

Re-building pupils' practical and enquiry skills

Welcome to the webinar. We will start at 3pm.
In the meantime, feel free to introduce yourselves, your role and location
in the Q&A

8th July 2020

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Welcome and introductions

- Presenting: Sue Daley and Raj Joshi
- Please post your name, role and location in the chat
- Other experts in the room: CLEAPSS, STEM Learning, London STEM Ambassador Hub



- 1 Black Country
- 2 Cambridge and Peterborough
- 3 Central and West London
- 4 Central Midlands
- 5 Cheshire and The Wirral
- 6 Cornwall
- 7 Derbyshire and Nottinghamshire
- 8 Devon
- 9 Dorset and South Wiltshire
- 10 Durham and Tees Valley
- 11 Gloucestershire and North Wiltshire
- 12 Greater Bristol
- 13 Greater Lincolnshire
- 14 Greater Manchester
- 15 Greater Merseyside and Warrington
- 16 Hampshire and Isle of Wight
- 17 Hertfordshire and Essex
- 18 Kent and Medway
- 19 Lancashire and Cumbria
- 20 Leicestershire, Leicester and Northants
- 21 Norfolk and Suffolk
- 22 North and East London
- 23 North and West Yorkshire
- 24 North Midlands
- 25 Northumberland Tyne and Wear
- 26 Oxfordshire and Reading
- 27 Somerset
- 28 South and East Yorkshire
- 29 South Central
- 30 South London
- 31 Southend, Essex and Thurrock
- 32 Surrey
- 33 Sussex

CLEAPSS is the guiding authority for everything science (and DT/Art practical)

We have now created a series of new guides to support schools during the COVID-19/Coronavirus Pandemic :-

[GL336 - CLEAPSS Advice during the COVID-19 / Coronavirus Pandemic - Version 23](#)
(Updated 29/05/20)

[GL338 - Practical activities for pupils attending school during extended periods of closure](#)

[GL339 – Practical activities for pupils at home during extended periods of school closure](#)

[GL343 – Guide to doing practical work during the COVID-19 Pandemic – Science - Ver. 1.11](#) (3rd July)

[GL345 – Guidance for science departments returning to school after an extended period of closure - Ver. 1.3](#) (26th June)

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What's New

Welcome to the new CLEAPSS Science Website

What is CLEAPSS

CLEAPSS resources give teachers ideas for exciting and engaging practical activities that fire pupils' imaginations and then, unlike many other sources of ideas, go on to show teachers and technicians in detail how to translate the ideas into safe and exciting experiences in the classroom.

CLEAPSS advice and documentation is recognised by the Health and Safety Executive and the Department for Education.. [\(read more\)](#)



Find Resources..

Search:

Go

Latest news from CLEAPSS..

COVID-19 (Coronavirus) in Schools - Updated 03/07/2020

Latest News

CLEAPSS office is closed following government advice.

We will however continue to answer ALL helplines, and continue to develop both emergency guidance for COVID-19 and longer term developmental guides across all the areas we cover.

CLEAPSS

The best pieces of guidance are the two below, which should answer many of the questions (and possibly prompt some more!) :-

<http://science.cleapss.org.uk/Resource-Info/GL343-Guide-to-doing-practical-work-in-a-partially-reopened-school-Science.aspx>

<http://science.cleapss.org.uk/Resource-Info/GL345-Guidance-for-science-departments-returning-to-school-after-an-extended-period-of-closure.aspx>

Key questions:

- What's the role of practical work and scientific enquiry?
- What tools do we have for developing progression in practical skills?
- How can we adjust the science curriculum in the short term and improve the way we deliver science lessons in the longer term?
- What strategies, resources and tools can we draw on to enhance pupils' development of these skills?

Building progression in practical skills development

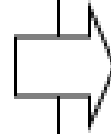
What came before?

Gathering and recording evidence	<ul style="list-style-type: none"> taking measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, bar and line graphs 	<ul style="list-style-type: none"> use appropriate techniques, apparatus, and materials during fieldwork and laboratory work, paying attention to health and safety 	<ul style="list-style-type: none"> carry out experiments appropriately having due regard to the correct manipulation of apparatus, the accuracy of measurements and health and safety considerations
		<ul style="list-style-type: none"> apply sampling techniques. 	<ul style="list-style-type: none"> recognise when to apply a knowledge of sampling techniques to ensure any samples collected are representative
		<ul style="list-style-type: none"> make and record observations and measurements using a range of methods for different investigations; and evaluate the reliability of methods and suggest possible improvements 	<ul style="list-style-type: none"> make and record observations and measurements using a range of apparatus and methods

KS3 – 4 progression overview: what comes next?

KS3 - Experimental skills and investigations (ES)

1. ask questions and develop a line of enquiry based on observations of the real world, alongside prior knowledge and experience
2. make predictions using scientific knowledge and understanding
3. select, plan and carry out the most appropriate types of scientific enquiries to test predictions, including identifying independent, dependent and control variables, where appropriate
4. use appropriate techniques, apparatus and materials during fieldwork and laboratory work, paying attention to health and safety
5. make and record observations and measurements using a range of methods for different investigations
6. evaluate the reliability of methods and suggest possible improvements
7. apply sampling techniques



KS4 - Experimental skills and strategies (ES)

1. use scientific theories and explanations to develop hypotheses
2. plan experiments or devise procedures to make observations, produce or characterise a substance, test hypotheses, check data or explore phenomena
3. apply a knowledge of a range of techniques, instruments, apparatus, and materials to select those appropriate to the experiment
4. carry out experiments appropriately having due regard to the correct manipulation of apparatus, the accuracy of measurements and health and safety considerations
5. recognise when to apply a knowledge of sampling techniques to ensure any samples collected are representative
6. make and record observations and measurements using a range of apparatus and methods
7. evaluate methods and suggest possible improvements and further investigations.

