Higher Tier

Year 11 Pupil Guide to Maths

A handbook to achieve your best possible outcomes

LIONHEART EDUCATIONAL TRUST

This guide aims to provide you with all the information you need to make the most of your maths lessons and revision time during Year 11. We want to help you achieve your best possible grade in maths and have the maths skills you need for the next stage of your education.

Our aim as maths teachers across all Lionheart schools is that:

All pupils are confident in maths; equipped with strong procedural and conceptual understanding for future education and for life.

You don't need to read this whole guide in one go (although you can), but dip in and look at relevant parts throughout the year.

Pick one of these quotes and use it to encourage yourself when things are hard this year.

"Success is the sum of all efforts, repeated day-in & day-out." **-** *R. Collier*

"Failure will never overtake me if my determination to succeed is strong enough." - Og Mandino

"Don't let what you cannot do interfere with what you can do." - John Wooden

"Excellence is not a skill. It is an attitude." - Ralph Marston

"You are braver than you believe, stronger than you seem and smarter than you think." - A.A Milne

"The more that you read, the more things you will know, the more that you learn, the more places you'll go." - Dr. Seuss

"There is no secret to success. It is the result of preparation, hard work, and learning from failure." - General Colin Powell

"Every accomplishment starts with the decision to try." - Gail Devers

All possible care has been taken to ensure that this guide is accurate.
If you spot any errors then please let us know via this form: forms.office.com/e/beEJqcTgjp

2024/2025 | version 1.3

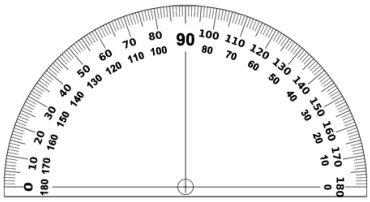
Contents

1. Pupil Checklist

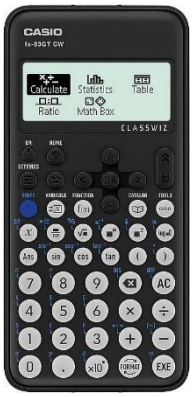
These are essential things that you must do. They don't all have to be done at once, so come back to this list and tick them off as you do them.

☐ Have a full set of equipment for all maths lessons, revision and exams
- A black pen and a spare (if one runs out, replace it)
- A ruler
- A rubber
- Two pencils
- A pencil sharpener
- A protractor
- A pair of compasses

Pair of compasses



Protractor



☐ Get a scientific calculator of your own and use it regularly so that you know how it works.
- It's worth getting a good calculator, it will make it easier for you in the exams.
- If you don't have a good one then get a Casio FX-83GTCW (about £12).

Casio Calculator at Amazon

☐ Make sure you are clear about what you have been taught and what is still to come. See page 5 and ask your teacher if you are not sure.

☐ Plan and start your independent revision as soon as possible. See page 10.

☐ Find out if there are any intervention or revision sessions that you can go to after school (and go to them)

☐ If you don't know your Complete Maths TUTOR login details, ask your teacher.

☐ Read section 6 on 'Being Metacognitive in Your Maths Work' (from page 16) because that is relevant immediately for your maths lessons.

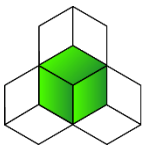
☐ Check you understand all the command words (page 42) and the key maths words (page 56). If you don't then start learning them.

☐ Get familiar with the formula sheet (page 46) to make it easier in the exam.

2. Parent Checklist

These are things you can do to support your child as they go through year 11 and prepare for their maths GCSE.

- ☐ Read this guide with your child and discuss what they can do to achieve the best possible outcome in the maths GCSE.
- ☐ Make sure your child has a full set of equipment including a good quality scientific calculator (see page 4). If your child qualifies as Pupil Premium, ask the school to help with equipment.
- ☐ Be clear about your child's current attainment and what is a realistic expectation for them to achieve in the GCSE exams.
- ☐ Know when the trial (mock) exams are scheduled (page 28) and check that your child is preparing properly for them
- ☐ Understand how the exams work (page 22) and which tier they will be entered for (page 27).
- ☐ Help them to structure their revision (see page 10).
- ☐ Encourage them to set aside specific planned revision time and to keep distractions (their phone) well away from them.
- ☐ If possible, find them a quiet space where they can concentrate on their work and keep their resources organised.
- ☐ Offer to test your child on basic knowledge such as the key maths words on page 56.
- ☐ Encourage your child to have a growth mindset and believe that they can always improve their understanding of maths with hard work.
- ☐ If you or your child are unsure about anything to do with maths or the GCSE exams, encourage your child to speak to their teacher or email them. If you don't have the teacher's email address then your child can find it by searching their name in their school email app.
- ☐ Sign up for a free parent account at Complete Maths TUTOR. You can link your account to your child's and keep track of the work they are doing. Some encouragement will go a long way.



Complete Mathematics TUTOR

bit.ly/CMT-parent

3. The Structure of Maths in Year 11

Our maths curriculum is a five-year journey that builds on what you learned in primary school and prepares you for the GCSE exams as well as the next stages of your education.

The full five-year curriculum outline (pdf), which lists everything you need to know and be able to do is available at:
bit.ly/LHTmaths

In year 11 the curriculum continues from where you got to at the end of year 10, which builds on years 7-9.

Your teacher will decide the pace at which you progress through the curriculum. It is more important to learn content properly than to 'get through' the curriculum without really learning it.

If you are working towards Foundation tier then you will have less content to learn in the later blocks. All content in **bold** is for Higher tier only.

Assessments (tests)

The assessments that your teacher will use to help you and them understand how well you are learning the content will continue in a similar way to previous years. As you move through year 11, the focus will become more on larger tests (trial exams) that show how well you know all the content you need for the GCSE exams.

Topic tests

In the same way as in previous years, short topic tests will focus on the specific content of each topic. As in year 10, these are exam style questions, some short and some longer.

Trial (mock) exams

You will sit four trial exams during year 11, which are important to help you prepare for the final exams. These will show how well you have learned the content and can apply it. You can read more about the trial exams from page 28.

Revision

The GCSE exams test content you have learned in maths from primary school and all through years 7-11. It is important that you revise everything that you are not already able to do easily. This revision will include:

- Structured revision activities in lessons (page 7)
- Compulsory homework
- Independent revision that you must do in your own time (page 10)
- Revision and intervention sessions outside lessons, e.g. after school (page 21)

Content of the Year 10 and Year 11 maths curriculum

The topics in **bold** are Higher tier only. There are also Higher tier only parts in some of the other topics.

Blocks	Topics
19a Non-Linear Algebra (start of year 10)	▪ Review of linear algebra ▪ Quadratics
20a Number	▪ Application of existing number knowledge ▪ Indices and Surds
19b Non-Linear Algebra	▪ Algebraic fractions ▪ Graphs ▪ Algebraic applications
20b Number	▪ Proportional reasoning ▪ Rounding
21 Comparing Data	▪ Construct and interpret statistical diagrams ▪ Scatter graphs ▪ Understand and apply statistics
22 Reasoning	▪ Angle proof ▪ Vectors ▪ Algebraic proof
23 Geometry	▪ Bearings ▪ Trigonometry and Pythagoras ▪ Similarity and congruence ▪ Transformations
24 Probability	▪ Listing ▪ Experimental probability ▪ Combined events
25 Algebra and Geometry	▪ Using angle and shape facts to derive results ▪ Proof in algebra and geometry (inc. vectors) ▪ Arcs and sectors ▪ **Equations of circles and tangents** ▪ **Circle theorems** ▪ Proportion
26 Shape and Trigonometry	▪ Loci and constructions ▪ Properties of 3-D shapes, their plans and elevations ▪ Surface area and volume ▪ **Similar areas and volumes** ▪ Trigonometry **(inc. non-right angled)**
27 Number and Statistics	▪ Percentages ▪ Correlation ▪ Time series ▪ **Distributions** ▪ Compound units
28 Further Algebra	▪ **Functions** ▪ **Gradients of curves & areas under graphs** ▪ **Kinematics** ▪ Sequences ▪ **Iteration**

4. In-Class and Compulsory Revision Programme

During Year 11, a series of structured revision activities take place in all maths classes, starting in the autumn term and continuing right up to the exams in the summer. There are also some resources to support your independent revision at home. These activities are designed to help prepare you for the exams, so it's essential to use them effectively and take responsibility for strengthening any areas where you feel less confident.

Autumn Term

Topic-Based Exam Question Booklets

Each topic-based booklet includes exam questions on a major area of the curriculum (e.g. Number or Algebra). You will work through each booklet in class, covering one topic at a time.

Process:

1. Your teacher will select specific questions for you to complete and provide a time limit. This helps you practice working at an exam pace, though you'll initially have more time than you would in an actual exam.
2. You will answer the questions independently and in silence. This is important, as it helps you practice reading and understanding exam questions, recalling necessary knowledge, and answering effectively, showing all working and good exam techniques.
3. Your teacher will model the correct solutions and explain where how the marks are awarded.
4. You'll then mark your work, make any corrections, and add notes to ensure you understand the methods and answers.

Remember: the goal is to improve your ability to answer exam questions. If there's something you don't understand or can't answer, it's up to you to seek clarification and improve.

The topic booklets cover:

- Number
- Algebra
- Geometry
- Mensuration (measurements)
- Probability
- Statistics

Any unfinished questions from a booklet should be used as part of your independent revision, and your teacher may assign these as specific homework.

Spring Term

Each week, you'll have **three types** of in-class revision tasks. These may be given at the start of the lesson or at another point, depending on your teacher's plan.

Ten short retrieval questions

These are to help you practice basic procedures and recall key knowledge. The questions will cover a mix of topics. It's crucial to know how to answer each question, so if you can't answer one, you need to learn how and practice similar questions.

One or two reasoning (AO2) and problem-solving (AO3) questions

These exam-style questions help you apply your knowledge, often requiring you to think hard. It's important to work through these independently—this is the kind of thinking you'll need to do in the exams. Use these questions to ensure you understand key mathematical word, and if there's a word you don't know, ask your teacher.

Multiple-choice retrieval questions

These will be on paper. Don't guess the answer; work it out and use the provided space to show your working and/or explain how you arrived at your answer. Incorrect options are designed to reveal any misunderstandings you may have, helping your teacher guide you in addressing these.

Homework booklet

During the spring term, you'll receive a homework booklet with around eight questions each week. These questions cover different topics to help you get comfortable switching between concepts—a vital skill for the exams.

Your teacher will provide answers and model solutions to help you understand the questions. It's your responsibility to work on any areas you find challenging by:

- Listening carefully to your teacher, making sure you have a copy of the correct solution and adding notes to help you understand when you come back to revise. Just because you can follow the teacher's work doesn't guarantee you'll be able to do it independently later.
- Testing yourself during independent revision on questions you initially couldn't solve. Try them again without looking at the solution, then check your work using the model solutions and your notes.
- Focusing on understanding the topic, not just memorising specific answers. Use Complete Maths Tutor or other resources to strengthen your understanding.

Easter break

Daily revision questions

You'll receive a booklet with around five questions for each weekday of the Easter break. These questions cover various topics and difficulty levels. Use this resource as **part** of your maths revision over Easter. Worked solutions, in both written and video formats, will be available on the VLE each day to help you check your work.

Summer term

Split papers

As the exams approach, you'll spend time in lessons on past exam papers. For effective practice, you'll use split papers, where each section represents one-third of a full exam paper. Each split

paper should take around 30 minutes to complete, though your teacher may adjust the time as needed.

Each split paper mixes questions from across the entire exam, so you'll practice switching between easier and more challenging questions. This is essential for the exams, as you'll need to choose appropriate methods on different topics.

Understanding common misunderstandings

You'll discuss with your teacher common misunderstandings that often occur on exam questions. You can also work through these independently within this guide from page 32.

Walking, Talking Mocks and Marks

Walking talking mocks

You may participate in a walking, talking mock in either an exam room or classroom. This is to improve your exam technique and help you practice completing full exam papers.

Unlike regular practice papers, you'll be guided through each step. Here's how it generally works:

1. Your teacher will introduce a question or a set of questions, highlighting key information and offering tips to help you approach the answer.
2. You'll get a specific amount of time, based on the number of marks, to answer each question. Timing is key to prepare you for using your time effectively in real exams.
3. The teacher will then model the solution(s), explaining their thought process and demonstrating the correct working and mark allocation.
4. Mark your answers and make notes to improve. Even if you score full marks, there may be ways to make your answers even clearer.
5. This process continues for either the whole paper or as long as the session allows.

*Walking talking **marks***

This works similarly to a walking, talking mock but focuses on one or two questions only, taking place in your maths lessons.

5. Independent Revision

Apart from your maths lessons, the amount and quality of your independent revision will make the biggest difference to how well you do in your maths GCSE (see cake on page 21).

Revision in maths is straightforward:

To revise maths effectively you need to be doing maths

→ Practice questions on topics that you can't do easily yet and topics that you can do but need to remember better (retrieval).

→ Mix up the topics each time you do practice questions.

→ If you get stuck, get some help from a video, worked example, friend or your teacher.

→ Come back to topics again another time to help you remember better.

Reading about maths or talking about it aren't effective ways of revising. The only way you can check whether you understand a topic is to have a go at questions on your own, with no help (as you will have to do them in exams).

There are lots of ways to practice maths questions and get help when you need it. Use the resources suggested below.

