sub-topic.
- Add extra smaller and smaller branches for more detail; these show the connections between facts or ideas.
- Add notes using words and diagrams; use arrows to show links.
- Keep your notes short and put key words along branches.
- Use coloured pens and highlighter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



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.



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

5. Revision and preparation

Planning your revision

Start planning your revision in plenty of time for the exams so you can develop a revision technique that works for you. A well-structured revision plan can give you the best chance of success in your examinations.

Identify the time you will spend revising and schedule time for revision.

Create a revision plan: a weekly plan will include the detail of what you will revise in the weeks up to the examination. This can then be broken down into a daily planner which will include more detail.

Write 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.

Plan to go back to your class notes and what you have already revised to recall information and keep everything fresh in your mind. Do not only recall words and definitions, make sure you recall main ideas, how things are related or different from one another, and new examples.

It is important to have breaks to stay alert and productive

- 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 bedtime; 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

- 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).
- Be honest with yourself about how much time you can really spend revising.

Revision plans

There are many different planners, calendars and timetables you can use to plan your revision. The plans provided here are just examples. The **Weekly plan** includes an overview of a week of revision leading up to the first examination. The **Daily plan** includes the detail of what you will be revising each day.

Weekly plan

	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
Morning							
Afternoon							
Evening							

Daily plan

	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							

Some revision techniques

Mind maps

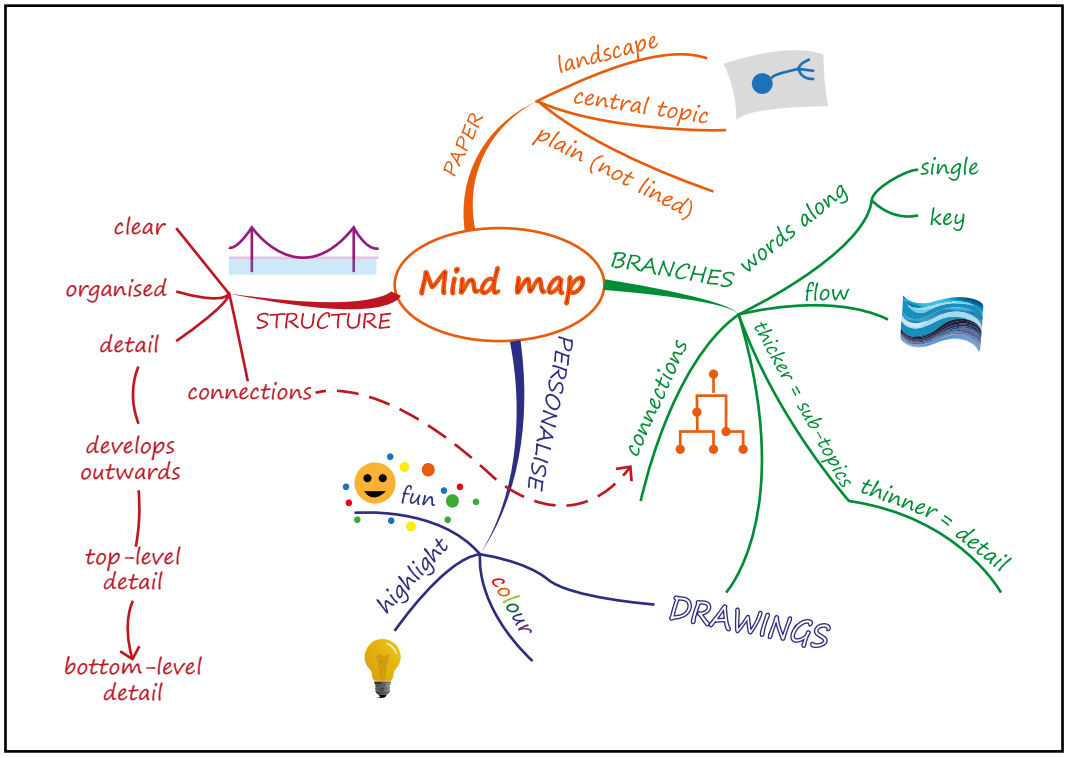
Mind maps are a great way to revise the links between different factors or to explore a larger topic.

They can also be used to brainstorm your ideas.

1. Use a blank sheet of paper and turn it on its side (landscape).
2. 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).
3. Write single key words or phrases along a branch and add drawings for visual impact.
4. 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 paper and lots of coloured pens.

