



Science
Mastery



Fully resourced KS3
Science curriculum,
developing teacher
subject knowledge

Student success through empowered teaching



Student success through empowered teaching

Teachers hold the key to unlocking students' potential, and we are here to help you on that journey.

Grown out of Ark Schools, one of the highest achieving academy groups in the UK, our team of well researched and highly skilled curriculum designers and expert trainers partner with you and your team to provide consistent, high-quality education for all students.

We help you provide your best teaching to all students, working with you to close the attainment gap. We've seen the impact on disadvantaged students through our Ark Schools (making nearly half a grade more progress than their peers nationally) and are here to give all students the opportunities that an excellent education provides.



Success for all

We believe that education has the power to help every young person excel – and it all starts with you.

By enriching the curriculum to move beyond achieving grades alone, we create a learning structure that constantly builds contextual and conceptual knowledge.

Our holistic approach helps you to identify and support specific needs. As a result, we help to narrow the attainment gap, ensuring no child is left behind.



Teachers make the difference

Our programmes are built for teachers, because you are the people who can make a real difference to a young person's understanding.

Personal development is central to our approach. We build teachers' subject and pedagogical expertise without taking time away from the classroom.

We also ensure that teachers remain in control. You choose the material and topics, but can access pre- and post-teaching assistance to make the most impact with every lesson.

Evidence meets practice

When creating our programmes, we conduct in-depth research into the latest curriculum designs and pedagogical theories. This approach means our support is always grounded in evidence-based principles.

Teachers also help to develop and test our curriculum in the classroom, meaning you can be confident that our programmes are accessible, easy to implement and make a tangible difference to the teacher and student experience.



Developing teacher subject knowledge

Informed by the latest research in pedagogical and cognitive science, our Science Mastery programme helps develop teacher subject knowledge across all areas, empowering you to inspire all students to succeed.

It also broadens the awareness of science and the multitude of different available careers your students could pursue, with engaging lessons that are brought to life with practical skill development through:

- A well-sequenced and interlinked KS3 Science curriculum
- A full suite of classroom planning, delivery and assessment
- Integrated training and professional development



Mathematics
Mastery

Also available at KS3, Mathematics Mastery.

Our science curriculum has been developed alongside Mathematics Mastery to ensure methods and language are consistent across subjects.

Find out more details on our website.

Driver of student attainment, by teachers for teachers

The Science Mastery programme has been informed, delivered and refined by expert science teachers from across the country. Their experience has contributed to the development of the programme as a practical, powerful driver of student attainment.

Science Mastery transforms science teaching and learning by focusing on the four key elements of great science education:

- **Factual and conceptual understanding**
- **Mathematics, practical and enquiry skills**
- **Language and communication**
- **Application of knowledge and skills**





Our approach

We are committed to our partnership together, knowing the journey to full-school transformation takes dedication and a consistent approach over time.

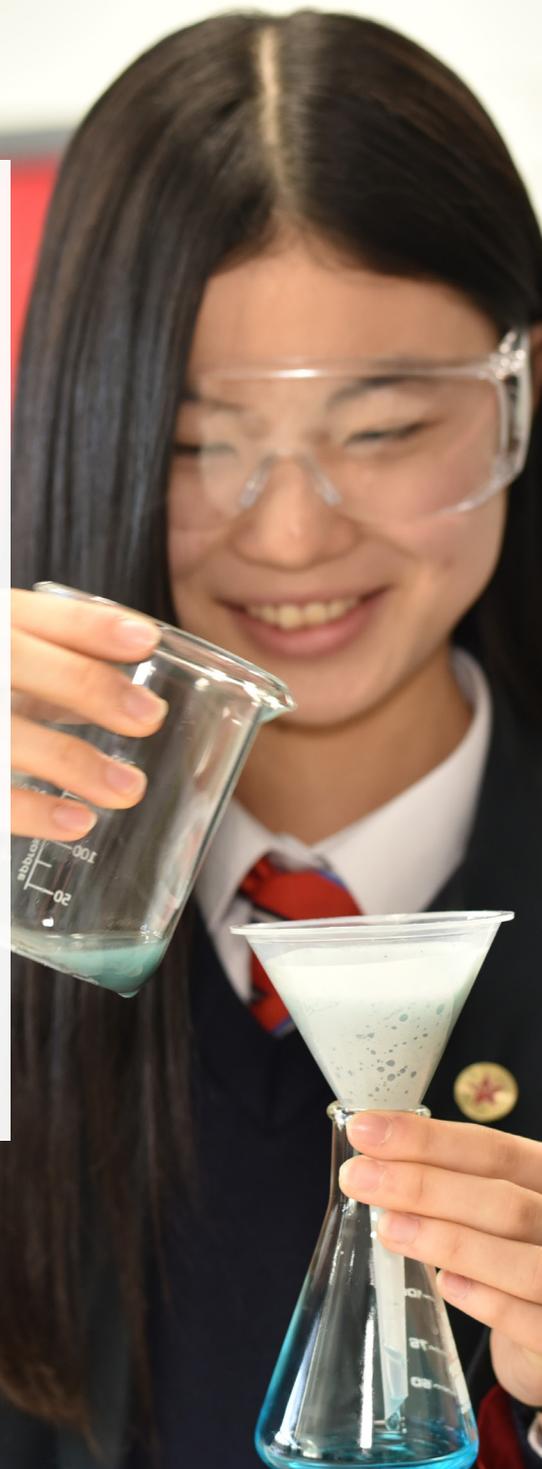
Providing integrated, consistent professional development, helping you improve students outcomes