STEM Clubs opportunities – applying the skills

Applying simple principles to real world scenarios and developing the skills of tinkering, patience and tweaking

[Watch YouTube Video here](#)

Justifying practical science at a whole school level

EEF recommendations

- <https://educationendowmentfoundation.org.uk/tools/guidance-reports/improving-secondary-science/>
- Recommendation 5 - Use practical work purposefully and as part of a learning sequence

Gatsby benchmarks

- <https://www.gatsby.org.uk/education/programmes/support-for-practical-science-in-schools>
- 10 Benchmarks and 10 Recommendations strongly support by research

Carrot-gate

- AQA GCSE trilogy Biology paper 1H Question 4
- 55% of students achieved at least one mark, but only 27% achieved two or more marks [out of 6]
- There were a few very good responses which demonstrated that the definition for osmosis had been learnt.




Cleapss

- Usually features in whole school H&S plan
- Have release Covid specific guidance throughout the different phases of school closure

<p>1</p> <p>Preconceptions: Build on the ideas that pupils bring to lessons</p>  <ul style="list-style-type: none"> • 1a: Understand the preconceptions that pupils bring to science lessons • 1b: Develop pupils' thinking through cognitive conflict and discussion • 1c: Allow enough time to challenge misconceptions and change thinking 	<p>2</p> <p>Self-regulation: Help pupils direct their own learning</p>  <ul style="list-style-type: none"> • 2a: Explicitly teach pupils how to plan, monitor, and evaluate their learning • 2b: Model your own thinking to help pupils develop their metacognitive and cognitive knowledge • 2c: Promote metacognitive talk and dialogue in the classroom 	<p>3</p> <p>Modelling: Use models to support understanding</p>  <ul style="list-style-type: none"> • 3a: Use models to help pupils develop a deeper understanding of scientific concepts • 3b: Select the models you use with care • 3c: Explicitly teach pupils about models and encourage pupils to critique them 	<p>4</p> <p>Memory: Support pupils to retain and retrieve knowledge</p>  <ul style="list-style-type: none"> • 4a: Pay attention to cognitive load—structure tasks to limit the amount of new information pupils need to process • 4b: Revisit knowledge after a gap to help pupils retain it in their long-term memory • 4c: Provide opportunities for pupils to retrieve the knowledge that they have previously learnt • 4d: Encourage pupils to elaborate on what they have learnt 	<p>5</p> <p>Practical Work: Use practical work purposefully and as part of a learning sequence</p>  <ul style="list-style-type: none"> • 5a: Know the purpose of each practical activity • 5b: Sequence practical activities with other learning • 5c: Use practical work to develop scientific reasoning • 5d: Use a variety of approaches to practical science 	<p>6</p> <p>Language of Science: Develop scientific vocabulary and support pupils to read and write about science</p>  <ul style="list-style-type: none"> • 6a: Carefully select the vocabulary to teach and focus on the most tricky words • 6b: Show the links between words and their composite parts • 6c: Use activities to engage pupils with reading scientific text and help them to comprehend it • 6d: Support pupils to develop their scientific writing skills 	<p>7</p> <p>Feedback: Use structured feedback to move on pupils' thinking</p>  <ul style="list-style-type: none"> • 7a: Find out what your pupils understand • 7b: Think about what you're providing feedback on • 7c: Provide feedback as comments rather than marks • 7d: Make sure pupils can respond to your feedback
<p>Teaching for engagement</p>						