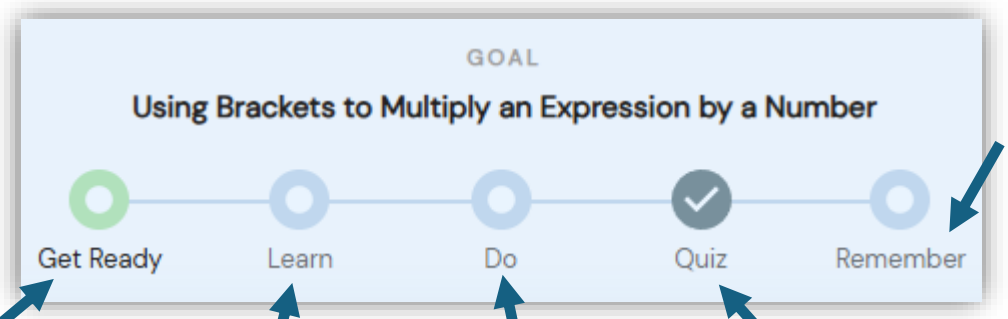
Complete Maths TUTOR

We have invested in Complete Maths TUTOR to support your independent work because, if you use it properly, it is a powerful way to revise all the maths you need, independently.

Complete Mathematics TUTOR

Pupils who used TUTOR regularly and targeted the right content have made accelerated progress, often gaining two grades more during year 11 than they may have done otherwise.

TUTOR's five step process within each 'Goal' follows the principles of how people learn.



A retrieval quiz with questions from mixed goals to help **improve long-term memory**

Check if you are ready to work on this new content by taking a quiz on the **maths you need to know before starting** this goal.

Watch the **video lesson** where an experienced teacher teaches the key facts you need.

Example / problem pairs
Watch worked examples and then have a go at similar questions on paper.

Take a quiz to **check your understanding** of the knowledge you have just worked on

For TUTOR to be most effective you must be working on the correct content. If it is too easy then you won't learn anything new (and will get bored). Your teacher may set specific work for you to do, but you can also select your own course to work through.

Make sure you attempt the practice examples (in the 'Do' section) on paper, not just in your head, to be sure you can do them.

A great focus would be the 'Target Grade' course for the grade you are currently working at. When you have mastered that content you can move onto the next grade.

You can also use TUTOR to work on something that you might have found difficult in lessons or exams. Ask your teacher to set you a bespoke course or search for a topic course yourself.

You should use TUTOR little and often as part of your ongoing revision, as well as completing homework. See page 13 for ideas of how to organise your revision.

Other Recommended Resources

It is important that you spend time working on paper as well as from a screen. Use these other resources as well as Complete Maths TUTOR.

Resources provided by your teacher

- ☐ Topic exam question booklets in the autumn term (page 7)
- ☐ Homework booklets in the spring term and Easter holiday (page 8)

Exam questions organised by topic

So that you can select the topics you need to practice. Most of these also include videos to help you if you get stuck.

Corbett Maths	corbettmaths.com/contents		Use 'Ctrl + F' or equivalent to search the page for a topic.
1st Class Maths	1stclassmaths.com/aqarevision		Topics are organised by approximate order of difficulty.
Dr Frost Maths	drfrost.org/worksheets.php?wdid=27		An example exam question of each type seen for each topic.
Maths Genie	mathsgenie.co.uk/gcse.php		Topics are organised by approximate order of difficulty.
Maths4Everyone	maths4everyone.com/pages/gcse-questions-by-topic.php		Use the dropdowns on the left and right to select the topics.

Mixed exam questions

So that you can practice a mixture of topics and switching between them. These are set up as practice exam papers, because switching between topics is what you must do in exams.

1st Class Maths	1stclassmaths.com/exam-papers		Make sure you select AQA papers of the correct tier. All year's papers are useful.
Corbett Maths	corbettmaths.com/2019/04/01/gcse-practice-papers/		Make sure you select the correct tier.

Official AQA past papers

Questions from some past papers are used for our revision resources, so you want to avoid those. If you want additional papers to practice then use these ones.

AQA Questions matter

June 2023	Higher Paper 1	Higher Paper 2	Higher Paper 3
	bit.ly/AQA-JUN23-1H-QP	bit.ly/AQA-JUN23-2H-QP	bit.ly/AQA-JUN23-3H-QP
	Paper 1 Markscheme	Paper 2 Markscheme	Paper 3 Markscheme
	bit.ly/AQA-JUN23-1H-MS	bit.ly/AQA-JUN23-2H-MS	bit.ly/AQA-JUN23-3H-MS
Nov 2022	Higher Paper 1	Higher Paper 2	Higher Paper 3
	bit.ly/AQA-NOV22-1H-QP	bit.ly/AQA-NOV22-2H-QP	bit.ly/AQA-NOV22-3H-QP
	Paper 1 Markscheme	Paper 2 Markscheme	Paper 3 Markscheme
	bit.ly/AQA-NOV22-1H-MS	bit.ly/AQA-NOV22-2H-MS	bit.ly/AQA-NOV22-3H-MS

How to Use Past Papers Effectively

Past papers are a great way of revising once you are confident with at least most of the topics you need to know for the exam (see the revision checklist from page 47). Use the other revision resources first and move to full past papers as you get closer to the final exams in the summer.

When you are using past papers for revision:

- Do them in exam style conditions – in silence, without help and with the same time limit as the exams. Put your phone away (preferably in a different room)
- Try hard to answer all the questions before you seek help.
- Mark the paper carefully with the mark scheme. See page 24 for help with mark schemes.
- Write down all the things that you got wrong or couldn't do.
- Find out how to do the things you couldn't by asking your teacher or using revision videos.

How to Organise Your Independent Revision

You should start revising at home **as soon as you can** in year 11.

Revision is most effective if it is done **little and often** rather than in big sessions.

If you wait until near the exams to start revising then you won't have enough time to prepare well for all your subjects.

Plan your maths revision sessions each week

- At least 20-30 minutes three times a week. You may change this to 40-60 minutes three times a week later in the year. The sooner you start, the less you will need to do each week.
- Plan what you will do in each session in advance, so you don't waste the first few minutes deciding.
- Keep your resources organised so they are easy to find.
- Do a mixture of topic specific practice and mixed practice.
- Keep a record of the topics you have found difficult in lessons, in tests and in previous revision sessions.
- Use a mixture of on-screen work and practice on paper.
- Always check your answers and working carefully against the mark scheme.

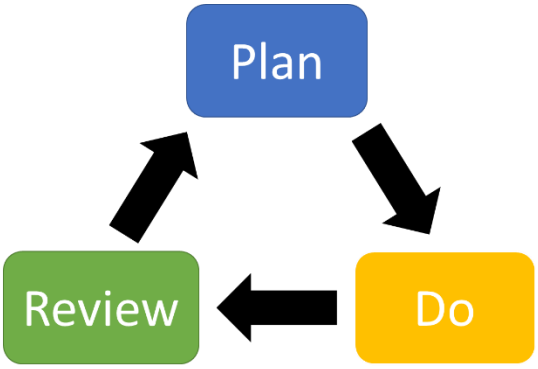
Plan, Do, Review Cycle

You can follow this cycle to organise each session or series of sessions. Don't neglect the planning and review stages, they will make the time you are going your revision more effective.

Plan
Identify areas of weakness
Create a revision plan

Do
Practice questions
Use videos and examples to help
Little and often
Topics that are hard, not easy
On paper and on screen

Review
Check your answers and working
Test yourself regularly
Adjust what you need to work on



Regular short retrieval

It is a good idea to do regular short retrieval practice every day if you can.

Try these resources:

- 'Memory Boost' on Complete Maths TUTOR – *try to keep your daily streak going*
- 5 a day on Corbett Maths – *five questions for every day of the year*
  corbettmaths.com/5-a-day/gcse

Corbett Maths 5-a-day

Revision Tips

These tips will help you make your revision easier and more effective.

- ✓ Many of the websites work well on phones including Complete Maths TUTOR. Why not do the Memory Boost on the Bus (if you get one) or first thing in the morning.

- ✓ Get a notebook and keep it with you in maths lessons and while you are revising. Write down anything that you have found difficult and know they you need to do some more work on. You can also write any questions you need to ask your teacher.

- ✓ Learning is hard work because it is challenging. If you are finding all your revision sessions easy then maybe you aren't working on the right topics. You should spend your time on things you can't do well yet and avoid spending much time on things you can already do easily.

- ✓ Review things you have learned regularly. If you did something new (or that you didn't understand before) in a session then plan to revisit it the following week by practicing some questions.

- ✓ Use the revision checklist (page 47) to make sure that you are covering all the content you need to know. If you are unsure about how important a topic is for you then ask your teacher.

- ✓ Practice answering exam questions and full papers in the same time as you have for the exams. That means appropriately one minute per mark.

- ✓ Have and use your own scientific calculator in lessons and revision. The more familiar you are with it before the exams, the easier you will be able to use it and then better you will do.

- ✓ Take advantage of any afterschool revision or intervention sessions you are offered but remember that they are extra and not instead of your independent revision.

- ✓ Use all your lesson time well. You must be there, so make the most of the lessons and time with your teacher.

- ✓ Put your phone in a different room when you are trying to concentrate on your revision. Give yourself short breaks and time on your phone if you need to, but when you are working keep possible distractions away.

6. Being Metacognitive in Your Maths Work

To learn best you need to understand the difference between:

- **Cognition**: doing the thinking
- **Metacognition**: reflecting on and managing your thinking

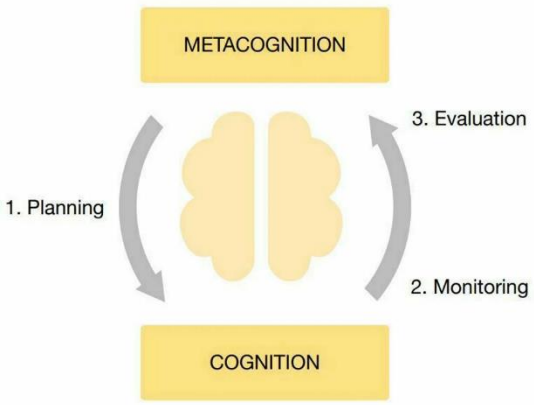
In maths, cognition is all the things you learn and ways to use that knowledge. This includes remembering, reasoning, problem-solving and understanding maths language.

Metacognition is being aware of and controlling your cognitive processes, thinking about your thinking. For example, if you notice that an approach to solving a maths problem isn't working and so you choose a different strategy.

> Although you can learn about the idea of metacognition in a general way, metacognition is specific to the subject. You need the subject knowledge (cognition) to be able to reflect on it and manage it (metacognition).

We use a three-part process to help us be metacognitive (manage our thinking):

1. **Planning:** *before a task*
    - how are you going to do a task
2. **Monitoring**: *during a task*
    - how well is it going and what do you need to adjust
3. **Evaluation:** *after a task*
    - how successful was your approach and what can you improve for next time



The Metacognition cycle

Your teacher will support your in developing and using metacognitive strategies in maths, but only you can control how hard you think and what you think about.

When you are working independently, you need to practice the process of planning, monitoring and evaluating each task that you do.

Metacognition is important because these are the things that the most effective and successful learners (of all ages) do. It doesn't come naturally to most of us, so we need to be deliberate about doing it.

What to actually do

Being metacognitive sounds fancy and complicated, but it is simple in practice. You just need to take a step back from your work and spend a short amount of time thinking about what you are going to do, what you are doing and what you have done.

Here are some questions you can ask yourself, when you are working in class or independently at home, that will guide you to think about what you are doing.

Planning: before a task

- What is this task/question asking me to do? What else do I need to know?
- When have I seen a task/question like this before? What did I do then? Was it successful?
- How is this different to what I have seen before?
- What maths (knowledge and processes) do I need to use for this task/question?
- What example(s) have I seen that will help?
- What are the steps I am going to take to answer this question?
- How motivated am I to attempt this task/question?

Monitoring: during a task

- Is my planned approach working?
- Are there any different ways to solve this?
- Does my working out look like the examples I have seen? Is it logical and clear so that someone else could follow it?
- Have I estimated an answer to check whether my answer is sensible?
- Is my answer sensible? If not, why not?
- Have I checked my working for mistakes?

Evaluation: after a task

- Am I convinced that I have the correct answer? How can I check?
- Have I checked my answer is the same as someone else's and/or the teacher's answer, or the mark scheme?
- What have I done well?
- How could I improve my working out or method?
- Have I missed anything from my answer, such as units, degree of accuracy?
- Can I explain my method and answer clearly to someone else?
- If I had a similar task/question in the future, what could I do differently/better?
- How did my motivation affect my performance?

You may have to go through the cycle of planning, monitoring and evaluation several times during a task or problem. See page 20 for an example of this.

Reciprocal Reading for Exam Questions

Reciprocal Reading is a metacognitive approach to making sure you understand something you are reading.

In maths, we can use this to understand maths problems and specifically exam questions.

It is a helpful process to think through for any questions that you don't immediately know how to answer.

Go through this Reciprocal Reading process when you do problems in lessons or when working independently. Use the resources available to you (e.g. your teacher, your book, the internet) to clarify and find answers to your questions.