We work with a goal in mind – to help your teachers deliver their best teaching possible. Our style of support responds to your team’s growing confidence and expertise.

Stage 1: Launch

Stage 2: Develop

Stage 3: Sustain



Launch 1 YEAR

Laying the foundations for impactful implementation

PD to lay foundations:

- Whole-school and 1:1 training on subject knowledge and pedagogy
- Dedicated training for your Mastery Lead
- Dedicated support from our team of Development Leads to help determine your areas of focus for greatest impact

Develop 1-3+ YEARS

Building on your team’s subject and pedagogical understanding to develop their practice

PD to hone classroom skill:

- Teacher training covering planning and adaptation of lessons, diagnosing and responding to learning gaps, providing challenge, assessment, and more
- Further training of Mastery Lead, equipping them to provide in-house training
- Annual 360 review ensuring you’re on track in transforming pupil outcomes

Sustain ONGOING

Making the programme your own

On-demand PD:

- Regular webinars and embedded training within resources to refine your teachers’ classroom practice
- Annual summative assessment tracks students’ progress and identifies development areas
- Option to add-on personalised support

✓ Classroom resources ✓ Subject knowledge development ✓ Teaching guidance



Enhancing practical science and maths skills

To help student success during the programme and beyond, we've developed a list of 100 practical, enquiry and maths skills which are mapped across 5 years to show how they develop over time.

Dedicated skills lessons are used to give teachers and students time to explicitly learn and practice different practical and enquiry skills. For each skill teachers will be assessing students through observation and we provide a competency framework to help teachers know what to look for to show students have the practical skills.

Maths in Science lessons have been developed alongside Mathematics Mastery and are consistent with methods and language taught in maths so that when vocabulary or skills are introduced in science, they will have already have been taught these in their maths classroom. These also include teacher guidance so that science teachers can be confident in delivering maths lessons.



Helping all students on the route to recovery

Every learner will have been affected by Covid-19 differently.

We believe that subject mastery is achievable for all students and so our programme design empowers all students to access the same ambitious curriculum.

Success for all has always been at the heart of our curriculum design. In recent times, more children than ever have been disadvantaged by the learning gap resulting from disrupted learning.

To help support the route to recovery, Science Mastery programme offers:

- a focus on formative assessment
- pre unit quizzes to identify gaps in learning
- links between content in different units, so you are training memory through regular retrieval
- 'What If?' activities, requiring students to apply their learning to a new context in order to solve problems and predict outcomes
- teacher guidance and resources to support high quality practical, enquiry and Maths skills development





What do I get when I join the programme?

Mastery curriculum

The Science Mastery 5-year curriculum map is organised under the 'big ideas' of science.

This allows students to make links between topics, building ideas into a coherent picture of how the world works. Presenting new information under the umbrella of a familiar 'big idea' helps students to recognise the connectedness of science, and also how each new topic connects to everyday life and familiar contexts. This approach allows for the planned interleaving of prior learning with new learning in a meaningful way.

A full suite of resources, available online via the MyMastery learning platform

Our MyMastery learning platform provides easy 'anytime, anywhere' access to the full suite of Science Mastery content, including teaching materials and professional development.



Integrated Professional Development

Throughout the programme, your team can make use of videos, tutorials and workshops to grow their subject and teaching expertise.

Our partnership packages offer a range of additional support, from one-to-one coaching to developing a subject lead. You choose the level of support that your school needs – with dedicated subject experts to help you.

Teaching overviews

Mastery class videos support teachers planning to teach a range of tricky topics.

Practical guides support practical science with sample results, set-up instructions, helpful diagrams, recommended methods and more.