Audit Tool

RECOMMENDATION 5 Practical Work

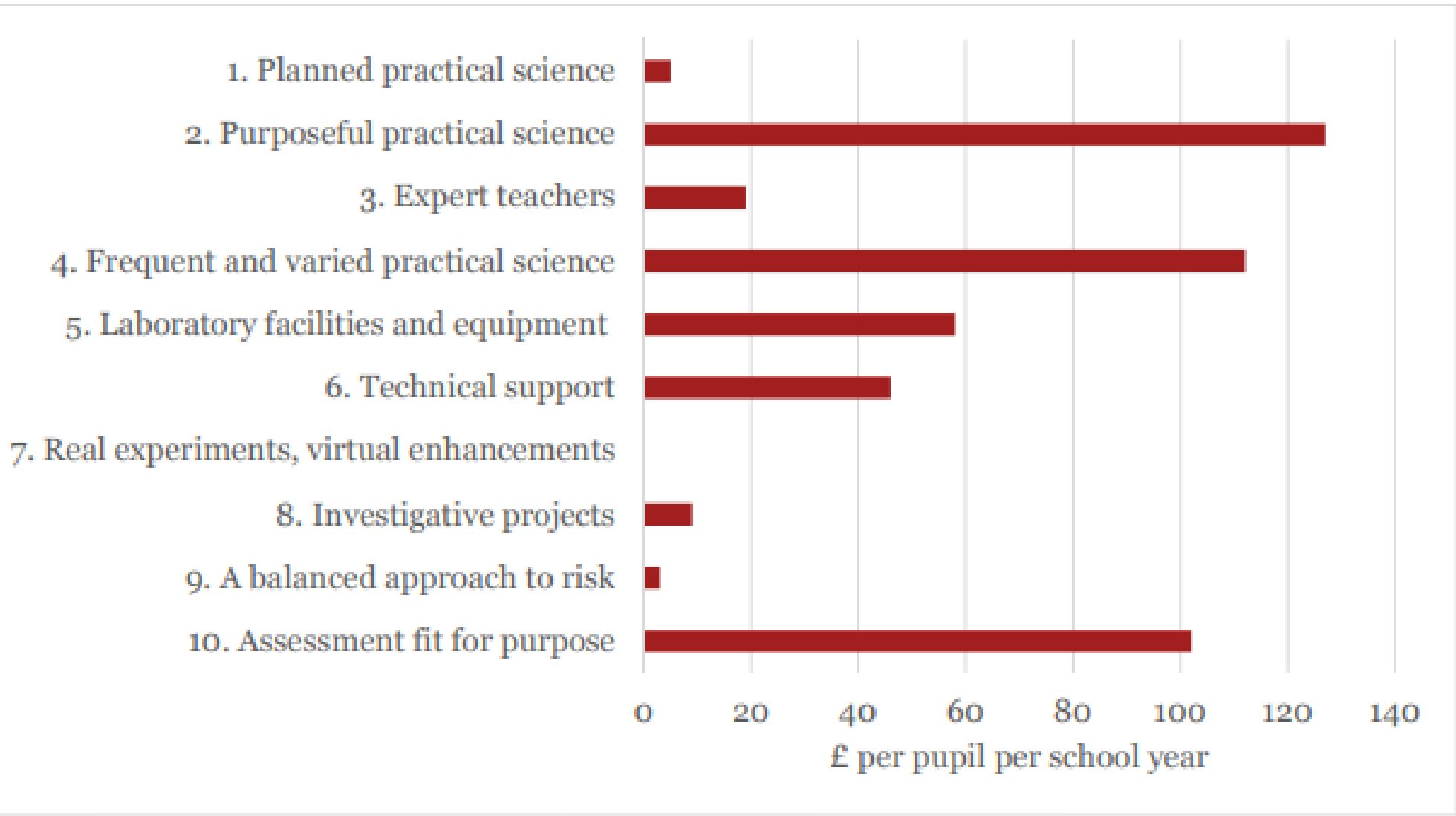
	Ineffective 	Intermediate 	Exemplary 
Using practical work purposefully	Teachers use practical work as a lesson activity rather than thinking about the reason that they are using it.	Teachers understand the different purposes that practical work can have. They consider why they are doing a particular activity and make this clear to pupils.	Teachers carefully select practical activities to support the aims of the lesson. They are clear about the purpose of the practical activity and make this explicit to pupils. Teachers use a range of practical activity types according to the purpose, this includes virtual experiments and open-ended investigations.
Linking practical work with other learning	Practical work is seen as a stand alone activity and is not clearly linked to the rest of the lesson. Teachers expect pupils to learn scientific concepts through practical activities alone.	Teachers link the practical activity to the aims of the lesson. They remind pupils through the activity what they should be observing and the ideas they should be using.	Teachers link the practical activity to the aims of the lesson. They remind pupils through the activity what they should be observing and the ideas they should be using. After the activity teachers discuss with pupils what was observed and how this adds to their understanding of the ideas being taught.
Using practical work to develop scientific reasoning	Limited opportunities for scientific inquiry are provided.	Opportunities for scientific inquiry are provided but these could be unfocused or are often pupil-lead.	Opportunities for scientific inquiry are frequent. These are teacher-lead and focus on skills which develop science specific reasoning skills.

Gatsby benchmarks

- 1 PLANNED PRACTICAL SCIENCE
- 2 PURPOSEFUL PRACTICAL SCIENCE
- 3 EXPERT TEACHERS
- 4 FREQUENT AND VARIED PRACTICAL SCIENCE
- 5 LABORATORY FACILITIES AND EQUIPMENT
- 6 TECHNICAL SUPPORT
- 7 REAL EXPERIMENTS, VIRTUAL ENHANCEMENTS
- 8 INVESTIGATIVE PROJECTS
- 9 A BALANCED APPROACH TO RISK
- 10 ASSESSMENT FIT FOR PURPOSE

Gatsby recommendations

- 1 THE 10 BENCHMARKS
- 2 TRAINING EXPERT TEACHERS
- 3 CONTINUING PROFESSIONAL DEVELOPMENT FOR TEACHERS
- 4 ACCOUNTABILITY AND PRACTICAL SCIENCE
- 5 VALID ASSESSMENT
- 6 PROJECTS IN THE CURRICULUM
- 7 RECRUITING, RETAINING AND DEPLOYING SPECIALIST TEACHERS
- 8 VALUING SCIENCE TECHNICIANS
- 9 PLANNING FOR SUCCESS
- 10 MANAGING RISKS



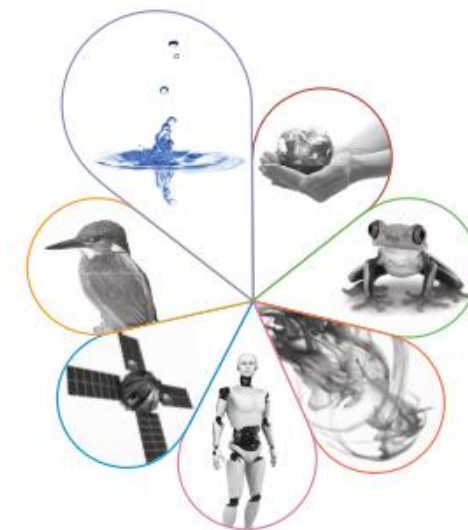
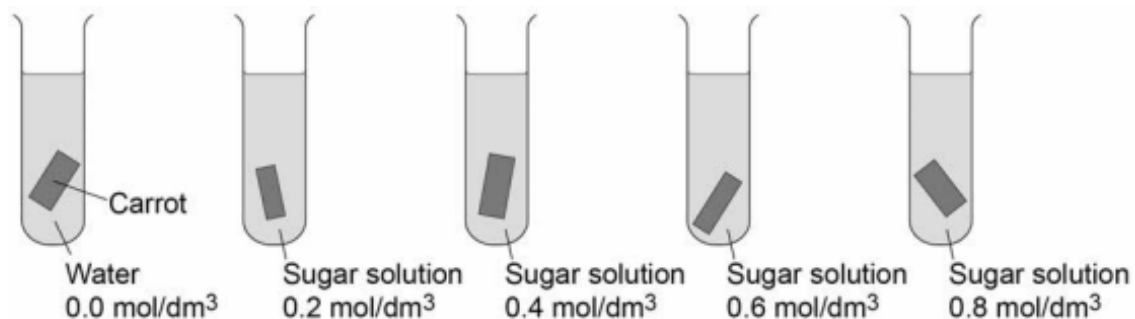
A student investigated the effect of different concentrations of sugar solution on pieces of carrot.