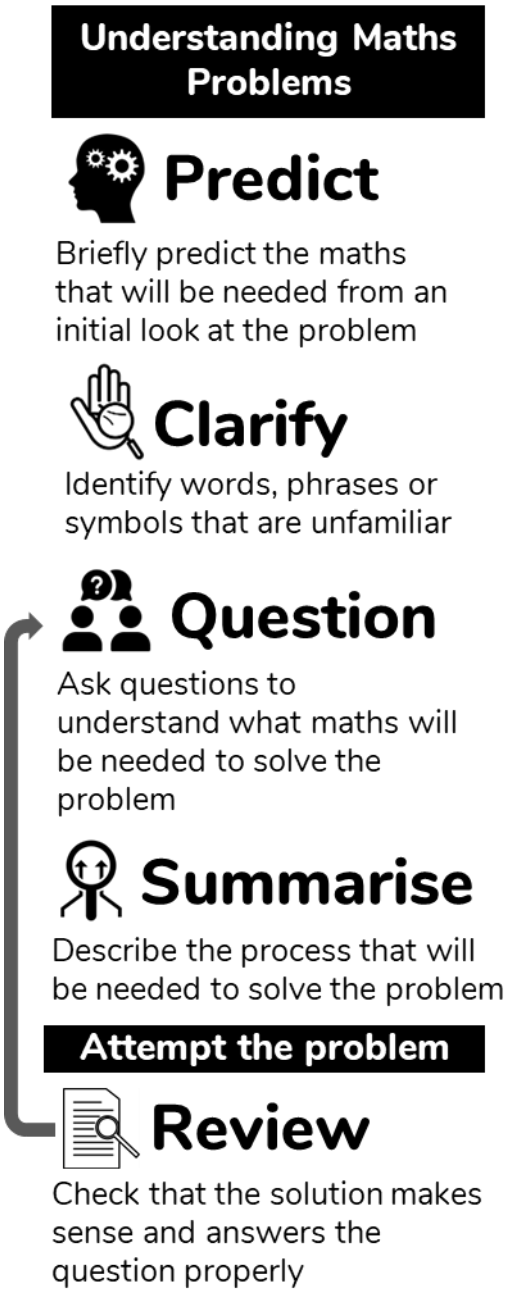
The more you practice this approach, the more natural you will find it. Thinking through this structure can help you tackle questions in exams that you don't know how to start. This may help you earn some marks for a question that you might not have otherwise.

You will see that this fits with our three-part process.

- ✓ Predict
- ✓ Clarify
- ✓ Question
- ✓ Summarise

→ **Planning**

- ✓ Attempt the problem → When you **monitor**
- ✓ Review → **Evaluation**



Ask your teacher to help you with this process when you do exam questions during in-class revision.

Don't be put off if you find it hard to answer exam questions. The effort required to tackle challenging questions is worthwhile and using strategies like Reciprocal Reading can help.

How to Receive Feedback and Respond to it

You get feedback on your work every day and every time you attempt a maths question.

This feedback comes in different forms and may include:

- Seeing how well you can answer the question and how confident you feel
- Comparing your answer to other people's answers and the correct answer
- Comparing your working out to other peoples' and the teachers' model solution
- Discussing your work with someone else in the class
- What the teacher says to the whole class about the question
- What the teacher says to you specifically about the question
- What the teacher writes on your work
- The examiners' expectations that you can see from the mark scheme
- Your own evaluation of your work

Feedback is very powerful and useful to help you improve your understanding of maths, but it will only do that if you engage with it properly. This means that you need to pay attention to it and do something with it!

The principles of effective feedback

These are three stages that need to happen for feedback to help you improve.

1 What good looks like	2 What's good and what could be better	3 How you are going to improve
You need to know what good looks like. You should aim for your work to match the quality of: ✓ Worked examples ✓ Your teacher's guidance ✓ Mark schemes	You need to know how your work compares to 'good'. This is where you receive the feedback. This could relate to: ✓ How well you have done the task/question ✓ How well you understand the topic ✓ How well you have organised your work	Take responsibility for acting on the feedback. It's not magic and will only help if you use it. This requires effort. ✓ Welcome the opportunity to improve. ✓ Make sure you understand the feedback ✓ Do something active with it

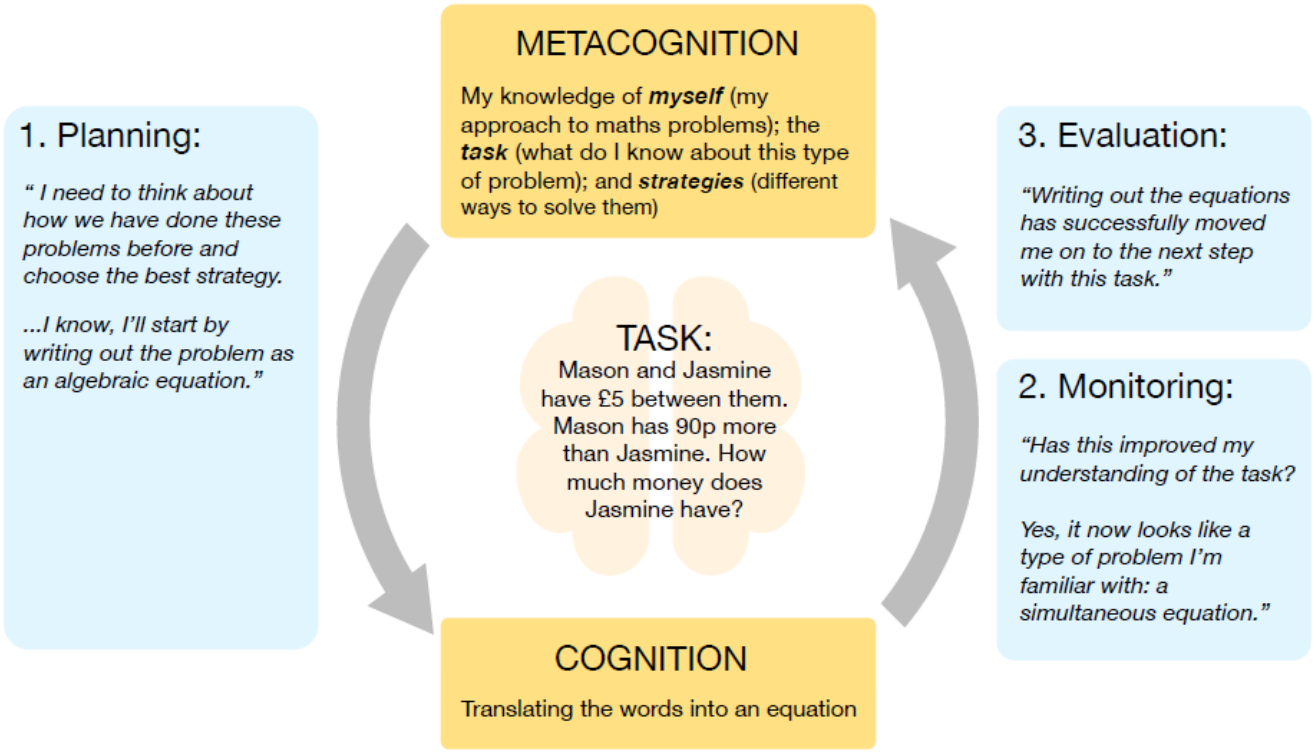
You need to take responsibility for this. The more independent you can become in getting feedback on your work and acting on it, the more effective a learner you will be. This is vital as you move into the next stages of your education after year 11.

Doing something with feedback

Whether the feedback comes from your own evaluation or from someone else, it will only help you improve your understanding if you do something actively with it. We often call this 'closing the gaps' in your knowledge.

- Check that you understand the feedback and ask if you don't.
- Decide whether you have got a correct solution, made a careless mistake or didn't understand/know what to do.

1. *If you had a correct solution, see how you could improve next time:*
   - More detail in your working out.
   - Setting your work out more neatly and/or logically.
   - Communicating better by adding additional information.
2. *If you made a careless mistake:*
   - Remember to check your work after answering a question to find and correct these types of mistakes.
   - Practice similar questions and make sure you don't make the same mistake.
3. *If you didn't understand or know what to do (even if you thought you did):*
   - Make sure you have a complete worked example for the type of question.
   - Revise that topic (not just the question). You may want to ask your teacher to direct you to exactly what to revise.
   - Have another go at the question (without looking at the solution).
   - Practice other similar questions to make sure you can now answer them.



An example of the Metacognition cycle for part of a maths question

7. Extra Curricula Interventions

You have at least 5 lessons (4 hours and 10 minutes) of maths lessons every week during year 11.

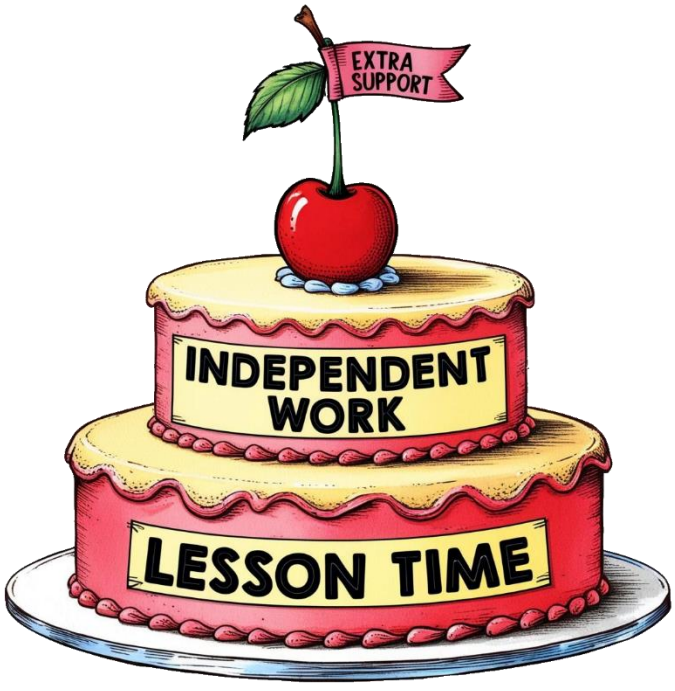
The things that will have the biggest impact on how successful you are in your GCSE will happen in this **lesson time** and will depend on:

- Your attitude.
- How well you use your lesson time.
- How hard you think, how well you listen and how well you keep your attention on what it should be on.
- Whether you take responsibility for your own understanding and ask if you need help.
- How well you use your independent revision time and homework to follow up what you do in lessons.

The **independent work** that you do outside of lessons, mostly at home, will have the next biggest impact. You need to be organised so that you can balance all your subjects and make time to revise effectively. For what effective revision looks like in maths see page 10.

If you have the privilege to get **extra support**, like after school, holiday or tutor time intervention sessions then you should make the most of it.

- Treat it as seriously as you should a lesson:
  - Attend every session
  - Arrive on time and stay for the whole session
  - Concentrate and work hard
- Realise it is only an extra, the cherry on the cake of your work:
  - It adds to your independent work, it doesn't replace it.
  - Extra intervention sessions won't make up for not using your lesson time well.



How different aspects impact how you do in your maths GCSE

8. How the Maths Exams Work

We follow the AQA Maths GCSE specification. The course code is 8300 and full details can be found on the AQA exam board website at: https://www.aqa.org.uk/subjects/mathematics/gcse/mathematics-8300/

Paper 1: non-calculator
What's assessed Content from any part of the specification may be assessed
How it's assessed ▪ written exam: 1 hour 30 minutes ▪ 80 marks ▪ non-calculator ▪ 33⅓% of the GCSE Mathematics assessment
Questions A mix of question styles, from short, single-mark questions to multi-step problems. The mathematical demand increases as a pupil progresses through the paper.

Paper 2 and paper 3: calculator
What's assessed Content from any part of the specification may be assessed
How it's assessed ▪ written exam: 1 hour 30 minutes per paper ▪ 80 marks per paper ▪ calculator allowed ▪ 33⅓% of the GCSE Mathematics assessment on each paper
Questions A mix of question styles, from short, single-mark questions to multi-step problems. The mathematical demand increases as a pupil progresses through the paper.

GCSE Mathematics has a Foundation tier (grades 1 – 5) and a Higher tier (grades 4 – 9). Pupils must take three question papers at the same tier.

All content can be assessed on any of the three question papers. As such, some questions will draw together elements of maths from different topic areas.

The table below shows the approximate weightings of the topic areas for the overall tier of assessment, **not** for each individual question paper.

Topic Area	Foundation Tier (%)	Higher Tier (%)
Number	25	15
Algebra	20	30
Ratio	25	20
Geometry	15	20
Probability and statistics (combined)	15	15

Assessment Objectives (AOs)

These are the things that the exam board assesses in the exams. Understanding assessment objectives is important because these are the things that they want to see that you can do with the knowledge of the topics you have learned.

AO1: Use and apply standard techniques

Pupils should be able to:

- accurately recall facts, terminology and definitions
- use and interpret notation correctly
- accurately carry out routine procedures or set tasks requiring multi-step solutions.

AO2: Reason, interpret and communicate mathematically

Pupils should be able to:

- make deductions, inferences and draw conclusions from mathematical information
- construct chains of reasoning to achieve a given result
- interpret and communicate information accurately
- present arguments and proofs
- assess the validity of an argument and critically evaluate a given way of presenting information.

AO3: Solve problems within mathematics and in other contexts

Pupils should be able to:

- translate problems in mathematical or non-mathematical contexts into a process or a series of mathematical processes
- make and use connections between different parts of mathematics
- interpret results in the context of the given problem
- evaluate methods used and results obtained
- evaluate solutions to identify how they may have been affected by assumptions made.

Here are the approximate weightings for each assessment objective. They are different for the two tiers.