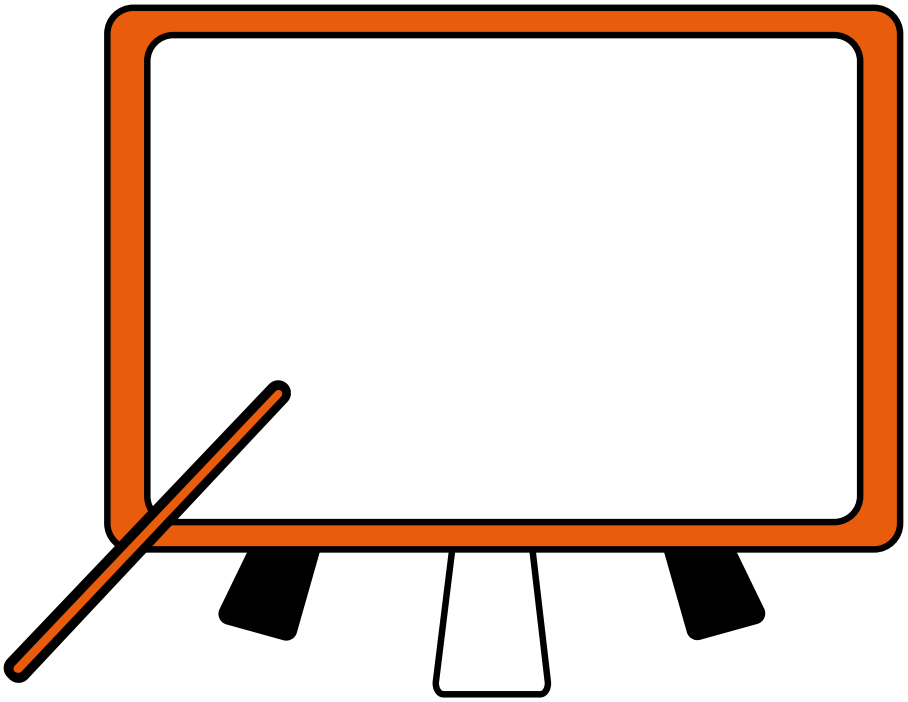


Teach the topic

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

1. Create some topic cards with key bullet points of information on. Leave space for ticks.
2. Give these to your parents, family, friends or whoever you want.
3. 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.
4. Your audience tick off all the points you mention in your presentation and give you a final score.

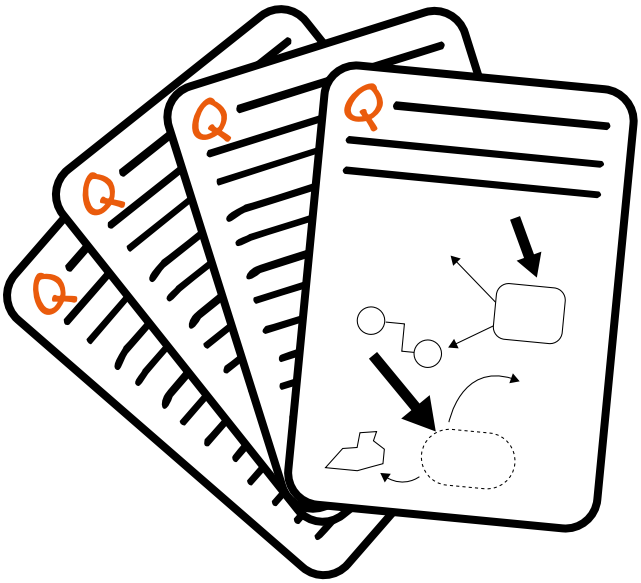
The brain loves competition, so if you do not score full marks you can repeat and try and again the next day or compete against friends. This system of repeat and rehearsal is very effective, especially with more complex topics, and does not take much preparation.

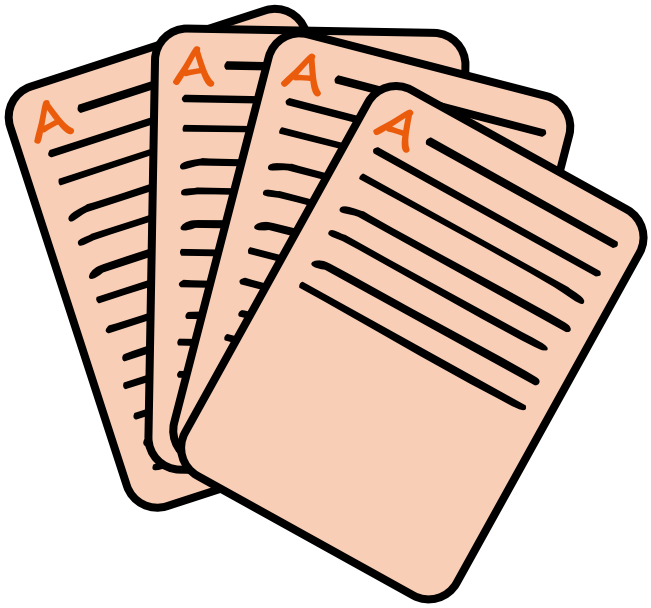


Question and answer (Q & A) cards

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.

1. 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.
2. Make sure you have the topic, or something appropriate depending on what you are focusing on, as a heading on each card. The questions should test your knowledge and understanding of key areas of the course.
3. A friend or family member uses the cards to test you in short 5 or 10 minute periods at any time during the day.
4. You could also do this alone by reading the questions to yourself, giving the answer and then checking the correct answer card.
5. 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 do not 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.





Question paper and mark schemes

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

1. 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.
2. Identify which topic a given question relates to so that you have a bank of questions for each topic; you might need to ask your teacher to help you do this.
3. 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.
4. 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 and mark schemes on the Cambridge website.

6. Revision checklists

The following checklists include information from the syllabus that you should revise. The lists do not contain all the detailed knowledge you need to know, just an overview. For more detail see the syllabus and talk to your teacher.