This is the method used.

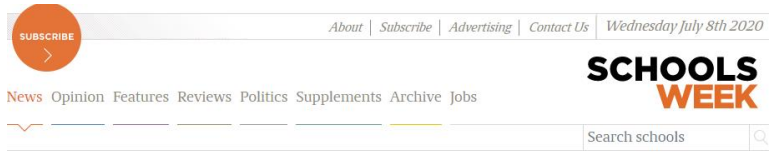
1. Weigh five pieces of carrot.
2. Place each piece into a different tube.
3. Into each tube add 20 cm³ of water or one of the sugar solutions as shown in **Figure 6**
4. Leave the apparatus for 2 hours.
5. Remove the carrot and dry each piece on paper towel.
6. Reweigh each piece.
7. Calculate the percentage (%) change in mass of each piece.

Figure 6 shows how the investigation was set up.

Figure 6



The national picture



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DfE confirms September back-to-school plans

Freddie Whittaker



Limits on attendance will be lifted from September, and schools will be expected to deliver their "full curriculum", the government has confirmed.



NATIONAL ACADEMY Online Classroom

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Welcome to the online classroom. Here you can access all of our lessons.

Synchronous



Students learn at the same time.

Communication happens in real time.

Possibly more engaging and effective.

Allows for instant feedback and clarification.



Examples

Video conferencing, live chat, live streamed videos.

Asynchronous

Students learn at different times.

Communication is not live.

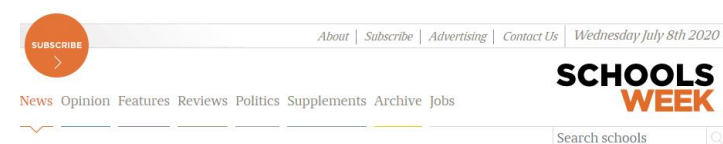
Possibly more convenient and flexible.

Allows students to work at their own pace.



Examples

Email, screencasts, Flipgrid videos, blog posts/comments.



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DfE mulls enforcing remote learning expectations

Freddie Whittaker and Sam Booth



Thu 2nd Jul 2020, 15:38



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Education secretary Gavin Williamson will consider ordering schools to provide a minimum level of remote education should their area go into local lockdown in autumn.

Adverts



Remote learning policy for a blended approach

Launch the learning	Task	Feedback
<p>Video or live learning – could be collaborative or use an external source such as Oak Academy, BBC Bitesize or STEM learning</p>	<p>Each student to be set a task linked to the launched learning. This is completed in the student’s own time – does not need to be completed in a specific time slot.</p> <p>Work can be differentiated within the class.</p> <p>Some students will need support to manage their time.</p> <p>Deadlines should be clearly set</p>	<p>Each student should receive feedback</p> <ul style="list-style-type: none">- Every piece to be acknowledged by the class teacher- Every 2 weeks www/ebi (could be through whole class feedback)

Weekly/fortnightly basis depending on timetable allocation of subject

Use of video and PEOE (predict, explain, observe, explain) strategies

Use of video to collect data: rates of reaction by Primrose Kitten

[Watch YouTube Video here](#)

Use of demo to prompt discussion & elicit thinking

[Watch YouTube Video here](#)



Sparks and charge by Lewis Matheson

Mind over matter

The challenge: to balance a can on its edge. One is full, one is empty and one has 50ml water in it:





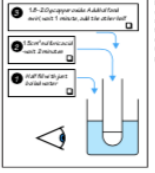





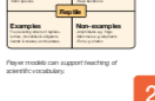


1. Predict and explain
2. Observe and explain

[Watch YouTube Video here](#)

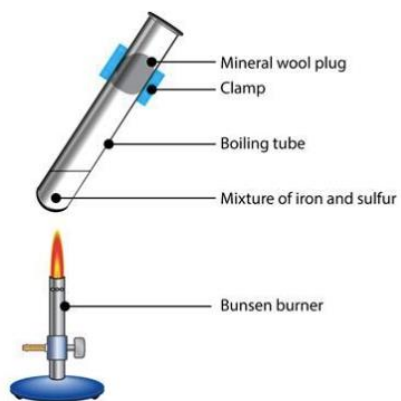
Cognitive load and lists of instructions