Foundation tier

Assessment objectives	Weighting in each paper (approx. %)	Overall weighting (approx. %)
AO1	40-60	50
AO2	15-35	25
AO3	15-35	25

Higher tier

Assessment objectives	Weighting in each paper (approx. %)	Overall weighting (approx. %)
AO1	30-50	40
AO2	20-40	30
AO3	20-40	30

Mark Schemes

GCSE exams are marked to award positive achievement wherever possible. This means that the examiner will be looking to give you as many marks as they can and give you the benefit of the doubt. Your job is to make it easy for them to give you marks. Read the exam technique section from page 30 for help with how you do this.

Types of marks in maths exams

These are the different types of marks that can be given. If you look at a mark scheme you will see these abbreviations in the 'Mark' and/or 'Comments' columns.

M	Method marks are awarded for a correct method which could lead to a correct answer.
A	Accuracy marks are awarded when following on from a correct method. It is not necessary to always see the method. This can be implied.
B	Marks awarded independent of method.
ft	Follow through marks. Marks awarded for correct working following a mistake in an earlier step.
SC	Special case. Marks awarded for a common misinterpretation which has some mathematical worth.
M dep	A method mark dependent on a previous method mark being awarded.
B dep	A mark that can only be awarded if a previous independent mark has been awarded.
oe	Or equivalent. Accept answers that are equivalent. eg accept 0.5 as well as $\frac{1}{2}$
[a, b]	Accept values between a and b inclusive.
[a, b)	Accept values a $\leqslant$ value < b
3.14...	Accept answers which begin 3.14 eg 3.14, 3.142, 3.1416

You also need to know about these principles that the examiners will use:

Diagrams

Diagrams that have working on them should be treated like normal responses. If a diagram has been written on but the correct response is within the answer space, the work within the answer space should be marked. Working on diagrams that contradicts work within the answer space is not to be considered as choice but as working, and is not, therefore, penalised.

Responses which appear to come from incorrect methods

Whenever there is doubt as to whether a pupil has used an incorrect method to obtain an answer, as a general principle, the benefit of doubt must be given to the pupil. In cases where

there is no doubt that the answer has come from incorrect working then the pupil should be penalised.

Questions which ask pupils to show working

Instructions on marking will be given but usually marks are not awarded to pupils who show no working.

Questions which do not ask pupils to show working

As a general principle, a correct response is awarded full marks.

Misread or miscopy

Pupils often copy values from a question incorrectly. If the examiner thinks that the pupil has made a genuine misread, then only the accuracy marks (A or B marks), up to a maximum of 2 marks are penalised. The method marks can still be awarded.

Further work

Once the correct answer has been seen, further working may be ignored unless it goes on to contradict the correct answer.

Choice

When a choice of answers and/or methods is given, mark each attempt. If both methods are valid then M marks can be awarded but any incorrect answer or method would result in marks being lost.

Work not replaced

Erased or crossed out work that is still legible should be marked.

Work replaced

Erased or crossed out work that has been replaced is not awarded marks.

Premature approximation

Rounding off too early can lead to inaccuracy in the final answer. This should be penalised by 1 mark unless instructed otherwise.

Continental notation

Accept a comma used instead of a decimal point (for example, in measurements or currency), provided that it is clear to the examiner that the pupil intended it to be a decimal point.

Your teacher will show you mark schemes when you look at practice exam papers. You can also ask them for mark schemes for other papers, so that you can look at them in more detail. Understanding how the marks are given will help you make your answers better.

Grades Boundaries and Tiers of Entry

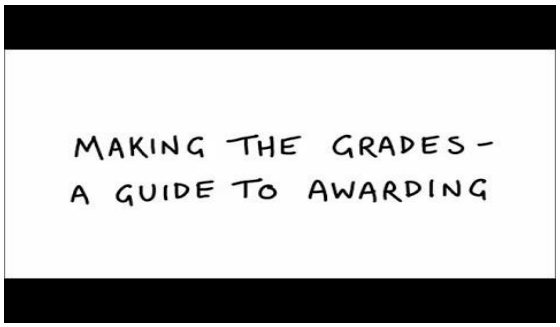
Grades boundaries for final exams

For the final exams, grades boundaries are set by the exam board's senior examiners using a careful process that includes looking at:

- Exam scripts that are close to the boundaries from this year and last year to make sure that each grade is the same standard every year.
- Statistical evidence, for example the performance in earlier tests taken by the pupils who took the exam.

This means that a set of grade boundaries are only valid for a specific set of exams.

Watch AQA's Video about how they set boundaries and award grades



Click to watch video

Scan to watch video

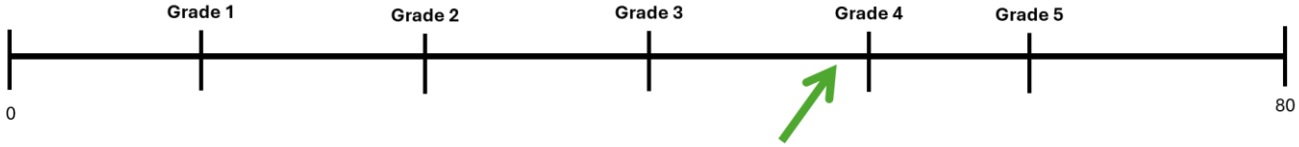
Or read their Grade Boundaries: Awarding Mini Guide

Grades boundaries for internal exams

Grade boundaries and estimated grades are set for the Trial Exams in Year 10 and Year 11 to give an indication of how well you are performing against the expectations of GCSE maths. While care is taken to make these as accurate as possible, **they are only estimates** and you shouldn't focus too much on the specific number. Grade boundaries change every year.

Focus on where you are within the boundaries

The best way to use these estimated grades is to think about where you are scoring in the spread of the grade boundaries. Don't concentrate on the estimated grade, but on how to improve.



In this example, from foundation tier, a pupil has scored just below the grade 4 boundary. This means that they are near the top of the grade 3 range and should be working to get at least a grade 4 in the final exams. Someone scoring just about the grade 3 boundary would also have an estimated grade 3 but would have to improve more to achieve a grade 4.

Tiers of entry

Maths is one of only a few GCSEs that are spilt into two tiers of entry, Foundation and Higher. This is because it is not possible to set one exam paper that tests the full range of attainment, from grade 1 to grade 9, while making the paper accessible for all pupils.

At Foundation tier grades 1 to 5 can be awarded and at Higher tier grades 4 to 9 can be awarded. All grades, above grade U, are pass grades and achieving any grade can be a major achievement. You should be proud of whatever grade you achieve if you have worked to the best of your ability.

Grades 4 and grade 5 can be awarded on either tier. If you don't achieve at least grade 4 then you will have to resit the course if you continue in education. Grade 4 is roughly equivalent to a C grade under the old system, while grade 5 is equivalent to a high C and low B.

The choice of which tier you sit can be complicated and there are lots of factors that go into the decision.

- If the evidence shows that you will be able to secure grade 6 or above then you will be entered for Higher tier.
- If the evidence shows that you are unlikely to secure a grade above 4 then you will be entered for Foundation tier.
- If the evidence shows that you are likely to secure a grade between 4 and 5 then a decision will be made based on things including:
    - Your scores on the trial exams and other assessments
    - Your attitude and how hard you work in lessons
    - How hard you work independently (at home), including your homework
    - What type of questions you are scoring best at. Foundation tier requires high marks on lots of number and basic algebra work. Higher tier requires you to be able to score marks on more complicated topics.

In every exam paper there is a set of 'crossover' questions, which appear on both tiers. These are used to help ensure that grades 4 and 5 are awarded fairly, whichever tier you sit. They also help to identify which is the most appropriate tier for you.

What should you do if you think you are on the wrong tier?

The most important thing you can do is work hard to understand as much of the maths you have been taught as possible. This is the only way to achieve your best possible grade.

If you think you should be working towards a different tier then you should talk to your maths teacher and explain why you think you should change. You must be prepared to listen to their reasoning for why you are on a specific tier. Ultimately it is the school's decision as to which tier you sit as the teachers are the experts.

If you know that you need a grade 6 or better in preparation for your choice of college course then you must put in whatever work is necessary to demonstrate that you can achieve that grade. The trial exams are your opportunity to show what you can do. Read on in this guide to find out how to make the best progress in Year 11 and prepare well for your exams.

9. Trial (Mock) Exams

You will sit several formal exams in preparation for the final exams in the summer of Year 11.

Each of these is an opportunity for you to test your current knowledge and skills in maths and to practice the whole process of sitting exams, including preparing, exam techniques and using feedback to improve your understanding. The aim is for you to be as fully prepared for the final exams as possible so that you can showcase all your mathematical abilities and achieve your best possible outcomes.

There is a total of five formal trial (mock) exams in Maths:

- Year 10 Trial Exam (calc/non-calc) --------Summer of Year 10
- Trial Zero (calc) ------------------------------ Sep of Year 11
- Trial One (non-calc) ------------------------ Nov/Dec of Year 11 (whole school exam series)
- Trial Two (calc) ------------------------------ Jan of Year 11
- Trial Three (calc) ---------------------------- Mar of Year 11

Each trial exam will be one 90-minute paper. You only sit one paper at a time, rather than a full set of three. This is so that there is time for your teacher to give detailed feedback to you, and for you to have time to improve your understanding of all your weak areas from that paper.

Each trial exam is an opportunity for you and your teacher to see how well you know the maths content you have been taught and to identify areas that you need to concentrate your revision on. Although you will be given a grade for each exam, these are only an estimate and should not be the main thing you focus on. The only grade that really matters is the one you achieve in the final exams.

Preparing for trial exams

You should treat trial exams as practice for the final exams, including preparing well for them.

You won't know exactly what topics will come up (and your teacher can't tell you), so just like for the final exams you need to make sure you know all the topics you have been taught as well as possible. This is why it is so important to revise little and often because there isn't time to do all your revision in the short period before an exam.

Use the resources and guidance from page 10 for your independent revision and make sure you use all the feedback you have received from your teacher about your classwork and homework to focus on the right topics.

The feedback you will receive

Your teacher will mark your trial exam papers using the standardised mark scheme. They may give you some written feedback on your paper and you will also receive:

- Feedback in lessons where the teacher will work through modelled solutions and explain how to pick up the available marks.
- An individual breakdown of your performance and key topic areas to work on. This will direct you to specific resources, such as Complete Maths Tutor courses, to help you fill gaps in your understanding. This will be proved for trials one, two and three.

How to use the feedback

Feedback will only help you improve if you use it properly. It is your responsibility to do this. Your teacher will help, but you must do the work. It requires effort to make worthwhile improvements and there aren't any shortcuts.

You should do the following to make sure that you can benefit most from the feedback you receive:

- Look carefully at each question that has been marked. Make sure you understand how you scored your marks and read all comments from your teacher. Begin to make any corrections (in green) that you can, based on this information and note down anything that you need to spend more time on.
- Listen actively to your teacher when they model solutions for you and explain each question. Write the correct working for each question and **add additional notes** for things that you didn't know or need to remember. Don't assume that because you follow your teacher's explanation at the time, you will be able to reproduce it and remember the details later.
- Note down anything you need to go away and work on independently (see the guide to independent revision from page 10). Then make sure you go away and do the work!
- Ask your teacher about anything that you still don't understand or need to be clearer about. If you don't want to speak to them in the lesson, send them an email.
- If you receive a personalised feedback document, spend some time prioritising what you need to focus on. Do this with the document and your exam paper together. Concentrate on areas that you didn't understand rather than where you made silly mistakes, although try to learn from these as well, so you don't repeat them.

10. Exam Technique

Use these tips to make the most of all the maths knowledge you have and avoid losing marks from simple errors. Practice in the trial exams so that you are fully prepared for the final exams.

1. Tackle the Questions You Know First

- Start with the questions you're confident about. This builds momentum and helps you gather those easy marks early on. Leave the tougher questions for later—this way, you'll avoid getting stuck and stressed at the beginning.
- Even if you think you're nearly there on a question but get stuck, move on. You can always come back to it, but don't let one question eat up too much time.

2. Use the Formula Sheet Smartly

- You'll have a formula sheet for your GCSE Maths exam, so make sure you're familiar with it before the test. This way, you'll know exactly where to look when you need a formula during the exam.
- Remember, understanding what each formula is used for will help you choose the right one quickly without wasting time.

3. Show Your Working – Don't Just Write the Answer

- Even if you can get the answer in your head or using your calculator, make sure to show your working. Examiners award marks for the method, not just the answer. If you make a small mistake with the answer but your method is right, you can still get most of the marks.
- Write each step clearly and in order. This will help you keep track of your work and make it easier for the examiner to follow what you're doing.

4. Label Your Diagrams and Use Rulers for Straight Lines

- For any questions involving shapes or graphs, make sure to label your diagrams with all given information, such as lengths or angle values.
- Use a ruler for straight lines. This keeps your diagrams neat and accurate, and it's easier to interpret when you need to add in more measurements.

5. Check Units Carefully

- Pay attention to the units given in the question, and make sure your answer matches. For example, if the question asks for an answer in metres and you're working in centimetres, make sure you convert it at the end.
- Don't lose easy marks by forgetting to write units in your final answer if they're required.

6. Keep an Eye on the Time

- Divide your time based on the number of marks for each question. Spend a few more minutes on questions worth more marks, but don't get bogged down by any single question. As a rough guide, think about "one mark per minute".
- Try to leave a few minutes at the end to review your answers. This lets you double-check for any silly mistakes or places where you may have misread the question.