Unit overviews and planning proformas summarise the important information for teachers on a lesson by lesson basis.

Mark schemes for quizzes precisely identify student misconceptions and provide model answers for formative assessment.

B1.1 Mastery Quiz: Cells
Mark Scheme

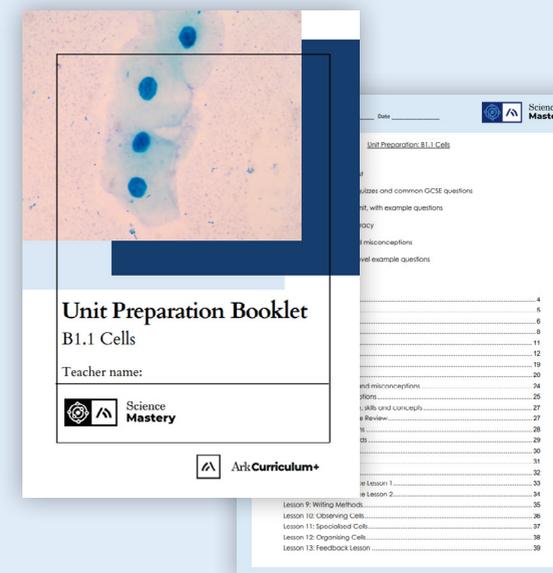
Section A

Qn	Answer	Marks	Supporting Information Suggestions for the tasks
1	C	1	Answering A is the common misconception that the cell wall and the cell membrane are the same or get confused. To fix it, show different diagrams and micrographs of the cell wall and the cell membrane alongside comparing their functions then ask students to explain the differences between the cell wall and the cell membrane. Answering B is a gap in knowledge about identifying the cell membrane and the cytoplasm. To fix it, ask students to label cell diagrams or identify errors on mislabelled cell diagrams.
2	B	1	Answering A shows that the student knows there is a factor of 1000 difference between kg and g, but they have incorrectly multiplied rather than divided by 1000. To fix it, ask students whether 'g is 1 kg a greater' and then ask them to write a sentence to say how many g are in 1 kg. Answering C shows that there is a lack of understanding of how to convert kg to g. To fix it, refresh how to convert g to kg and also m to km, then give students practice questions.
3	C	1	Answering A or B suggests that students cannot order decimal numbers from smallest to largest. To fix it, show students how answer C can be obtained by adding together 0.2 + 0.02 + 0.002. Then ask students to put the following numbers in order from smallest to largest: 0.22, 0.222, 0.2.
4	B	1	Answering A suggests that the student has a gap in knowledge about the function of microscopes. To fix it, ask students to explain why we cannot see red blood cells without a microscope. Answering C suggests that the student has mixed up the function of the slide with the more general function of the microscope. To fix it, ask students to explain why we can't see individual onion cells when on a slide.
5	B	1	Answering A suggests a gap in knowledge, since 'blood system' is not an organ system. To fix it, ask students to list all of the organ systems they know, with a brief description of their function.

Planning guidance

The Science Mastery programme includes everything teachers need in order to think through lesson planning and encourages science teachers to work collaboratively with an expert colleague, or in a group.

As all lesson resources are provided, teachers' planning time can be spent on high impact preparation and adapting for students' individual needs.





Lesson resources

We understand the importance of creative freedom when planning lessons. We also know the needs of teachers and students vary hugely. Our materials therefore provide a selection of activities to choose from, which are all fully editable to meet your students.

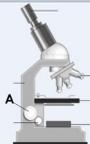
Slide decks are provided for each lesson, including notes and guidance to support delivery.

Fully
editable

Observing Cells

Answer these questions in full sentences:

- Name a part of plant cells that is **not** in animal cells.
- Name the part of the microscope labelled A.
- What is the total magnification of a microscope if the objective lens is x4 and the eyepiece lens is x10.
- What is the difference between a hazard and precaution?
- Name the part of the microscope where the slide is placed.



Do Now

ArkCurriculum+ 05/11/2021

Observing Cells

B1.1.8

Science Mastery

B1.1.1 Prior Knowledge Review Maths in Science Lesson 2
 B1.1.2 Asking Questions B1.1.7 Writing Methods
 B1.1.3 Risk and Hazards B1.1.8 Observing Cells
 B1.1.4 Animal Cells B1.1.9 Specialised Cells
 B1.1.5 Plant Cells B1.1.10 Organising Cells
 B1.1.6 Microscopes B1.1.11 Feedback Lesson



Quick Quiz

True or false?