When you have revised something from the checklist, use the R, A and G tick boxes to record how confident you feel about it:

R (**RED**) means you are unsure and lack confidence in that area; 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, to turn them into **GREEN** topics. You might find it helpful to highlight each topic in red, amber, 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.

Core
1. Number

Syllabus content	What do you know?	R	A	G	Comments
Types of numbers	Identify and use: • natural numbers • integers (positive, zero and negative) • prime numbers • square numbers • cube numbers • common factors (e.g. HCF – highest common factor of two numbers) • common multiples (e.g. LCM – lowest common multiple of two numbers) • rational and irrational numbers • reciprocals	☐	☐	☐	
Sets	Understand and use set language, notation and Venn diagrams	☐	☐	☐	
	Definition of sets: • $A = \{x: x \text{ is a natural number}\}$ • $B = \{a, b, c, \dots\}$ • $C = \{x: a \leq x \leq b\}$	☐	☐	☐	
	Notation: Number of elements in set A $n(A)$ Complement of set A A’ Universal set $\mathscr{E}$ Union of A and B $A \cup B$ Intersection of A and B $A \cap B$	☐	☐	☐	

Syllabus content	What do you know?	R	A	G	Comments
Powers and roots	Calculate with the following: • squares • square roots • cubes • cube roots • other powers and roots of numbers	☐	☐	☐	
Fractions, decimals and percentages	Use the language and notation of the following in appropriate contexts: • proper fractions • improper fractions • mixed numbers • decimals • percentages	☐	☐	☐	
	Recognise equivalence and convert between these forms	☐	☐	☐	
Ordering	Order quantities by magnitude and demonstrate familiarity with the symbols =, ≠, >, < , ⩾ and ⩽	☐	☐	☐	
The four operations	Use the four operations for calculations with: • integers • fractions • decimals • correct ordering of operations (BIDMAS) and use of brackets	☐	☐	☐	
Indices I	Understand and use indices (positive, zero and negative integers).	☐	☐	☐	
	Understand and use the rules of indices for: • multiplication of indices, e.g. $2^{-3} \times 2^4$ • division of indices, e.g. $2^3 \div 2^4$ • index numbers raised to an index, e.g. $(2^3)^2$	☐	☐	☐	

Syllabus content	What do you know?	R	A	G	Comments
Standard Form	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 values in standard form (only using a calculator)				
Estimation	Round values to a specified degree of accuracy of: • significant figures • decimal places				
	Make estimates for calculations involving numbers, quantities and measurements				
	Round answers to a reasonable degree of accuracy in the context of a given problem				
Limits of accuracy	Give upper and lower bounds for data rounded to a specified accuracy				
Ratio and proportion	Understand and use ratio and proportion to: • give ratios in their simplest form • divide a quantity in a given ratio • use proportional reasoning and ratios in context, e.g. map scales, determine best value				
Rates	Use common measures of rate, e.g. hourly rates of pay, exchange rates between currencies				
	Apply other measures of rate, e.g. pressure, density				
	Solve problems involving average speed, including recall of speed/distance/time formula				
Percentages	Calculate a percentage of a quantity				
	Express one quantity as a percentage of another				
	Calculate percentage increase or decrease				
	Calculate with simple and compound interest, including recall of formulas				

Syllabus content	What do you know?	R	A	G	Comments
Using a calculator	Use a calculator efficiently				
	Enter values appropriately on a calculator, e.g. 2 hours 30 minutes				
	Interpret the calculator display appropriately, e.g. in money 4.8 means $4.80.				
Time	Calculate with time: seconds (s), minutes (min), hours (h), days, weeks, months, years, including the relationship between units				
	Calculate times in terms of the 24-hour and 12-hour clock				
	Read • clocks • timetables				
Money	Calculate with money				
	Convert from one currency to another				

2. Algebra and graphs

Syllabus content	What do you know?	R	A	G	Comments
Introduction to algebra	Use letters to represent generalised numbers				
	Substitute numbers into expressions and formulas				
Algebraic manipulation	Simplify expressions by collecting like terms				
	Expand products of algebraic expressions: • with a single bracket, e.g. $3x(2x-4y)$ • with a pair of brackets, e.g. $(3x+y)(x-4y)$				
	Factorise by extracting common factors				

Syllabus content	What do you know?	R	A	G	Comments
Indices II	Understand and use indices: • positive, zero, negative • fractional				
	Understand and use the rules of indices, e.g. to simplify: • $(5x^3)^2$ • $12a^5 \div 3a^{-2}$ • $6x^7 y^4 \times 5x^{-5} y$				
Equations	Construct expressions, equations and formulas				
	Solve linear equations in one unknown				
	Solve simultaneous linear equations in two unknowns				
	Change the subject of formulas				
Inequalities	Represent and interpret inequalities, including on a number line				
Sequences	Continue a given number sequence or pattern				
	Recognise patterns in sequences, including the term-to-term rule				
	Recognise relationships between different sequences: • linear sequences • simple quadratic sequences • simple cubic sequences				
	Find and use the *n*th term of sequences				
Graphs in practical situations	Use and interpret graphs in practical situations including: • travel graphs • conversion graphs				
	Draw graphs from given data				