7. Use Your Calculator Wisely

- For the calculator paper, make sure you know how to use all the functions on your calculator, like the square root, indices, fractions, and standard form.
- Use your calculator to check your answers where possible. For example, if you've solved for x in an equation, plug it back in to see if it works.

8. Write Clearly and Don't Rush

- When you're writing out your answers, try to stay neat and clear. If you're rushing or your writing is messy, it can be hard for the examiner to follow your steps, and you might lose marks.
- Clear working can also help you catch mistakes as you go along. If you have time at the end, re-read the question and your answer to make sure everything lines up.
- Make sure you clearly cross through any work you don't want marked. If there are two solutions, one right and one wrong, the examiner might not be able to give you full credit.

9. Break Down Multi-Step Problems

- Some questions will require several steps to get to the final answer. Tackle these by breaking them down step-by-step rather than trying to solve them all at once.
- Write down what you know first, then think about which formula or approach to apply for each part. This will help you stay organised and avoid getting overwhelmed.
- If you're stuck, just think about the maths that might be relevant and write something down. Identifying the key information in the question can help. In questions worth multiple marks, early marks can be scored for relatively simple steps, like rearranging an equation.

10. Don't Panic – It's OK to Skip and Come Back

- If you get stuck, remember it's totally fine to skip that question and come back later if you have time. Getting bogged down on a tough question can lead to wasted time and frustration.
- Sometimes, moving forward with other questions can give you a confidence boost, and you might find that you have a fresh perspective when you come back.

11. Use Logical Thinking and Estimation

- If you're unsure about a calculation, try estimating the answer first. This can help you quickly rule out any options that don't make sense.
- Estimation is also useful if you don't have enough time to work through every single step in detail. A close estimate might get you some partial marks.
- Check if your answer is realistic. Can a second-hand car cost £7 million? Does the earth weigh 4kg? If the answer doesn't seem right you could've made a simple error.

12. Read and Re-read Questions Carefully

- Take an extra moment to read each question carefully before you start answering. Look out for any command words. Some questions include specific instructions or conditions that you need to follow to get the full marks.
- Re-read the question after you've answered and check you have done all that was asked. It can also help you catch any small details you might have missed.

11. Other Things You Need to Know

Common Misunderstandings in Maths Exams

Every year, in GCSE Maths exams, pupils lose marks for reasons that have nothing to do with their mathematical knowledge or ability. Pupils often misread, misunderstand or misinterpret questions and don't always do what the question is asking them to do.

Here are some common misunderstandings that you need to learn to avoid.

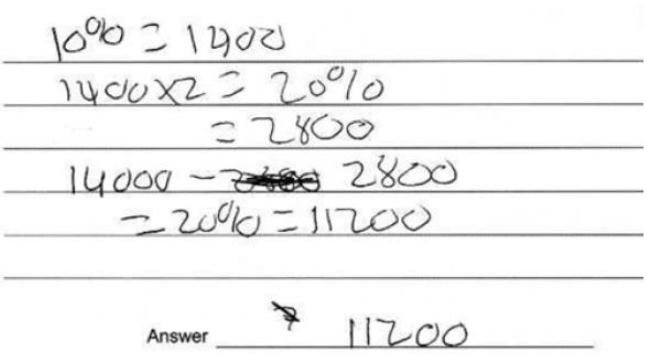
1. Misreading the question and giving the wrong answer despite doing the maths correctly

Example

Non-calculator question

Work out 20% of 14 000

Incorrect pupil response:



Exam board comment:

"If pupils show working for 20% off 14 000 they are likely to only lose one mark, but it's an unnecessary mark to lose. In the response, the pupil knows how to work out 20%, but has finished by taking 20% off and can only get one of the two marks."

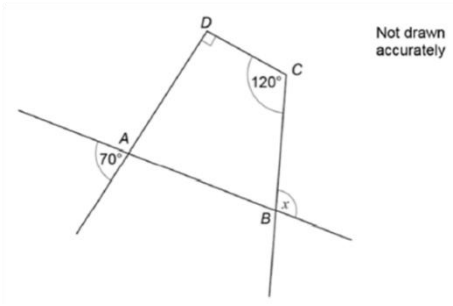
How to avoid this type of misunderstanding:

When you have answered each question, go back and read the question again to make sure that what you have written answers what you were asked to do.

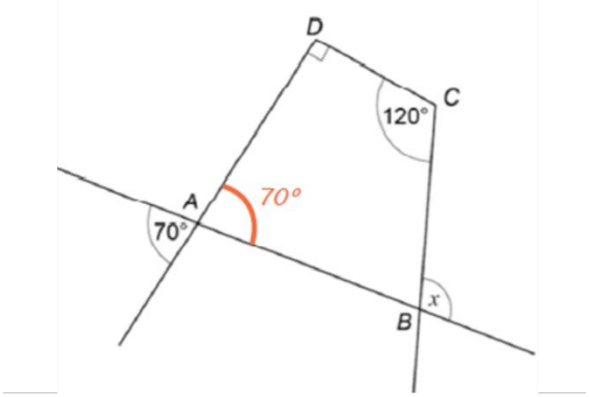
Disagreeing with the question

Example 1

ABCD is a quadrilateral.
Sides are extended as shown.
Show that $x = 100°$



Incorrect pupil response:



x = 100° - not true

x is 70° it is corresponding angle to the 70° at A

Exam board comment:

"If pupils don't get the same result as the one we're asking for, they've made a mistake. The problem with the argument made here is that x is not corresponding to the 70° as the lines DA and CB are not parallel."

How to avoid this type of misunderstanding:

If a question says "Show that" then whatever they ask you to show, is correct. If you don't get that answer, you have made a mistake, and you should look for where you have gone wrong and correct it if you can.

Example 2

Sami is trying to work out the exact value of y using Pythagoras' theorem.

Here is her working

$(2y)^2 = 6^2 + 8^2$

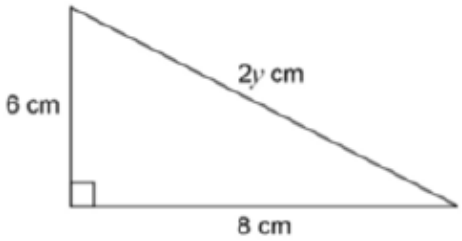
$2y^2 = 36 + 64$

$2y^2 = 100$

$y^2 = 100 \div 2$

$y^2 = 50$

$y = \sqrt{50}$



Not drawn accurately

What error has she made in her working?

Incorrect pupil response: *No error, Sami has done it right*

Exam board comment:

"We're not trying to trick pupils, if we're asking for an error, there's an error to be found. This response incorrectly states that there's nothing wrong with the work."

How to avoid this type of misunderstanding:

If a question says that there is an error then there is one. You need to find it.

2. Not reading the question carefully enough to understand what is being asked for

Example

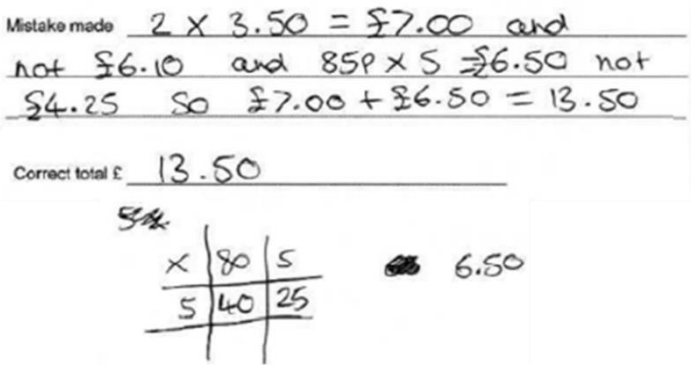
Rulers	Pens
85p each	£3.50 each

Jenny buys 5 rulers and 2 pens.
She works out how much she should pay.

$5 \times 85p = £4.25$
$2 \times £3.50 = £6.10$
Total = £10.35

Jenny's total is wrong.
What mistake has she made?
Include the correct total in your answer.

Incorrect pupil response:



Exam board comment:
"The wording of the question has 'mistake' as singular. This example response has indicated additional mistakes that aren't actually there. Encourage pupils to read questions carefully to determine how many mistakes there are."

How to avoid this type of misunderstanding:
Read questions carefully to make sure that you answer in the way they want you to.

3. Misreading a number in a question or misreading a question's meaning

Example 1

A college has
a total of 105 teachers
19 more female teachers than male teachers.
What proportion of the teachers are female?
(3 marks)

Exam board comment:
*"This question was quite widely misread as 19 female teachers, not '19 **more** female teachers'. That would have made the question too simple, so we wouldn't have been able to award marks for work following. Again, careful reading of the question is important."*

Tip: *If the examiner can follow your working they will award appropriate method marks for working shown, even if the wrong value is used. This is one reason why you need to write your working out carefully and in full.*

Example 2

8.6	0.27	6.3	0.4

b) Choose two of the cards to make the answer to this calculation as large as possible.
Include the answer to the calculation. (2 marks)

□ − □ = □

Exam board comment:
"In part b) of this question, lots of pupils just used the largest numbers in the calculation and didn't get the largest possible answer."

How to avoid this type of misunderstanding:
Read the **whole of the question** carefully before you answer it and when you have finished answering, read it again to check that you have read it (and answered it) correctly.

4. Not understanding the difference between the two meanings of 'estimate' and when to spot them

Example 1

In non-calculator papers pupils are often asked to estimate the value of a calculation, often prompting to round to the nearest 10 or to 1 significant figure.

This means you should round each to that accuracy first and then do the calculation.

> By rounding each number to the nearest 10, estimate the value of
> $262 \div 19.8$ (2 marks)

Example 2

Sometimes the word 'estimate' is used for the mean of a grouped frequency table.

Here is some information about 20 trains leaving a station

Number of minutes late, t	Number of trains	Midpoint	
$0 \leq t < 5$	12		
$5 \leq t < 10$	7		
$10 \leq t < 15$	1		
$t \geq 15$	0		

Work out an estimate of the mean number of minutes late.

Incorrect pupil responses:

Number of minutes late, t	Number of trains	Midpoint	
$0 \leq t < 5$	12	2.5	30
$5 \leq t < 10$	7	7.5	52.5
$10 \leq t < 15$	1	12.5	12.5
$t \geq 15$	0		

Work out an estimate of the mean number of minutes late. [3 marks]

$\frac{30 + 50 + 10}{20} = \frac{90}{20}$

Answer 4.5 minutes

Number of minutes late, t	Number of trains	Midpoint	FX
$0 \leq t < 5$	12	× 2.5	30
$5 \leq t < 10$	7	× 7.5	52.5
$10 \leq t < 15$	1	× 12.5	12.5
$t \geq 15$	0	0	0

Work out an estimate of the mean number of minutes late. [3 marks]

Mean = add all data ÷ by how many

30 + 52.5 + 12.5 = 95

95 ÷ 20 = 4.75

Answer 5 minutes

Exam board comment:

"This method requires the use of exact calculations on midpoints and no rounding should be carried out. It's an estimate because we don't know the exact data values within each group, with the midpoints representing them in the best way possible.

In the second response the pupil has also rounded, but only at the very end, so we can see a fully correct answer before any rounding and award full marks."

How to avoid this type of misunderstanding:
Consider whether the question asks for an estimate because the data you are given is not exact (like the mean from grouped data) or the estimate is to give an approximate answer.

5. Trying to evaluate (find the value of) indices rather than using the rules of indices to simplify

Example

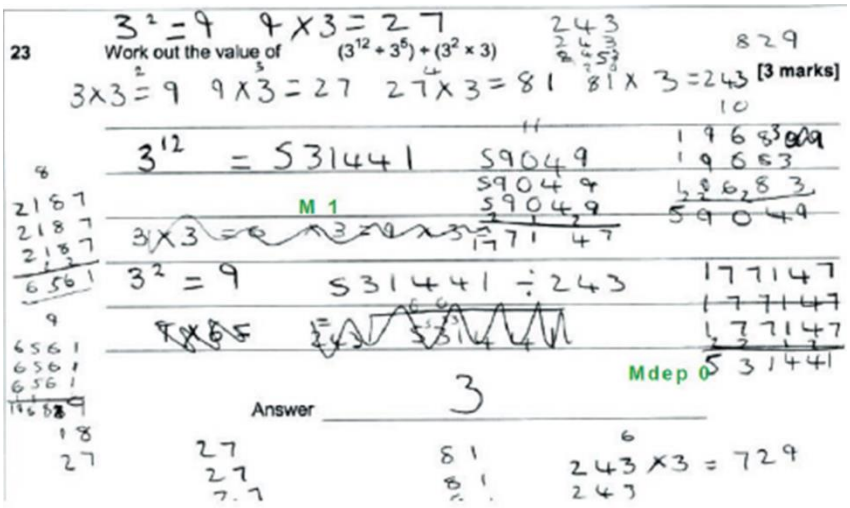
Work out the value of

$(3^{12} \div 3^5) \div (3^2 \times 3)$

(3 marks)

Tip: Evaluating powers instead of using rules of indices means losing precious time.