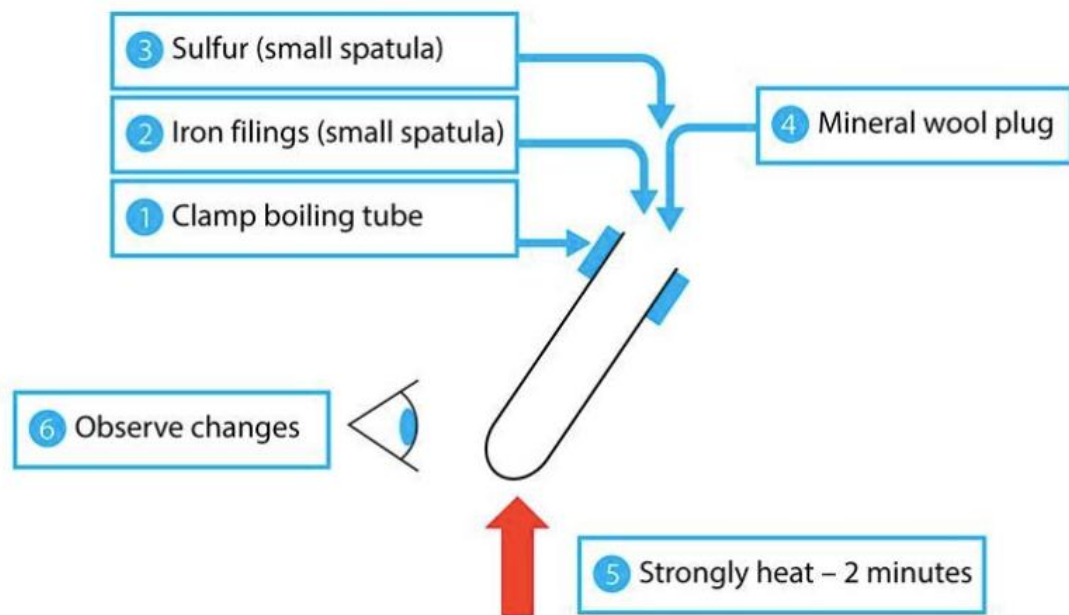
USING RESEARCH TO IMPROVE SCIENCE TEACHING: THE EDUCATION ENDOWMENT FOUNDATION'S GUIDANCE REPORT

	Recommendations	Research Base	Examples	Applications	
<p>Why Science? Science education is one of the ways to develop... and scientific literacy is... essential to being an informed citizen. When asked why they chose to research the study of science, most pupils mention an enjoyment factor.</p> <p>Background The guidance report draws on the best available evidence regarding science teaching at Key Stages 2 and 4. The primary source of evidence was a series of evidence reviews conducted by Southampton University.</p> <p>How was it put together? The guidance report began with a consultation with teachers, academics and other experts. The EEF team appointed an Advisory Panel and evidence review team, and agreed research questions for the evidence review. The Advisory Panel consisted of both expert teachers and academics. The evidence review team conducted searches for the best available international evidence about approaches to science teaching. Finally, the EEF selected with the support of the Advisory Panel a draft recommendation.</p> <p>Who was on the advisory panel? Professor Judith Bennett (University of York) Lu Comerford (Middlesex Youth) Professor Hattie Eppler (University of York) Dr Hilary Kauer (Hale Darnley High School) Laurie Stephenson (Blackpool Research School)</p>	<p>1 Preconceptions: Build on the ideas that pupils bring to lessons</p>	<p>Pupils construct their own explanations for phenomena, and these are refined through scientific explanations. Cognitive conflict is an effective way of trying to push for thinking. Misconceptions can be difficult to shift, but doing so can lead to big gains in learning.</p>	<p>Teachers can encourage misconceptions. For example, pupils can imagine 'frictionless' compounds, prompted by the teacher, rather than using to misconceptions.</p> 	<p>Use diagnostic questions to find out which misconceptions are held by your pupils. Sometimes these can be anticipated, so many can correct at different stages. Address misconceptions, and allow time for pupils understanding to develop and change.</p>	<p>Address the simple ideas in the three conceptual levels that most pupils need to understand Chemistry.</p> 
	<p>2 Self-regulation: Help pupils direct their own learning</p>	<p>Conventional education strategies between self-regulation and attainment in science. Low self-regulation with most pupils need to be developed with the context of learning a subject, and specific strategies to demonstrate your own thinking to guide and engage pupils in metacognitive talk.</p>	<p>The planning, monitoring, evaluation cycle.</p> 	<p>Metacognition includes monitoring your learning and changing your approach to achieve a result. This is underpinned by the Planning-Monitoring-Evaluate cycle, and pupils need to go through it more than once to complete a task. Good learners are often unconfident, but novice learners might need to be taught these processes explicitly.</p>	<p>One of the reasons pupils find Chemistry tricky is because they have to explain phenomena they observe and experience. The macroscopic level using processes they can see or even imagine, the sub-microscopic level and represent them using symbols, formulae. To fully understand Chemistry, students must link these conceptual levels, and make links between them. Explicitly modelling the type of thinking could help students to consistently monitor their understanding and support them to correct errors and extend ideas by engaging in the underlying idea.</p>
	<p>3 Modelling: Use models to support understanding</p>	<p>Modelling is widespread in science teaching. Ideas that models are based on should be transferable to pupils, and it is important that pupils understand how models differ from the idea being taught, and what the underlying idea refers to.</p>	<p>Understanding to explain the effect of fertiliser on crop growth.</p> 	<p>Good teachers use models of their own to provide a bridge between pupils' current ideas and new understanding. Model awareness of thinking about the 'real thing'. By being explicit about models, you can help your pupils understand their own thinking. Make sure pupils are familiar with the underlying idea that the model is based on, or the modelling is to be used for, rather than just the model.</p>	<p>Instructions for practical work, where written methods are displayed separately to diagrams, can act to reduce cognitive load. Combining them could help ease pupils' working memory.</p> 
	<p>4 Memory: Support pupils to retain and retrieve knowledge</p>	<p>Cognitive science has led to breakthroughs in our understanding of how functions and processes, and applying laboratory data to classroom practice that significantly research supports cognitive load theory, spaced review, retrieval practice and elaborative interrogation, which have an increase of students with practice effects.</p>	<p>A simplified model of how how working memory interacts with long-term memory.</p> 	<p>There are important components of memory - long-term memory (store of knowledge) and working memory (where thinking happens). Over time, memory that it can quickly become overloaded, resulting in cognitive overload and this increases the possibility that the content may be misunderstood and not effectively encoded in the long-term memory.</p>	<p>Helping practical instructions can reduce the cognitive effect.</p> 
	<p>5 Practical Work: Use practical work purposefully and as part of a learning sequence</p>	<p>Science science engages pupils, but it is important to be clear about your purpose for using practical work. Practical work has positive impacts on the development of specific practical skills, and there are benefits to developing scientific reasoning skills through practical work. Open-ended research projects can have positive impacts.</p>	<p>For practical activities that aim to improve understanding of scientific theory, and that have a positive impact on the development of specific practical skills, and there are benefits to developing scientific reasoning skills through practical work. Open-ended research projects can have positive impacts.</p> 	<p>Be clear about the skills or knowledge you are trying to develop in your pupils with a particular practical activity. Think about the best approach to developing these things, and plan how to sequence it with other learning. Even if the practical experience, make explicit of scientific reasoning.</p>	<p>Regular low-stakes quizzing supports memory retrieval.</p> 
	<p>6 Language of Science: Develop scientific vocabulary and support pupils to read and write about science</p>	<p>There are consistent, strong correlations between pupils' literacy skills and their success in science. Pupils need to be explicitly taught new scientific vocabulary allowing the links between words to an efficient way of teaching scientific and other understanding, selected writing and science writing can help develop pupils' understanding.</p>	<p>Teach pupils to segment and manipulate words according to their morphemes (and pay attention to new words with similar components are more easily recognised).</p> 	<p>To become competent in the language of science, pupils need to be able to comprehend, analyse, and interpret texts, and a wide range of scientific texts. Focus on the words that pupils really need to understand, and make sure they understand them well. Teach new scientific vocabulary explicitly, and give pupils how to use it, and how to use it in a range of contexts.</p>	<p>Regular low-stakes quizzing supports memory retrieval.</p> 
	<p>7 Feedback: Use structured feedback to move on pupils' thinking</p>	<p>Simply providing more feedback will not necessarily lead to better outcomes. The type of feedback that is critical. The time should use energy of strategies to find out what pupils understand. Feedback should help pupils develop an awareness of feedback that affects what pupils learn how to respond to and engage them to do so.</p>	<p>Feedback at all levels needs to be clear, specific for pupils to transfer, unless feedback at the level of 'self-reflection' may lead pupils to think that their ideas are good.</p> 	<p>Feedback should help the pupil develop an awareness of feedback that affects what pupils learn how to respond to and engage them to do so.</p>	<p>Clear models can support teaching of scientific vocabulary.</p> 