Syllabus content	What do you know?	R	A	G	Comments
Graphs of functions	Construct tables of values, and draw, recognise and interpret graphs for functions of the following forms: • $ax + b$, where a and b are integer constants • $\pm x^2 + ax + b$, where a and b are integer constants • $\frac{a}{x} (\neq 0)$, where a is an integer constant	☐	☐	☐	
	Solve associated equations graphically, including finding and interpreting roots by graphical methods	☐	☐	☐	
Sketching curves	Recognise, sketch and interpret graphs of the following functions: • linear • quadratic *(knowledge of roots and symmetry is required)*	☐	☐	☐	

3. Coordinate geometry

Syllabus content	What do you know?	R	A	G	Comments
Coordinates	Use and interpret Cartesian coordinates in two dimensions	☐	☐	☐	
Drawing linear graphs	Draw straight-line graphs for linear equations	☐	☐	☐	
Gradient of linear graphs	Find the gradient of a straight line	☐	☐	☐	
Equations of linear graphs	Interpret and obtain the equation of a straight-line graph in the form $y = mx + c$	☐	☐	☐	
Parallel lines	Find the gradient and equation of a straight line parallel to a given line	☐	☐	☐	

4. Geometry

Syllabus content	What do you know?	R	A	G	Comments
Geometrical terms	Use and interpret the following geometrical terms: • point • vertex • line • parallel • perpendicular • bearing • right angle • acute, obtuse and reflex angles • interior and exterior angles • similar • congruent • scale factor	☐	☐	☐	
	Use and interpret the vocabulary of: • triangles • special quadrilaterals • polygons • nets • simple solids	☐	☐	☐	
	Use and interpret the vocabulary of a circle	☐	☐	☐	
Geometrical constructions	Measure and draw lines and angles	☐	☐	☐	
	Construct a triangle, given the lengths of all sides, using a ruler and pair of compasses only	☐	☐	☐	
	Draw, use and interpret nets	☐	☐	☐	
Scale drawings	Draw and interpret scale drawings	☐	☐	☐	
	Use and interpret three-figure bearings	☐	☐	☐	

Syllabus content	What do you know?	R	A	G	Comments
Similarity	Calculate lengths of similar shapes				
Symmetry	Recognise line symmetry and order of rotational symmetry in two dimensions				
Angles	Calculate unknown angles and give simple explanations using the following geometrical properties: • sum of angles at a point = 360° • sum of angles at a point on a straight line = 180° • vertically opposite angles are equal • angle sum of a triangle = 180° • angle sum of a quadrilateral = 360°				
	Calculate unknown angles and give geometric explanations for angles formed within parallel lines: • corresponding angles are equal • alternate angles are equal • co-interior angles sum to 180° (supplementary)				
	Know and use angle properties of regular and irregular polygons *(you are expected to use the correct geometrical terminology when giving reasons for answers)*				
Circle theorems	Calculate unknown angles and give explanations using the following geometrical properties of circles: • angle in a semicircle = 90° • angle between tangent and radius = 90° *(you are expected to use these geometrical properties when giving reasons for answers)*				

5. Mensuration

Syllabus content	What do you know?	R	A	G	Comments
Units of measure	Use metric units of: • mass • length • area • volume • capacity in practical situations	☐	☐	☐	
	Convert quantities into larger or smaller units	☐	☐	☐	
Area and perimeter	Carry out calculations involving the perimeter and area of a: • rectangle • triangle • parallelogram • trapezium	☐	☐	☐	
Circles, arcs and sectors	Carry out calculations involving the circumference and area of a circle	☐	☐	☐	
	Carry out calculations involving arc length and sector area as fractions of the circumference and area of a circle	☐	☐	☐	
Surface area and volume	Carry out calculations and solve problems involving the surface area and volume of a: • cuboid • prism • cylinder • sphere • pyramid • cone	☐	☐	☐	

Syllabus content	What do you know?	R	A	G	Comments
Compound shapes and parts of shapes	Carry out calculations and solve problems involving perimeters and areas of: • compound shapes • parts of shapes	☐	☐	☐	
	Carry out calculations and solve problems involving surface areas and volumes of: • compound solids • parts of solids	☐	☐	☐	

6. Trigonometry

Syllabus content	What do you know?	R	A	G	Comments
Pythagoras' theorem	Know and use Pythagoras' theorem	☐	☐	☐	
Right-angled triangles	Know and use the sine, cosine and tangent ratios for acute angles in calculations involving sides and angles of a right-angled triangle	☐	☐	☐	
	Solve problems in two dimensions using Pythagoras' theorem and trigonometry	☐	☐	☐	

7. Transformations and vectors

Syllabus content	What do you know?	R	A	G	Comments
Transformations	Recognise, describe and draw the following transformations: • Reflection of a shape in a vertical or horizontal line • Rotation of a shape about the origin, vertices or midpoints of edges of the shape, through multiples of 90° • Enlargement of a shape from a centre by a scale factor • Translation of a shape by a vector $\begin{pmatrix} x \\ y \end{pmatrix}$	☐	☐	☐	