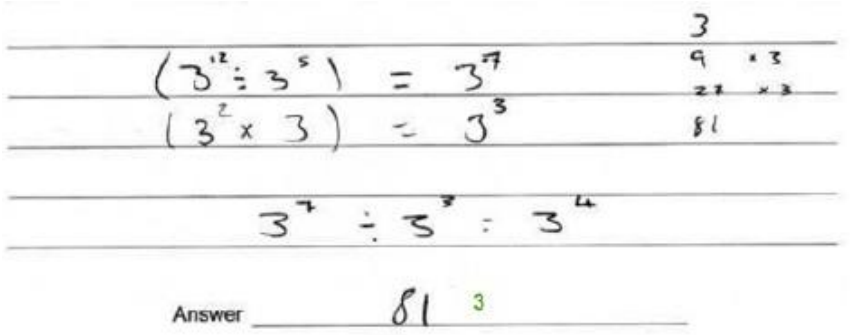
Incorrect pupil response:



Exam board comment:

"Sometimes we ask for the answer as a power but, in many cases we don't. We don't expect pupils to spend lots of time evaluating: it's not likely to be successful. In this example response, the pupil tries to work out 3^{12}. This is beyond what we would ask for on a non-calculator paper."

Correct pupil response:



Exam board comment:
"This response shows how quickly the solution can come once you use the rules of indices."

How to avoid this type of misunderstanding:
Think about how much time the examiner will expect you to take for a question. A good rule is about one minute per mark. If a method will take a lot longer than this, particularly on a calculator paper, then there is probably a better approach.

6. Not noticing when you are asked to 'simplify' or 'factorise fully'

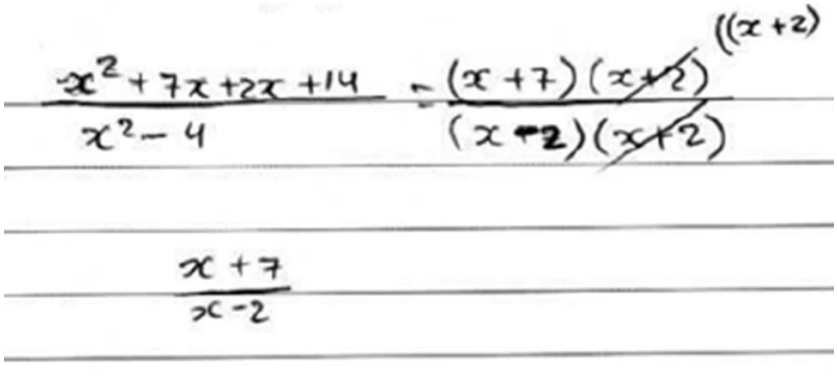
When the word 'fully' is used in simplifying questions, it's to make sure you look for the maximum possible amount of simplifying and don't just consider one factor or one change.

Example 1

Simplify fully $\dfrac{x^2 + 9x + 14}{x^2 - 4}$

Tip: Even if the word 'fully' isn't in the question, you should still go as far as correct mathematics allows.

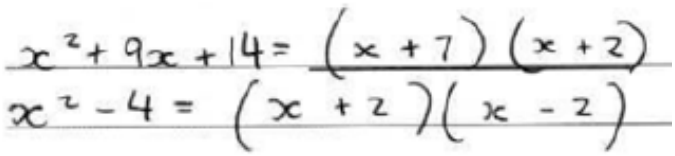
Correct pupil response:



Exam board comment:

"There will usually be something that cancels from the numerator and the denominator so pupils should include thinking about the likelihood of a common factor on each appearing. The first example response shows how this is done."

Incorrect pupil response:



Exam board comment:

"This example response has correctly factorised but not spotted the opportunity to cancel, possibly because the identical brackets have not fallen directly in line."

Example 2

Factorise fully $24y^2 - 20y$

Incorrect pupil response 1:

Answer: $y\ (24y - 20)$

Incorrect pupil response 2:

Answer: $4(6y^2 - 5y)$

Exam board comment:

"More straightforward factorising questions are often only partly done by pupils. In the two example responses, neither has gone to the fully correct answer of $4y(6y - 5)$*"*

How to avoid this type of misunderstanding:

Always check that you have gone as far as you can when simplifying. If you are asked to factorise, check that you have taken out the common number factors and all the common letter factors.

7. Assuming the number of marks for a question tells you how many answers there are

Example 1

Write down all the factors of 18 (2 marks)

Exam board comment:

"The question is worth two marks, but there are six factors of 18: 1, 2, 3, 6, 9 and 18"

Example 2

Write down all the prime numbers between 40 and 50 (2 marks)

Exam board comment:

"The question is worth two marks, but there are three prime numbers, 41, 43 and 47"

Example 3

Solve $x^2 = 196$ (2 marks)

Exam board comment:

"Sometimes the marks can be a clue to what's needed. This example was from a calculator paper. We wouldn't award 2 marks for square rooting 196 on a calculator to get 14*. The second mark is for finding the second solution to this equation –* 14*"*

Tip: The number of marks allocated to a question is related to the amount of work required to obtain the fully correct answer.

How to avoid this type of misunderstanding:

Read the question carefully and do what it asks. Does it say something like "find **all** the factors"? Think about whether you have had to do enough for the number of marks available.

8. Not taking hints when they are given in the question

There are several ways that the examiners display questions to help save you time and unnecessary work, but pupils don't always realise. For example, sometimes they ask you to list all the possible outcomes in a listing situation.

Example 1

A shop sells ice creams. Each ice cream has two scoops. The possible flavours are vanilla (V), strawberry (S), chocolate (C) and mint (M). The two scoops can be the same flavour or different flavours. a) List all the possible options for the two scoops. (2 marks)

Pupil response 1:

Vanilla/Vanilla

Vanilla/Strawberry

Vanilla/Chocolate

Vanilla/Mint

Strawberry/Chocolate

Strawberry/Strawberry

Strawberry/Mint

Chocolate/Chocolate

Chocolate/Mint

Mint/Mint

Pupil response 2:

	V	S	C	M
V	VV	VS	VC	VM
S	SV	SS	SC	SM
C	CV	CS	CC	CM
M	MV	MS	MC	MM

Exam board comment:

"Response 2 shows a nice grid method and use of the initials. No credit was lost for listing flavours in both orders, e.g. CV and VC"

Tip: The examiners put letters in brackets after the names to save you time. There's no need to write out the full names.

Example 2

Date	Description	Credit (£)	Debit (£)	Balance (£)
13/12/2016	Starting balance			212.48
14/12/2016	Council tax		128.39	_____
15/12/2016	Salary	856.21		_____

Complete the bank statement.
(2 marks)

Tip: If it's greyed out, it's not needed.

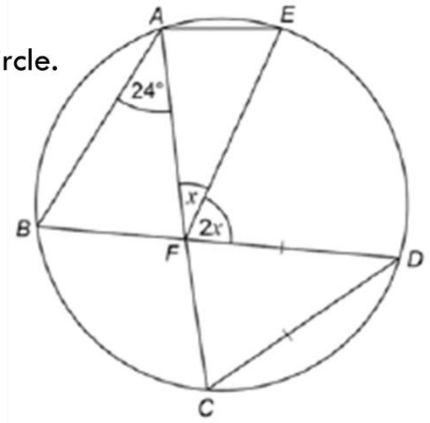
Exam board comment:

"Bank statement questions are quite common in our papers. You only need to write in the white, blank cells."

Example 3

A, B, C, D and E are points on a circle.
BFD and AFC are straight lines.
$DC = DF$

Work out the size of angle x.
You must show your working which may be on the diagram.
(4 marks)



Exam board comment:

"In lots of questions involving angles we can give pupils marks for work they do on the diagram."

Tip: If the question says you can write on the diagram, it's a big hint that it's probably the easiest way to show your working.

Example 4

Work out the fraction that is halfway between $\frac{1}{2}$ and $1\frac{1}{4}$ (3 marks)

Exam board comment:

"In this example question, we helped by putting a scale on a question asking about halfway points. Using the scale was a good way of getting part marks if pupils couldn't complete the whole question."

How to avoid this type of misunderstanding:

Practice as many exam questions as you can to get used to spotting hints. Read questions carefully and underline/highlight any hints you see.

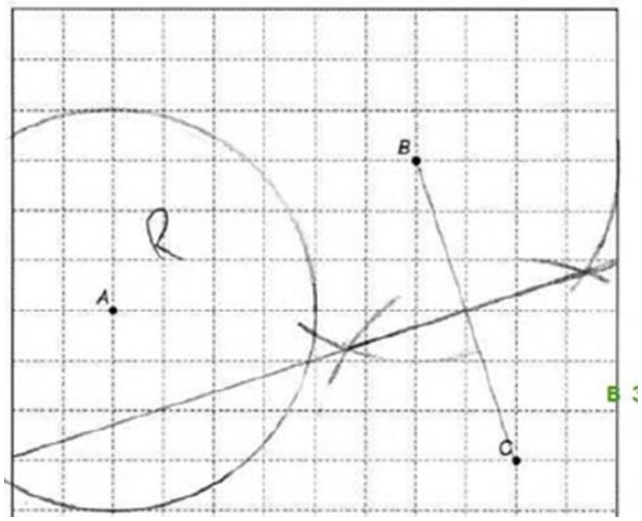
9. Not using the proper equipment to answer questions

If the examiners ask you to use a ruler and compasses, then they need to see the use of them in your answer. They can spot if rulers and compasses haven't been used.

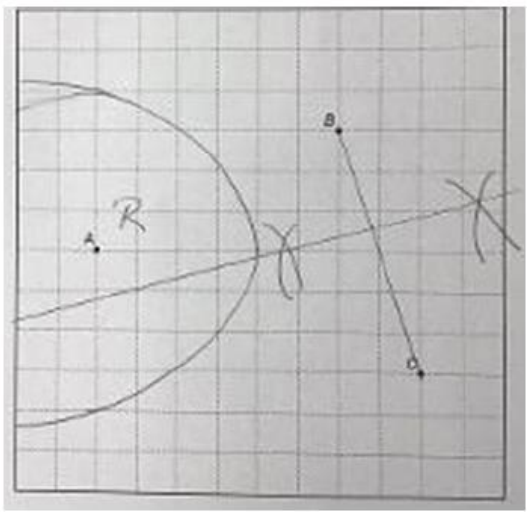
Example

Using ruler and compasses, show the region inside the grid that is
less than 4 cm from a
and
nearer to B than to C
Label the region R.
Show all your construction lines. (3 marks)

Correct pupil response:



Incorrect pupil response:



Exam board comment:

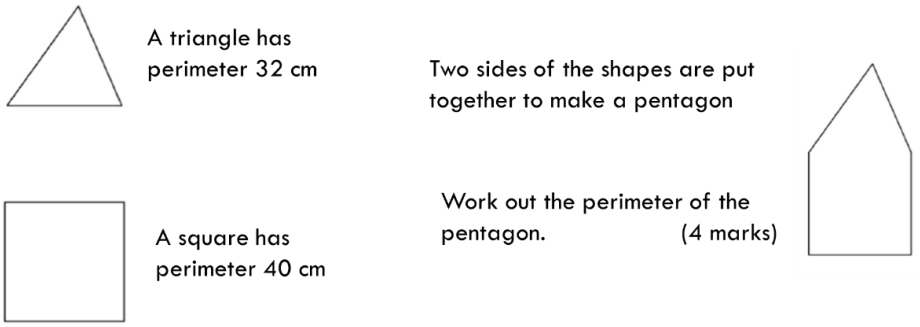
"The first response shows clear use of compasses. However, the second response tried to convince us without using the right equipment. We couldn't give any marks for this response."

How to avoid this type of misunderstanding:
Make sure that you have all the equipment you need during your maths lessons as well as for the exam. Practice using your equipment including measuring with your ruler and protractor. Different equipment (particularly compasses) feels different to use and you will find it easier to be accurate with familiar equipment.

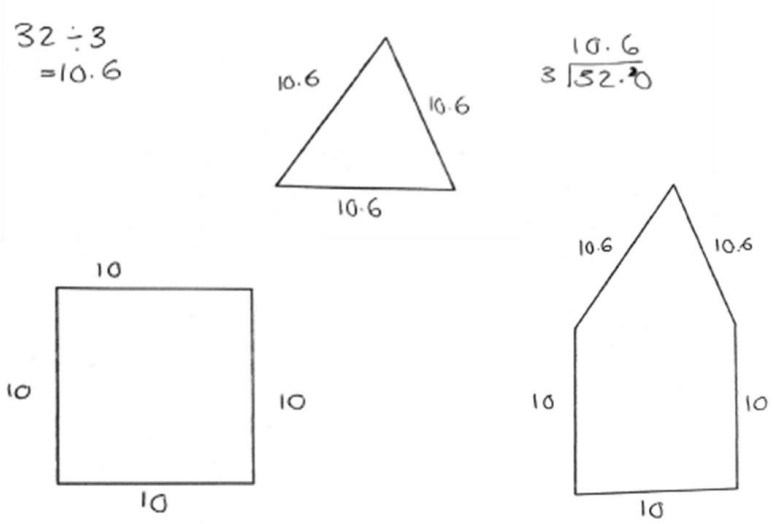
Tip: Examiners can only give marks for drawings that are within a small distance from the exam answer. Make sure you draw and measure as carefully and precisely as you can.

10. Making wrong assumptions about the situation and making costly mistakes as a result

Example



Incorrect pupil response:



Exam board comment:
"There's nothing in the question that says the triangle is equilateral, but many pupils made this assumption rather than reasoning that the 'common' side must be 10. The unusual aspect of this question which may have worried pupils is that it's impossible but unnecessary to know the length of each side of the triangle."

How to avoid this type of misunderstanding:
Read questions carefully and check whether it specifies details or not. Don't assume something, if there isn't enough information to know whether it is true.

Command Words

Command words are the words and phrases used in exams that tell you how you should answer the question. Use this as a reference, make sure you know what all these mean and highlight them when answering exam questions. Check you have followed the command after you have answered the question.