Improving practical work with integrated instructions



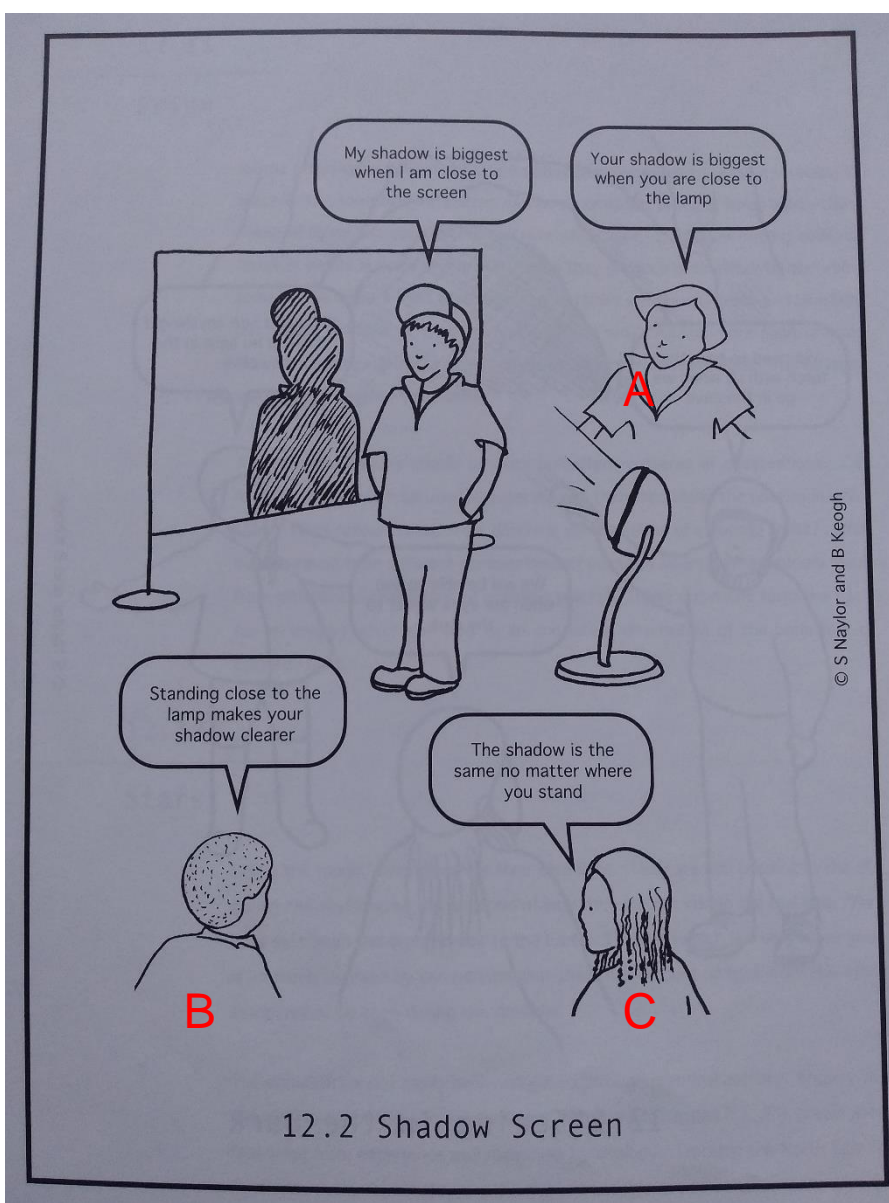
1. Clamp a boiling tube at about 45°C
2. Add a small spatula of iron filings to the boiling tube
3. Add a small spatula of sulfur to the boiling tube
4. Add a bung of mineral wool to the neck of the boiling tube
5. Heat the iron/sulfur mixture strongly for two minutes
6. Observe the changes to the mixture during heating