8. Probability

Syllabus content	What do you know?	R	A	G	Comments
Introduction to probability	Understand and use the probability scale from 0 to 1	☐	☐	☐	
	Calculate the probability of a single event	☐	☐	☐	
	Understand that the probability of an event not occurring = 1 – the probability of the event occurring	☐	☐	☐	
Relative and expected frequencies	Understand relative frequency as an estimate of probability	☐	☐	☐	
	Calculate expected frequencies	☐	☐	☐	
Probability of combined events	Calculate the probability of combined events using, where appropriate: • sample space diagrams • Venn diagrams • tree diagrams	☐	☐	☐	

9. Statistics

Syllabus content	What do you know?	R	A	G	Comments
Classifying statistical data	Classify and tabulate statistical data	☐	☐	☐	
Interpreting statistical data	Read, interpret and draw inferences from tables and statistical diagrams	☐	☐	☐	
	Compare sets of data using tables, graphs and statistical measures	☐	☐	☐	
	Appreciate restrictions on drawing conclusions from given data	☐	☐	☐	

Syllabus content	What do you know?	R	A	G	Comments
Averages and measures of spread	Calculate the: • mean • median • mode • range for individual data and distinguish between the purposes for which these are used	☐	☐	☐	
Statistical charts and diagrams	Draw and interpret: • bar charts • pie charts • pictograms • stem-and-leaf diagrams • simple frequency distributions	☐	☐	☐	
Scatter diagrams	Draw and interpret scatter diagrams	☐	☐	☐	
	Understand what is meant by positive, negative and zero correlation	☐	☐	☐	
	Draw by eye, interpret and use a straight line of best fit	☐	☐	☐	

Extended
1. Number

Syllabus content	What do you know?	R	A	G	Comments
Types of numbers	Identify and use: • natural numbers • integers (positive, zero and negative) • prime numbers • square numbers • cube numbers • common factors (eg HCF – highest common factor of two numbers) • common multiples (eg LCM – lowest common multiple of two numbers) • rational and irrational numbers • reciprocals	☐	☐	☐	
Sets	Understand and use set language, notation and Venn diagrams	☐	☐	☐	
	Definition of sets: • $A = \{x: x \text{ is a natural number}\}$ • $B = \{(x, y): y = mx + c\}$ • $C = \{x: a \leq x \leq b\}$ • $D = \{a, b, c, \ldots\}$	☐	☐	☐	
	Notation: • 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 $\emptyset$ • Universal set $\mathscr{E}$ • A is a subset of B $A \subseteq B$ • A is not a subset of B $A \not\subseteq B$ • Union of A and B $A \cup B$ • Intersection of A and B $A \cap B$	☐	☐	☐	

Syllabus content	What do you know?	R	A	G	Comments
Powers and roots	Calculate with the following: • squares • square roots • cubes • cube roots • other powers and roots of numbers	☐	☐	☐	
Fractions, decimals and percentages	Use the language and notation of the following in appropriate contexts: • proper fractions • improper fractions • mixed numbers • decimals • percentages	☐	☐	☐	
	Recognise equivalence and convert between these forms	☐	☐	☐	
Ordering	Order quantities by magnitude and demonstrate familiarity with the symbols =, ≠, >, < , ⩾ and ⩽	☐	☐	☐	
The four operations	Use the four operations for calculations with: • integers • fractions • decimals • correct ordering of operations (BIDMAS) and use of brackets	☐	☐	☐	
Indices I	Understand and use indices (positive, zero and negative integers)	☐	☐	☐	
	Understand and use the rules of indices for: • multiplication of indices, e.g. $2^{-3} \times 2^4$ • division of indices, e.g. $2^3 \div 2^4$ • index numbers raised to an index, e.g. $(2^3)^2$	☐	☐	☐	
Standard Form	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 values in standard form	☐	☐	☐	

Syllabus content	What do you know?	R	A	G	Comments
Estimation	Round values to a specified degree of accuracy of: • significant figures • decimal places	☐	☐	☐	
	Make estimates for calculations involving numbers, quantities and measurements	☐	☐	☐	
	Round answers to a reasonable degree of accuracy in the context of a given problem	☐	☐	☐	
Limits of accuracy	Give upper and lower bounds for data rounded to a specified accuracy	☐	☐	☐	
	Find upper and lower bounds of the results of calculations which have used data rounded to a specified accuracy	☐	☐	☐	
Ratio and proportion	Understand and use ratio and proportion to: • give ratios in their simplest form • divide a quantity in a given ratio • use proportional reasoning and ratios in context, e.g. map scales, determine best value	☐	☐	☐	
Rates	Use common measures of rate, e.g. hourly rates of pay, exchange rates between currencies	☐	☐	☐	
	Apply other measures of rate, e.g. pressure, density	☐	☐	☐	
	Solve problems involving average speed, including recall of speed/distance/time formula	☐	☐	☐	
Percentages	Calculate a percentage of a quantity	☐	☐	☐	
	Express one quantity as a percentage of another	☐	☐	☐	
	Calculate percentage increase or decrease	☐	☐	☐	
	Calculate with simple and compound interest, including recall of formulas	☐	☐	☐	
	Calculate using reverse percentages	☐	☐	☐	