Calculate	*The answer is a number, which you should work out using any appropriate method.*
Compare... and/to/with	*Work out or identify the values required and say which is smaller/larger, etc.* *Where appropriate, consider the context when giving your answer.*
Complete	*Add the missing information to a table or diagram (often statistical).*
Construct	*Draw accurately.* *If told to use compasses, all construction arcs and lines should be shown.*
Convert ...(in)to	*Change a value from one numerical form to another or a measure from one unit to another.*
Describe	*Use mathematical terminology to define the given information.*
Describe (fully) the single transformation that maps...	• *With enlargement, give the scale factor and centre of enlargement.* • *With reflection, give the equation of the line of reflection.* • *With rotation, give the angle, direction and centre of rotation.* • *With translation, give the translation vector.* *This should always be done fully, even if that word is absent from the instruction.*
Do not use a graphical method	*Algebraic manipulation or interpretation is required.*
Does the data support this statement?	*Use calculations and/or statistical measures based on the given data to make a decision.*
Draw	*Give an accurate depiction of a graph, map, diagram, etc.*
Draw a sketch of	*Give a depiction of a graph, map, diagram, etc, where the important features are identified.*
Estimate (a mean from grouped frequency)	*Use class midpoints to work out an estimate of the mean.*
Estimate (used when the exact or definitive answer	*Use the given information to work out the answer.*

cannot be obtained from the information given)	*In this case it is good practice to use/give the exact answer of any calculation and then round the final answer to a sensible degree of accuracy.*
Estimate the value of (used with a calculation)	*Use approximations to work out a value.* *Unless told otherwise, pupils should round the given values to 1 significant figure.*
Evaluate… method and/or claim (Higher Tier only)	*Identify which part of the method, calculation or assertion is incorrect or explain why it must be correct.*
Express… as (Higher Tier only)	*Convert a number from one form to another.*
Factorise (fully)	*Take out any common factors of an expression or convert a quadratic expression into two linear factors.* *This should always be done fully, even if that word is absent from the instruction. Use of the word 'fully' is a hint that more than one factor can be taken out.*
Give a reason for your answer/choice	*Show a calculation and/or written evidence for your answer.*
Give a reason why…	*Show a calculation and/or written evidence to support the given statement.*
Give one/an example to show…	*Write one example to substantiate or disprove a given statement.*
Give one/an example where…	*Write one example that fits the given conditions.*
Give working and a reason to support your answer	*Both a calculation and a written explanation are needed.*
Give your answer as a/in the form…	*You may work with values in a different format, but give the answer in the format required.*
Give your answer in its simplest form	*Cancel any fractions and collect any like terms.*
Give your answer in terms of… (Higher Tier only)	*The given variable should be the only variable in your answer.*
Give your answer in terms of π	*Don't use a decimal value of pi, just do the working with the coefficients of pi.*
Give your answer to… decimal places/significant figures	*Show the full answer in your working but give the rounded value on the answer line.*
How does this affect…	*Comment on how your answer to a previous question part is different due to a change to an assumption used.*

Is... correct?	*Tick a box if given or state 'yes' or 'no' in your answer.*
Is your answer to part... sensible?	*Use approximations to check if a previous answer makes sense in the context of the question.*
Label	*Identify required regions, lengths or axis labels.*
List	*Write down all qualifying values or items.*
Make... (different) criticism(s) of...	*Write down the required number of errors or omissions in the given method or diagram.*
Mark	*Show a position on a map or diagram with the letter or symbol required.*
Match each... to...	*Join corresponding items in two lists by straight lines.*
Measure	*Use a ruler to measure a length or a protractor to measure an angle.*
Multiply out (and simplify)	*Multiply out the bracket(s), collecting like terms where possible.*
One has been done for you	*The given example shows the format in which the rest of the answers are required.*
Plot	*Mark the points with a cross.*
Practise on this diagram	*The first diagram can be used for practise, but if both diagrams are attempted the second one will be marked.*
Put your answer on this diagram (when two diagrams are given for the pupil to use)	
Prove that... (Higher Tier only)	*Give a formal algebraic proof with each step shown **or** a formal geometric proof with each step shown and justification for each step.*
Rearrange... to make... the subject	*Write the given formula with a different subject as specified.*
Show all your construction lines	*The drawing should be done by standard constructions with all arcs shown.*
Show how... could use the data to support her hypothesis (Higher Tier only)	*Work with the given information to give calculations and/or statistical measures that support the given hypothesis.*
Show that...	*Give every step of a process that will lead to the required outcome.*

Show working to check…	*Show working that helps you decide whether or not the given working was correct and give your decision.*
Show working to support your answer	*If you have made a decision, give a calculation (and wording where it helps) that shows why you made it.*
Simplify (fully)	*Collect terms or cancel a fraction.* *This should always be done fully, even if that word is absent from the instruction. Use of the word 'fully' is a hint that more than one simplification step will be required.*
Simplify your answer	*Cancel any fractions and collect any like terms.*
Solve	*Find the value(s) that satisfy a given equation or inequality.*
State	*Write the required information using correct mathematical vocabulary.*
State the units of your answer	*The correct units must be given to gain full marks (there may be a stand-alone) mark for giving the correct units*
Use the graph to…	*You should get your answer from the graph rather than from calculation.*
Using part… or otherwise… (Higher Tier only)	*You can use a previous answer as part of your method here, but there are other methods where it is not used.*
What does this mean/tell you about…	*Explain in words the implication of the given information.*
What error/mistake has… made? (Higher Tier only)	*Identify which part of the method or calculation is incorrect.*
Work out	*One or more calculations will usually be necessary.*
Write down	*The answer should be obtainable from the information given, so no working out should be needed.*
Write down your full calculator display	*Give your answer as a decimal and write all the digits shown on your calculator. However, as calculators can show many digits, at least 6 digits would be seen as sufficient here.*
You may use… to help you	*A diagram or table has been given that may be helpful in organising your working, but you do not have to use it.*
You must show your working	*A correct answer will not receive the marks unless working is given to show how the answer was arrived at.*

Formulas

This is the formula sheet that will be provided in your exams. **Although you will be given these, you still need to know how to use them!**

Perimeter, area and volume

Where a and b are the lengths of the parallel sides and h is their perpendicular separation:

Area of a trapezium $= \frac{1}{2}(a+b)h$

Volume of a prism = area of cross section × length

Where r is the radius and d is the diameter:

Circumference of a circle $= 2\pi r = \pi d$

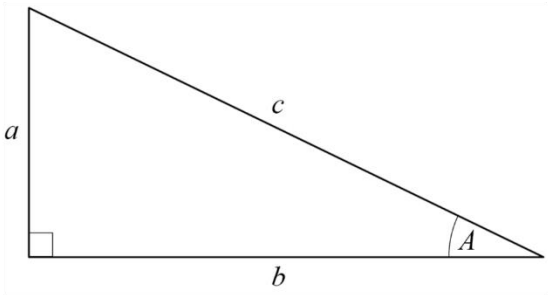
Area of a circle $= \pi r^2$

Quadratic formula

The solution of $ax^2 + bx + c = 0$ where $a \neq 0$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Pythagoras' Theorem and Trigonometry

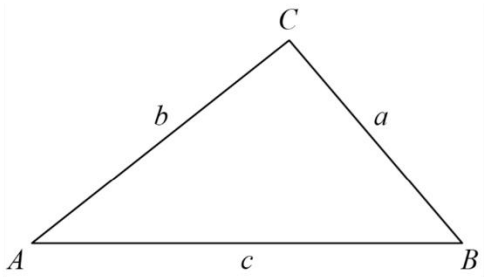


In any right-angled triangle where a, b and c are the length of the sides and c is the hypotenuse:

$$a^2 + b^2 = c^2$$

In any right-angled triangle ABC where a, b and c are the length of the sides and c is the hypotenuse:

$$\sin A = \frac{a}{c} \qquad \cos A = \frac{b}{c} \qquad \tan A = \frac{a}{b}$$



In any triangle ABC where a, b and c are the length of the sides:

sine rule: $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

cosine rule: $a^2 = b^2 + c^2 - 2bc\cos A$

Area of triangle $= \frac{1}{2}ab\sin C$

Compound Interest

Where P is the principal amount, r is the interest rate over a given period and n is number of times that the interest is compounded:

$$\text{Total accrued} = P\left(1 + \frac{r}{100}\right)^n$$

Probability

Where $\mathrm{P}(A)$ is the probability of outcome A and $\mathrm{P}(B)$ is the probability of outcome B:

$$\mathrm{P}(A \text{ or } B) = \mathrm{P}(A) + \mathrm{P}(B) - \mathrm{P}(A \text{ and } B)$$

$$\mathrm{P}(A \text{ and } B) = \mathrm{P}(A \text{ given } B)\,\mathrm{P}(B)$$

Higher Revision Checklist

These are all the things you need to know and be able to do organised by topic area. You can use the R, A, G columns to rate how confident you are with each thing and as you improve, update your rating. This is a useful tool to help you plan what to focus on in your revision.

Higher: Number		**R**	**A**	**G**
N1	Comparing and ordering numbers			
N2	Calculating with integers			
	Calculating with decimals			
	Multiplying and dividing with fractions			
N3	Using the order of operations			
N4	Working with multiples, factors and prime numbers			
N5	Applying systematic methods for listing groups			
	Using the product rule for counting to enumerate the number of possible groups			
N6	Calculating with powers and roots			
	Estimating powers and roots of any given positive number			
N7	Using the laws of indices			
	Calculating with fractional indices			
N8	Manipulating fractions and mixed numbers			
	Adding and subtracting fractions and mixed numbers			
	Simplifying expressions with surds			
	Calculating with surds			
	Rationalising the denominator of fractions with surds			
N9	Working with numbers in standard form			
N10	Converting between fractions and decimals			
	Converting between recurring decimals and their corresponding fractions			
N11	Using ratio notation			
	Making links between fractions and ratios			
N12	Calculating with percentages			
	Converting between fractions and percentages			
N13	Using common units of measurement			
N14	Using estimation, including to check the accuracy of calculations			
N15	Understanding the use of rounding			
N16	Using upper and lower bounds			
	Calculating minimum and maximum amounts, using upper and lower bounds			

Higher: Algebra		R	A	G
A1	Understanding algebraic notation			
A2	Substituting into expressions and formulae			
A3	Understanding and using algebraic language and symbols			
A4	Simplifying algebraic expressions by collecting like terms			
	Expanding and factorising using a single bracket			
	Expanding and factorising using two brackets			
	Using the laws of indices with algebraic terms			
	Expanding using three brackets			
	Factorising non-monic quadratic expressions			
	Working with algebraic fractions			
A5	Understanding and using formulae in words and algebraic formulae			
	Rearranging algebraic formulae to change the subject			
A6	Manipulating algebraic expressions to support statements			
	Using algebraic expressions to prove outcomes			
A7	Understanding and using function machines			
	Interpreting the reverse of a function machine as the 'inverse function'			
	Interpreting and using composite functions			
A8	Working with coordinates in four quadrants			
A9	Plotting straight line graphs			
	Using $y = mx + c$ to identify parallel graphs			
	Using $y = mx + c$ to identify perpendicular graphs			
	Using $y = mx + c$ and two points, or one point and the gradient, to write the equation of a line			
A10	Working out the gradient of a straight line			
	Working out the y-intercept of a straight line			
A11	Identifying roots, intercepts and turning points from a quadratic graph			
	Calculating roots of a quadratic graph algebraically			
	Deducing the turning point of a quadratic graph by completing the square			
A12	Making links between different types of graphs and their equations			
	Recognising, sketching and interpreting graphs of exponential functions			
	Recognising, sketching and interpreting graphs of trigonometric functions			
A13	Sketching translations and reflections of graphs of a given function			

A14	Plotting and interpreting real-life graphs, including exponential graphs			
	Solving problems involving speed, distance, time and acceleration using graphs			
A15	Calculating (or estimating) gradients of graphs, and interpreting results in context			
	Calculating (or estimating) areas under graphs, and interpreting results in context			
A16	Recognising and using the equation of a circle with centre (0, 0)			
	Finding the equation of a tangent to a circle at a given point			
A17	Solving linear equations with one unknown			
	Solving linear equations with one unknown on both sides			
	Solving linear equations using graphs			
A18	Solving quadratic equations, including those that require rearrangement, by factorising			
	Solving quadratic equations by using the quadratic formula			
	Solving quadratic equations by completing the square			
	Solving quadratic equations using graphs			
A19	Solving pairs of simultaneous equations using algebraic methods, including quadratic equations			
	Solving pairs of simultaneous equations using graphs			
A20	Finding approximate solutions to equations using iterative processes			
A21	Forming and solving equations (including simultaneous equations) from contexts			
A22	Solving linear inequalities with one or two variables			
	Solving quadratic inequalities with one variable			
	Representing inequalities on a number line			
	Representing the solution set to inequalities using set notation			
	Plotting inequalities in two variables to identify regions			
A23	Writing the terms of a sequence from a rule given in words			
	Writing the terms of a sequence from a given nth term			
A24	Recognising and extending 'special' sequences (Square numbers, triangular numbers, ...)			
	Recognising and extending 'other' sequences (Fibonacci, quadratic, geometric, ...)			
	Recognising and extending geometric sequences where the common ratio is a surd			
A25	Writing the nth term of a linear sequence			
	Writing the nth term of a quadratic sequence			