Integrating simple text instructions with simple apparatus diagrams

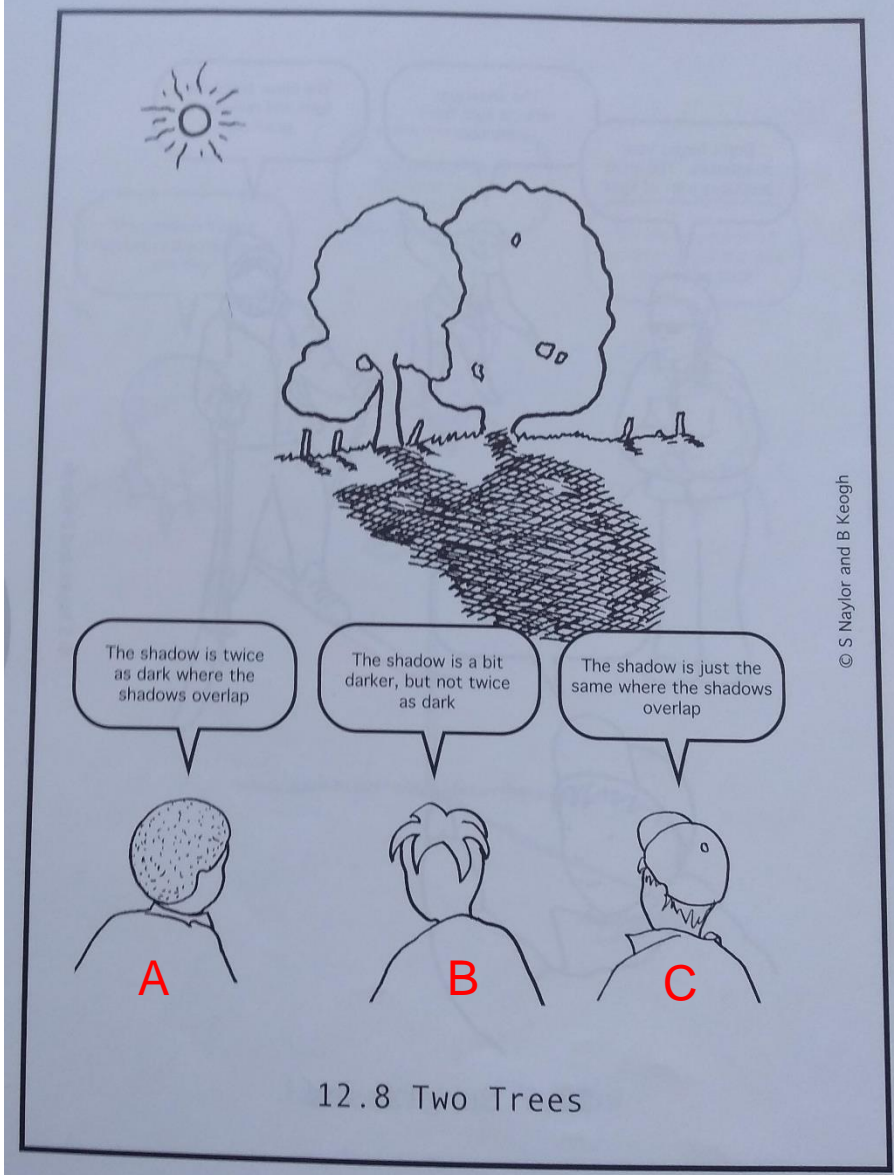
David Paterson
with RSC

Use of concept cartoons and simulations



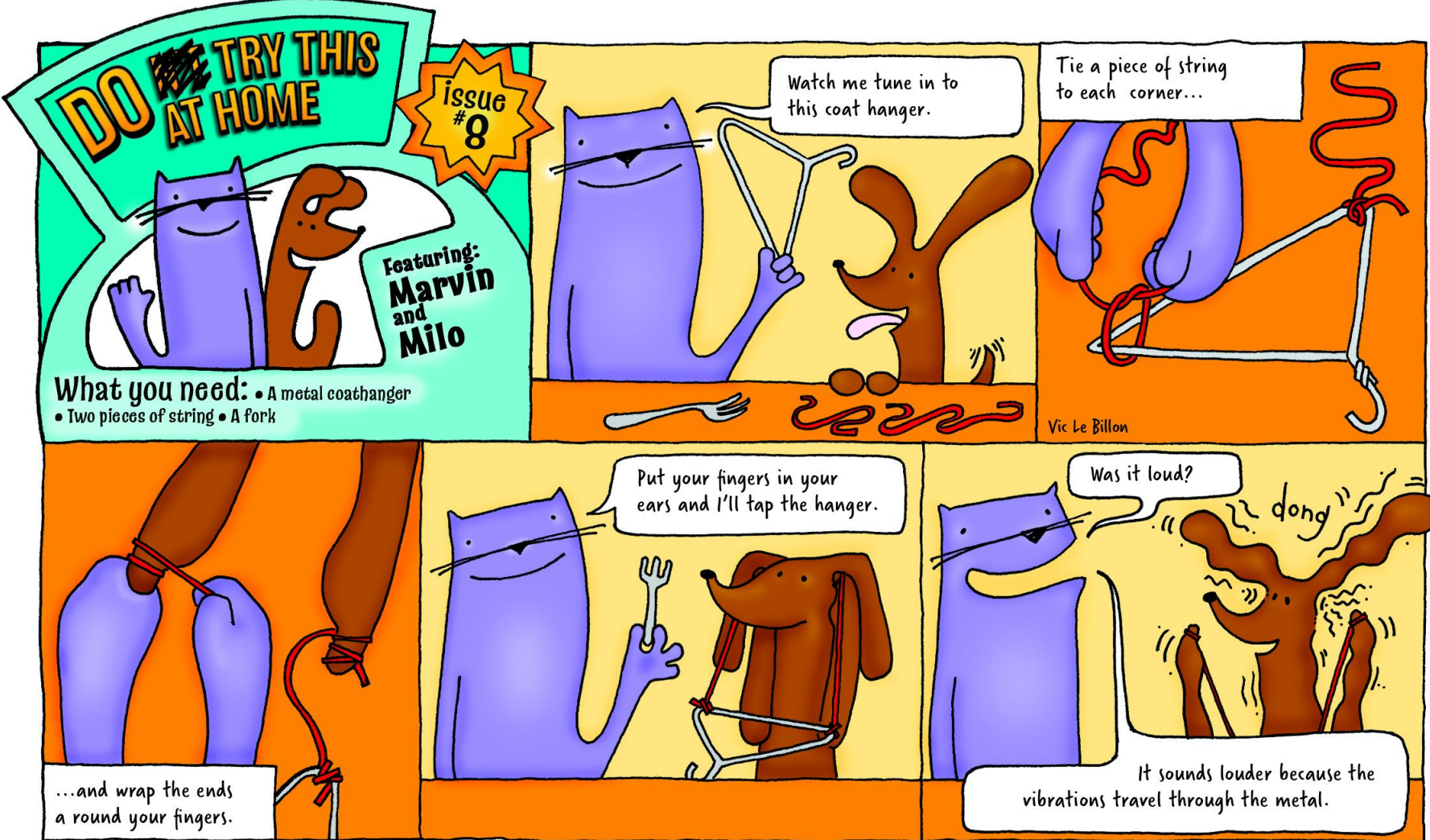
Person	Why do they think that?
A	
B	
C	

What I first thought was the right answer	
An experiment I did to find out the answer	
What I think the answer is now	



Person	Why do they think that?
A	
B	
C	

What I first thought was the right answer	
An experiment I did to find out the answer	
What I think the answer is now	



Download more Marvin and Milo activities at iop.org/marvinandmilo

© Institute of Physics 2019



<https://web.microsoftstream.com/video/691f2b79-3a75-452c-94cb-d80e3711e780>

Questions Responses **4**

Will it float? Pears

4 Responses	00:03 Average time to complete	Active Status	...
-----------------------	--	-------------------------	-----

[Review answers](#) [Post scores](#) Open in Excel

1. Will a pear float?
[More Details](#)

<input type="radio"/> Yes, it will float	2
<input type="radio"/> No, it will sink	2

A pie chart showing a 50/50 split between two categories: 'Yes, it will float' (blue) and 'No, it will sink' (orange).



Lab Procedure: Part 2

1. For each of the objects, determine the density at which it sinks in kg/L.
2. Use a mass of 4.5 kg.
3. List this value in the table.

	Air	Gasoline	Olive Oil	Water	Honey
Styrofoam					
Wood					
Ice					
Brick					
Aluminum					

<https://phet.colorado.edu/en/simulation/buoyancy>

Next steps

STEM Learning - remote learning

Maths in the secondary science curriculum

Develop your teaching of key areas of mathematics in the science curriculum.

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Develop and implement effective health and safety in your science department.

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Health and safety for NQTs in science

Develop your confidence in effective health and safety for science practicals.