Syllabus content	What do you know?	R	A	G	Comments
Using a calculator	Use a calculator efficiently	☐	☐	☐	
	Enter values appropriately on a calculator, e.g. 2 hours 30 minutes	☐	☐	☐	
	Interpret the calculator display appropriately, e.g. in money 4.8 means $4.80	☐	☐	☐	
Time	Calculate with time: seconds (s), minutes (min), hours (h), days, weeks, months, years, including the relationship between units	☐	☐	☐	
	Calculate times in terms of the 24-hour and 12-hour clock	☐	☐	☐	
	Read • clocks • timetables	☐	☐	☐	
Money	Calculate with money	☐	☐	☐	
	Convert from one currency to another	☐	☐	☐	
Exponential growth and decay	Use exponential growth and decay, e.g. depreciation, population change	☐	☐	☐	
Surds	Understand and use surds, including simplifying expressions	☐	☐	☐	
	Rationalise the denominator	☐	☐	☐	

2. Algebra and graphs

Syllabus content	What do you know?	R	A	G	Comments
Introduction to algebra	Use letters to represent generalised numbers	☐	☐	☐	
	Substitute numbers into expressions and formulas	☐	☐	☐	

Syllabus content	What do you know?	R	A	G	Comments
Algebraic manipulation	Simplify expressions by collecting like terms	☐	☐	☐	
	Expand products of algebraic expressions: • with a single bracket, e.g. $3x\,(2x - 4y)$ • with a pair of brackets, e.g. $(3x + y)\,(x - 4y)$ • with more than two brackets, e.g. $(x - 2)\,(x + 3)\,(2x + 1)$	☐	☐	☐	
	Factorise by extracting common factors	☐	☐	☐	
	Factorise expressions of the form: • $ax + bx + kay + kby$ • $a^2x^2 - b^2y^2$ • $a^2 + 2ab + b^2$ • $ax^2 + bx + c$ • $ax^3 + bx^2 + cx$	☐	☐	☐	
	Complete the square for expressions in the form $ax^2 + bx + c$	☐	☐	☐	
Algebraic fractions	Manipulate algebraic fractions such as: • $\frac{x}{3}+\frac{x-4}{2}$ • $\frac{2x}{3}+\frac{3(x-5)}{2}$ • $\frac{3a}{3}\times\frac{9a}{10}$ • $\frac{3a}{3}\div\frac{9a}{10}$ • $\frac{1}{x-2}\div\frac{x+1}{x-3}$ Factorise and simplify rational expressions such as $\frac{x^2-2x}{x^2-5x+6}$	☐	☐	☐	

Syllabus content	What do you know?	R	A	G	Comments
Indices II	Understand and use indices: • positive, zero, negative • fractional	☐	☐	☐	
	Understand and use the rules of indices, e.g. to simplify: • $3x^{-4} \times \frac{2}{3}x^{\frac{1}{2}}$ • $\frac{2}{5}x^{\frac{1}{2}} \div 2x^{-2}$ • $\left(\frac{2x^5}{3}\right)^3$	☐	☐	☐	
Equations	Construct expressions, equations and formulas	☐	☐	☐	
	Solve linear equations in one unknown	☐	☐	☐	
	Solve fractional equations with: • numerical denominators • linear algebraic denominators	☐	☐	☐	
	Solve simultaneous linear equations in two unknowns	☐	☐	☐	
	Solve quadratic equations by: • factorisation • completing the square • use of the quadratic formula	☐	☐	☐	
	Change the subject of formulas	☐	☐	☐	

Syllabus content	What do you know?	R	A	G	Comments
Inequalities	Represent and interpret inequalities, including on a number line	☐	☐	☐	
	Construct, solve and interpret linear inequalities	☐	☐	☐	
	Represent and interpret linear inequalities in two variables graphically	☐	☐	☐	
	List inequalities that define a given region	☐	☐	☐	
Sequences	Continue a given number sequence or pattern	☐	☐	☐	
	Recognise patterns in sequences, including the term-to-term rule	☐	☐	☐	
	Recognise relationships between different sequences • linear sequences • quadratic sequences • cubic sequences • exponential sequences • simple combinations of these • Find and use the *n*th term of sequences	☐	☐	☐	
Proportion	Express direct proportion in algebraic terms	☐	☐	☐	
	Express inverse proportion in algebraic terms	☐	☐	☐	
	Use algebraic expressions of direct and indirect proportion to find unknown quantities	☐	☐	☐	

Syllabus content	What do you know?	R	A	G	Comments
Graphs in practical situations	Use and interpret graphs in practical situations including: • travel graphs • conversion graphs	☐	☐	☐	
	Draw graphs from given data	☐	☐	☐	
	Apply the idea of rate of change to simple kinematics involving: • distance–time graphs • speed–time graphs • acceleration and deceleration	☐	☐	☐	
	Calculate distance travelled as area under a speed–time graph	☐	☐	☐	
Graphs of functions	Construct tables of values, and draw, recognise and interpret graphs for functions of the following forms: • ax^n (includes sums of no more than three of these) where $n = -2,\ -1,\ -\frac{1}{2},\ 0,\ \frac{1}{2},\ 1,\ 2,\ 3$ and a is a rational number • $ab^x + c$ where a and c are rational numbers and b is a positive integer	☐	☐	☐	
	Solve associated equations graphically, including finding and interpreting roots by graphical methods	☐	☐	☐	
	Draw and interpret graphs representing exponential growth and decay problems	☐	☐	☐	
Sketching curves	Recognise, sketch and interpret graphs of the following functions: • linear • quadratic • cubic • reciprocal • exponential *(knowledge of turning points, roots, symmetry, vertical and horizontal asymptotes is required)*	☐	☐	☐	