- Carrying the microscope by the arm is a safety hazard.
- The slide and the coverslip are made of glass.
- Good scientific drawings are labelled and use simple lines.
- You must always start on the lowest magnification objective lens when looking at a specimen using the microscope.

Check for understanding

Student resources

Student Books provide a range of activities to support the independent tasks for each lesson.

Knowledge organisers consolidate the essential knowledge for each unit.

Student glossaries list all new vocabulary that are introduced in each unit alongside definitions and example sentences.

Science Mastery

Asking Questions

- Science is about
 - observing the world (watching and listening)
 - asking questions about nature and how the world works
 - coming up with ideas and explanations that explain what we see
 - testing our ideas to see if they are true
 - using our knowledge and skills to solve problems and improve lives
- A scientific question is one that
 - can be answered
 - can be tested or measured

Staying Safe

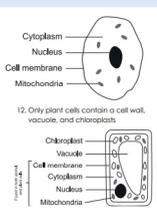
- A **hazard** is something that can cause harm.
- A **risk** is the harm that might happen to you or someone else.
- A **precaution** is what you do to prevent a hazard from causing harm.

Cells

- Living things are called organisms.
- All organisms carry out the **5 life processes**: movement, respiration, sensitivity, growth, reproduction, excretion and nutrition.
- All living things are made of cells.
- Unicellular** organisms are made of only one cell e.g. bacteria.
- Multicellular** organisms are made of many cells e.g. humans.
- Animal and plant cells contain a **nucleus**, **cell membrane**, **mitochondria** and **cytoplasm**.

Specialised Cells

- Specialised cells have different structures that let them carry out their function.
- Sperm cells**. Their function is to swim to the egg cell for fertilisation. The structure

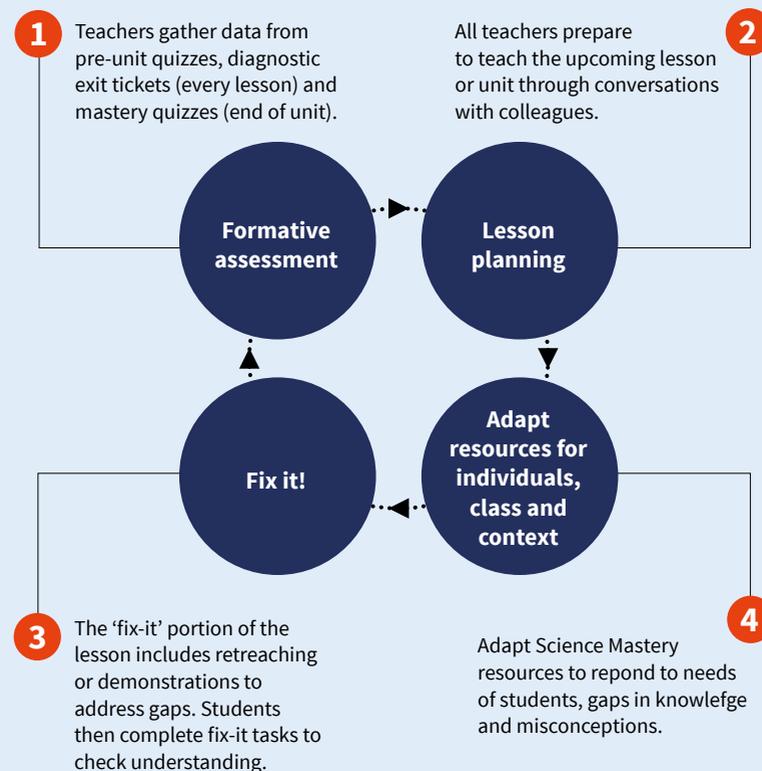


Assessment and intervention

We provide a fully planned and integrated formative assessment model that complements and advances the skills students develop during their Science Mastery lessons.

This includes:

- quick and easy checks for understanding within the lesson
- a diagnostic Mastery Quiz at the end of each unit
- an Exit Ticket to check learning at the end of each lesson





Customise the level of support for your school

Our friendly partnerships team will be happy to talk you through the programme and help you decide on the right approach and package for your school.

To book a demo, or sign up for a free trial, contact us on:

E: partnerships@arkcurriculumplus.org.uk

T: 020 3116 6363

Or book a call online at

www.arkcurriculumplus.org.uk/book-a-demo

Pricing

We are a non-profit organisation. The schools that we work with are charged a financial contribution which goes towards delivering and developing the programmes. You can find pricing information on our website – but do get in touch to receive a quote for your specific setting.

<https://www.arkcurriculumplus.org.uk/join-us>

Also available at Key Stage 3:



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Mastery



English
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Writing
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