Higher: Ratio, proportion and rates of change		R	A	G
R1	Changing freely between standard units of:			
	length			
	mass			
	volume/capacity			
	area/volume			
	time			
	compound units (speed, density)			
R2	Using scale factors			
	Using scale diagrams and maps			
R3	Writing one amount as a fraction of another			
R4	Simplifying ratios to their lowest terms			
	Writing a ratio in the form 1 : n and n : 1			
R5	Sharing amounts in a given ratio			
	Sharing amounts in contextual problems			
R6	Comparing amounts using ratios and fractions			
R7	Using proportion as the equality of ratios			
R8	Relating ratios to fractions			
	Relating ratios to equations			
R9	Understanding the meaning of a percentage			
	Calculating percentages, and percentage changes, using a multiplier			
	Writing one amount as a percentage of another			
	Comparing amounts using percentages			
	Working with percentages greater than 100%			
	Writing change as a percentage			
	Calculating using percentages in reverse			
	Calculating using simple interest			
R10	Solving problems involving direct proportion			
	Solving problems involving inverse proportion			
R11	Working with speed, distance and time			
	Working with density, mass and volume			
	Working with pressure, force and area			
	Working with rates and the unitary method			
R12	Solving length, area and volume problems with similar shapes			
	Solve problems involving trigonometric ratios and similarity			

R13	Understanding and using direct proportion algebraically			
	Understanding and using inverse proportion algebraically			
	Constructing and interpreting equations that describe direct and inverse proportion			
R14	Understanding that the gradient of a line represents a rate of change			
	Recognising graphs that depict direct and inverse proportion			
R15	Interpreting the gradient at a point on a curve as an instantaneous rate of change			
	Applying the concepts of average and instantaneous rates of change in context			
R16	Working with repeated proportional changes using a multiplier and a power, including compound percentages			
	Working with general iterative processes			

Higher: Geometry and Measures		**R**	**A**	**G**
G1	Using mathematical names and conventions with geometric figures			
G2	Using a straight edge and a pair of compasses to construct:			
	the perpendicular bisector of a line segment			
	a perpendicular to a given line from and at a given point			
	the bisector of a given angle			
	an accurate drawing of a sketch of a geometric figure			
	Using constructions to solve loci problems			
G3	Using angle facts to solve problems, including:			
	the sum of angles at a point, and on a straight line			
	vertically opposite angles			
	alternate and corresponding angles in parallel lines			
	the sum of angles in a triangle			
	the sum of angles in polygons, using the sum of angles in a triangle			
G4	Describing the properties of common quadrilaterals			
G5	Using the basic criteria for congruent triangles			
G6	Reasoning mathematically with geometric figures			
G7	Applying and describing the transformation of geometric figures using:			
	reflection			
	translation			
	rotation			
	enlargement by positive and negative, integer scale factors			

	enlargement by positive and negative, fractional scale factors			
G8	Describing the effect of a combination of transformations			
	Describing invariance in transformations			
G9	Identifying and naming the parts of a circle			
G10	Applying and proving the standard circle theorems			
G11	Solving problems using coordinates			
G12	Identifying and naming common 3D solids			
	Identifying and naming the parts of a 3D solid			
G13	Constructing plans and elevations of 3D solids			
G14	Using standard units of measure (length, area, volume/capacity, mass, time, money, etc.)			
G15	Measuring and drawing lines angles			
	Interpreting maps and scale drawings			
	Using bearings to describe direction			
G16	Knowing and applying formulae to calculate using:			
	area of triangles, parallelograms, trapezia			
	volume of cuboids			
	volume of prisms			
	volume of cylinders			
G17	Knowing and applying formulae to calculate using:			
	circumference of circles			
	area of circles			
	Calculating the area and perimeter of compound shapes, involving circles			
	Calculating the surface area and volume of spheres, pyramids, cones and composite solids, using given formulae			
G18	Calculating using the lengths of arcs and the area of sectors			
G19	Understanding the effect of transformations, applying this to congruence and similarity			
	Applying the concepts of similarity to calculate areas and volumes of similar figures			
G20	Knowing and using Pythagoras' Theorem to calculate lengths in right-angled triangles			
	Knowing and using the trigonometric ratios to calculate lengths in right-angled triangles			
	Knowing and using the trigonometric ratios to calculate angles in right-angled triangles			
	Applying Pythagoras' Theorem and the trigonometric ratios in 3D			
G21	Knowing the exact values for specific trigonometric ratios			
G22	Applying the sine rule to find unknown lengths and angles			

	Applying the cosine rule to find unknown lengths and angles			
G23	Calculating the area, sides and angles in angle triangles using ½ *ab* sin *C*			
G24	Describing translation in 2D using vectors			
G25	Calculating using 2D column vectors			
	Using vectors to construct geometric arguments and proofs			

Higher: Probability		**R**	**A**	**G**
P1	Constructing and interpreting two-way tables, frequency tables and frequency trees			
	Comparing relative frequencies to theoretical probabilities			
P2	Finding probabilities from lists and tables			
	Understanding the idea of relative frequency as an estimate of theoretical probability			
	Understanding the concept of randomness			
P3	Understanding and using the 0 – 1 probability scale			
	Estimating probabilities using relative frequency			
P4	Understanding and using the sum of the probabilities of mutually exclusive events (= 1)			
P5	Understanding the benefit of conducting a greater number of trials in an experiment			
P6	Completing tables to show outcomes of an event			
	Completing tree diagrams to show outcomes and probabilities			
	Constructing and interpreting Venn diagrams			
	Understanding and using set notation used with reference to Venn diagrams			
P7	Listing the outcomes to events in systematic ways			
	Using and interpreting two-way tables			
	Using and interpreting frequency trees			
	Calculating probabilities from tables			
P8	Calculating probabilities using the 'and' and 'or' rules			
	Understanding whether two events are 'independent' or 'dependent'			
	Using a tree diagram to calculate probabilities			
P9	Calculating conditional probabilities using two-way tables			
	Calculating conditional probabilities using tree diagrams			
	Calculating conditional probabilities using Venn diagrams			

Higher: Statistics		R	A	G
S1	Analysing sets of data for patterns and outliers			
	Understanding the benefits and limitations of sampling			
S2	Constructing and interpreting:			
	frequency tables			
	bar charts, vertical line charts and frequency diagrams			
	pictograms			
	pie charts			
	time series graphs			
	two-way tables			
S3	cumulative frequency diagrams			
	histograms with equal class intervals			
	histograms with unequal class intervals			
S4	Calculating the mean, median, mode and range for a list of data			
	Estimating the mean, and finding the interval containing the median, of grouped data			
	Comparing distributions of data sets using box plots			
	Comparing distributions of data sets making use of quartiles and inter-quartile range			
S5	Using the mean, median, mode and range, as well as diagrams to describe sets of data			
S6	Using and interpreting scatter diagrams			
	Recognising correlation and describing relationships from scatter diagrams			
	Drawing lines of best fit and estimating unknown values			

Likely Topics on the Non-Calculator Paper (paper 1)

There are certain topics that are very likely to be included in paper 1 because the examiners want to test your ability to work with them without a calculator.

It would be a good idea to revise these well before non-calculator papers, including Trial 1 and Paper 1 of the final exams.

- Long multiplication - ensure you can perform long multiplication on paper and are able to do long division.
- Percentages and ratios.
- Indices - know the laws of indices **including fractional and negative powers** and be able to substitute numbers without a calculator.
- Standard form - perform standard form without a calculator, this includes multiplying, dividing and converting into ordinary form.
- Percentages without calculator - be able to find percentages of amounts, percentage increase and decrease, reverse percentages and simple interest without a calculator. Remember the numbers will be simple in the non-calculator paper.
- Fractions - you should be able to perform fractional arithmetic in proper form, improper form and mixed fraction form.
- Fractions of amounts.
- Converting between fractions, decimals, percentages.
- Estimation and Approximation - rounding numbers to one significant figure and then estimate values to complex calculations.
- Product of Primes - writing a number as a product of its prime factors

  e.g. $24 = 2 \times 2 \times 2 \times 3.$
- Highest Common Factor and Lowest Common Multiple - Finding the HCF and LCM of larger numbers, maybe with the use of a Venn Diagram.
- Surds - simplifying surds, multiply and dividing surds and rationalising the denominator.
- Recurring Decimals into Fractions - make sure you can convert recurring decimals.
- Quadratic factorisation - Factorising quadratics can come up in this paper. It's unlikely to come up in a calculator paper these days as most calculators can do this for you. **This will include solving quadratic equations by factorising.**
- Completing the Square - another topic that they generally don't put in a calculator paper because you calculator can do most of the work.
- Circle theorems.

Remember that any topic can appear on any paper, so this is just a guide, and you need to know as much of the content as possible for every exam paper.

Key Maths Words You Need to Know

You need to know what these words mean so if you don't, then use this page to learn them.

Test yourself by covering up the definition and retrieving it from your memory or get someone to test you.

Key Word	Definition
Area	The space inside a 2D shape.
Capacity	How much something can hold. Measured in litres, ml or cm^3
Correlation	How two things are related, positive- when one goes up the other goes up, negative – when one goes up, the other goes down.
Congruent	The same shape and size.
Density	The amount of mass in a certain space (volume) or how packed something is.
Diameter	The distance across a circle through the centre.
Digit	Any of the numbers from 0-9. Digits make up larger numbers.
Elevation (side, front, back)	Different views of a 3D shape.
Factor	A number that divides into another number without leaving a remainder.
Frequency	How often or how many.
Gradient	How steep a line is. A higher gradient means a steeper line. Calculated by $\frac{change\ in\ y\ (vertical)}{change\ in\ x\ (horizontal)}$
Geometric sequence / progression	A sequence where there is a common ratio, a number that each term is multiplied by to get the next term.
Hemisphere	Half of a sphere. Imagine a globe split in half; each half is a hemisphere, like the Northern Hemisphere and Southern Hemisphere on Earth.
Index form	A way to write numbers using powers. For example, $\mathbf{2^3}$ is index form for $2 \times 2 \times 2$
Integer	A whole number that can be positive, negative, or zero.
Linear / Arithmetic sequence	A list of numbers where each number increases or decreases by the same amount (common difference).
Mass	The amount of stuff in an object, often measured in grams or kilograms.

Mean	The value when a set of numbers are shared out equally. Found by adding the values and dividing by the number of values.
Median	The middle value in a list of numbers when arranged from smallest to largest. If there's an even number of values, it's the average (mean) of the two middle ones.
Mode / Modal	The number that appears most frequently in a set of numbers. It's the most common value.
Multiple	A number you get when you multiply a given number by an integer.
Parallelogram	A four-sided shape with opposite sides that are both parallel and equal in length, like a slanted rectangle.
Perimeter	The distance all the way around the outside of a shape. Imagine walking around the edge of a field or shape—that's its perimeter.
Plan	A drawing or layout of something from above, like a bird's-eye view or blueprint of a building's floor.
Population	The total number of people or things in a group being studied or counted, like the population of a city or a survey.
Pressure	The force applied to a surface per unit area, like pressing down on something. Usually measured in mass per unit of area (e.g. kg/m^2)
Prime number	A number that has only two factors: 1 and itself. For example, 5 is a prime number because it can only be divided by 1 and 5.
Prism	A 3D shape with identical ends (called bases or cross sections) and flat sides. Imagine a box with triangular or rectangular bases.
Quadrilateral	Any four-sided shape, like squares, rectangles, trapeziums, and parallelograms.
Range	The difference between the largest and smallest values in a set of numbers. It shows how spread out the values are.
Regular polygon	A shape with all equal sides and angles, like an equilateral triangle or square.
Similar	Shapes that have the same shape but may be different sizes. They look the same but may be scaled up or down. Similar shapes have the same size angles.
Sum	The total when adding.
Tangent	A line that touches a curve or circle at exactly one point without crossing it.
Trapezium	A four-sided shape with only one pair of parallel sides, like a slanted rectangle with uneven sides.
Volume	The amount of space inside a 3D shape, like how much a box can hold. It's measured in cubic units like cubic metres (m^3) or cubic centimetres (cm^3).

12. Frequently Asked Questions

Why am I in Higher tier and not Foundation tier, the work is too hard?

The decision about which tier is best for you can be complicated. See page 27 for more details and speak to your teacher if you still don't understand.

I need a grade 6/7 for college and I am predicted lower than that, what can I do?

Your teacher will have predicted the most likely grade for you to achieve based on their current knowledge of your results in trial exams and your work in class. If you want to achieve a better grade then you will need to work harder, make the most of your lessons and revise well. Use this guide and speak to your teacher, who will be happy to help you.

Can I change classes?

We work hard to make sure that every pupil is in the best class for them to achieve the highest outcomes possible. Being in a higher set doesn't automatically make any difference to your outcomes. The only way to improve is to work harder. If your attainment gets better and a different set would be more appropriate, then your teacher will make that judgement.

What topics will be on the Trial exams?

Just like with the real exams, trial exams can test any content on the GCSE syllabus (see page 28). Your teacher can't tell you what will come up. For Trial 1, which is non-calculator, you can look at the common non-calculator topics on page 55.

When are the final GCSE maths exams this year?

The dates for the Maths GCSE papers in the summer of 2025 are:

- Paper 1 – Thursday 15th May
- Paper 2 – Wednesday 4th June
- Paper 3 – Wednesday 11th June

All three papers are in the morning.

I have a question that isn't answered in this guide

The first person to contact is your maths teacher. If they don't know the answer to your question then they will be able to find out. Speak to them in school or email them. You can find their email address by searching in Outlook.