Syllabus content	What do you know?	R	A	G	Comments
Differentiation	Estimate gradients of curves by drawing tangents				
	Use the derivatives of functions of the form ax^n, where a is a rational constant and n is a positive integer or zero, and simple sums of not more than three of these				
	Apply differentiation to gradients and stationary points (turning points)				
	Discriminate between maxima and minima by any method				
Functions	Understand functions, domain and range and use function notation				
	Understand and find inverse functions $\mathrm{f}^{-1}(x)$				
	Form composite functions as defined by $\mathrm{gf}(x) = \mathrm{g}(\mathrm{f}(x))$				

3. Coordinate geometry

Syllabus content	What do you know?	R	A	G	Comments
Coordinates	Use and interpret Cartesian coordinates in two dimensions				
Drawing linear graphs	Draw straight-line graphs for linear equations				
Gradient of linear graphs	Find the gradient of a straight line				
	Calculate the gradient of a straight line from the coordinates of two points on it				
Length and midpoint	Calculate the length of a line segment				
	Find the coordinates of the midpoint of a line segment				
Equations of linear graphs	Interpret and obtain the equation of a straight-line graph				

Syllabus content	What do you know?	R	A	G	Comments
Parallel lines	Find the gradient and equation of a straight line parallel to a given line	☐	☐	☐	
Perpendicular lines	Find the gradient and equation of a straight line perpendicular to a given line	☐	☐	☐	

4. Geometry

Syllabus content	What do you know?	R	A	G	Comments
Geometrical terms	Use and interpret the following geometrical terms: • point • vertex • line • plane • parallel • perpendicular • perpendicular bisector • bearing • right angle • acute, obtuse and reflex angles • interior and exterior angles • similar • congruent • scale factor	☐	☐	☐	
	Use and interpret the vocabulary of: • triangles • special quadrilaterals • polygons • nets • solids	☐	☐	☐	
	Use and interpret the vocabulary of a circle	☐	☐	☐	

Syllabus content	What do you know?	R	A	G	Comments
Geometrical constructions	Measure and draw lines and angles	☐	☐	☐	
	Construct a triangle, given the lengths of all sides, using a ruler and pair of compasses only	☐	☐	☐	
	Draw, use and interpret nets	☐	☐	☐	
Scale drawings	Draw and interpret scale drawings	☐	☐	☐	
	Use and interpret three-figure bearings	☐	☐	☐	
Similarity	Calculate lengths of similar shapes	☐	☐	☐	
	Use the relationships between lengths and areas of similar shapes and lengths, surface areas and volumes of similar solids	☐	☐	☐	
	Solve problems and give simple explanations involving similarity	☐	☐	☐	
Symmetry	Recognise line symmetry and order of rotational symmetry in two dimensions	☐	☐	☐	
	Recognise symmetry properties of prisms, cylinders, pyramids and cones	☐	☐	☐	
Angles	Calculate unknown angles and give simple explanations using the following geometrical properties: • sum of angles at a point = 360° • sum of angles at a point on a straight line = 180° • vertically opposite angles are equal • angle sum of a triangle = 180° • angle sum of a quadrilateral = 360°	☐	☐	☐	
	Know and use angle properties of regular and irregular polygons *(you are expected to use the correct geometrical terminology when giving reasons for answers)*	☐	☐	☐	

Syllabus content	What do you know?	R	A	G	Comments
Circle theorems I	Calculate unknown angles and give explanations using the following geometrical properties of circles: • angle in a semicircle = 90° • angle between tangent and radius = 90° • angle at the centre is twice the angle at the circumference • angles in the same segment are equal • opposite angles of a cyclic quadrilateral sum to 180° (supplementary) • alternate segment theorem *(you are expected to use these geometrical properties when giving reasons for answers)*				
Circle theorems II	Use the following symmetry properties of circles: • equal chords are equidistant from the centre • the perpendicular bisector of a chord passes through the centre • tangents from an external point are equal in length *(you are expected to use these geometrical properties when giving reasons for answers)*				

5. Mensuration

Syllabus content	What do you know?	R	A	G	Comments
Units of measure	Use metric units of: • mass • length • area • volume • capacity in practical situations				
	Convert quantities into larger or smaller units				

Syllabus content	What do you know?	R	A	G	Comments
Area and perimeter	Carry out calculations involving the perimeter and area of a: • rectangle • triangle • parallelogram • trapezium	☐	☐	☐	
Circles, arcs and sectors	Carry out calculations involving the circumference and area of a circle	☐	☐	☐	
	Carry out calculations involving arc length and sector area as fractions of the circumference and area of a circle	☐	☐	☐	
Surface area and volume	Carry out calculations and solve problems involving the surface area and volume of a: • cuboid • prism • cylinder • sphere • pyramid • cone	☐	☐	☐	
Compound shapes and parts of shapes	Carry out calculations and solve problems involving perimeters and areas of: • compound shapes • parts of shapes	☐	☐	☐	
	Carry out calculations and solve problems involving surface areas and volumes of: • compound solids • parts of solids	☐	☐	☐	

6. Trigonometry

Syllabus content	What do you know?	R	A	G	Comments
Pythagoras' theorem	Know and use Pythagoras' theorem	☐	☐	☐	
Right-angled triangles	Know and use the sine, cosine and tangent ratios for acute angles in calculations involving sides and angles of a right-angled triangle	☐	☐	☐	
	Solve problems in two dimensions using Pythagoras' theorem and trigonometry	☐	☐	☐	
	Know that the perpendicular distance from a point to a line is the shortest distance to the line	☐	☐	☐	
	Carry out calculations involving angles of elevation and depression	☐	☐	☐	
Exact trigonometric values	Know the exact values of: • $\sin x$ for $x = 0°, 30°, 45°, 60°$ and $90°$ • $\cos x$ for $x = 0°, 30°, 45°, 60°$ and $90°$ • $\tan x$ for $x = 0°, 30°, 45°$ and $60°$	☐	☐	☐	
Trigonometric functions	Recognise, sketch and interpret the following graphs for $0° \leqslant x \leqslant 360°$: • $y = \sin x$ • $y = \cos x$ • $y = \tan x$	☐	☐	☐	
	Solve trigonometric equations involving $\sin x$, $\cos x$ or $\tan x$, for $0° \leqslant x \leqslant 360°$	☐	☐	☐	
Non-right-angled triangles	Use the sine rule in calculations involving lengths and angles for any triangle	☐	☐	☐	
	Use the cosine rule in calculations involving lengths and angles for any triangle	☐	☐	☐	
	Use the formula area of triangle = $\frac{1}{2}ab \sin C$	☐	☐	☐	
Pythagoras' theorem and trigonometry in 3D	Carry out calculations and solve problems in three dimensions using Pythagoras' theorem and trigonometry, including calculating the angle between a line and a plane	☐	☐	☐	

7. Transformations and vectors

Syllabus content	What do you know?	R	A	G	Comments
Transformations	Recognise, describe and draw the following transformations: • Reflection of a shape in a straight line • Rotation of a shape about a centre through multiples of 90° • Enlargement of a shape from a centre by a scale factor • Translation of a shape by a vector $\begin{pmatrix} x \\ y \end{pmatrix}$	☐	☐	☐	
Vectors in two dimensions	Describe a translation using a vector represented by $\begin{pmatrix} x \\ y \end{pmatrix}$, $\overrightarrow{AB}$ or $\mathbf{a}$	☐	☐	☐	
	Add and subtract vectors	☐	☐	☐	
	Multiply a vector by a scalar	☐	☐	☐	
Magnitude of a vector	Calculate the magnitude of a vector $\begin{pmatrix} x \\ y \end{pmatrix}$ as $\sqrt{x^2 + y^2}$	☐	☐	☐	
Vector geometry	Represent vectors by directed line segments	☐	☐	☐	
	Use position vectors	☐	☐	☐	
	Use the sum and difference of two or more vectors to express given vectors in terms of two coplanar vectors	☐	☐	☐	
	Use vectors to reason and to solve geometric problems	☐	☐	☐	

8. Probability

Syllabus content	What do you know?	R	A	G	Comments
Introduction to probability	Understand and use the probability scale from 0 to 1				
	Understand and use probability notation				
	Calculate the probability of a single event				
	Understand that the probability of an event not occurring = 1 – the probability of the event occurring				
Relative and expected frequencies	Understand relative frequency as an estimate of probability				
	Calculate expected frequencies				
Probability of combined events	Calculate the probability of combined events using, where appropriate: • sample space diagrams • Venn diagrams • tree diagrams				
Conditional probability	Calculate conditional probability using Venn diagrams, tree diagrams and tables				

9. Statistics

Syllabus content	What do you know?	R	A	G	Comments
Classifying statistical data	Classify and tabulate statistical data				
Interpreting statistical data	Read, interpret and draw inferences from tables and statistical diagrams				
	Compare sets of data using tables, graphs and statistical measures				
	Appreciate restrictions on drawing conclusions from given data				

Syllabus content	What do you know?	R	A	G	Comments
Averages and measures of spread	Calculate the: • mean • median • mode • quartiles • range • interquartile range for individual data and distinguish between the purposes for which these are used	☐	☐	☐	
	Calculate an estimate of the mean for: • grouped discrete data • grouped continuous data	☐	☐	☐	
	Identify the modal class from a grouped frequency distribution	☐	☐	☐	
Statistical charts and diagrams	Draw and interpret: • bar charts • pie charts • pictograms • stem-and-leaf diagrams • simple frequency distributions	☐	☐	☐	
Scatter diagrams	Draw and interpret scatter diagrams	☐	☐	☐	
	Understand what is meant by positive, negative and zero correlation	☐	☐	☐	
	Draw by eye, interpret and use a straight line of best fit	☐	☐	☐	
Cumulative frequency diagrams	Draw and interpret cumulative frequency tables and diagrams	☐	☐	☐	
	Estimate and interpret the median, percentiles, quartiles and interquartile range from cumulative frequency diagrams	☐	☐	☐	
Histograms	Draw and interpret histograms	☐	☐	☐	
	Calculate with frequency density	☐	☐	☐	

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