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Leading on secondary science curriculum design

Consider the principles of an effective curriculum and how to plan for progression in content, skills and long term learning.

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Secondary support for new teachers

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Explore courses by subject



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New



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Teaching for home learning: Secondary science

Ease the transition to teaching science to secondary pupils during the COVID-19 pandemic with online and offline approaches.

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students.

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- learn from leading experts.

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[STEM Learning online CPD](http://www.stem.org.uk/online-cpd)

LIVE CHAT

If you need any help, our subject experts are available weekdays from 8:30 am to 4.30 pm via our webchat, which you can find on the bottom right-hand corner of all our web pages.

They can help answer your questions, point you in the right direction and give advice.

Other support available

REMOTELY DELIVERED LESSONS FOR YOUNG PEOPLE

Remotely-delivered, curriculum-linked science lessons accompanied by live Q&A sessions with our subject experts. Lessons are accompanied by 'live chat' Q&A sessions to provide secure 1:1 support for teachers, parents and learners, and signpost additional resources where appropriate.

■ www.stem.org.uk/remote-lessons

FREE RESOURCES FOR HOME TEACHING

A selection of primary, secondary and post 16 resources organised into topic area and year group. Many of the resources also include opportunities for working scientifically at home to help young people's learning.

■ www.stem.org.uk/home-teaching#free-resources-for-home-teaching

LIVE CHAT

If you need any help, our subject experts are available weekdays from 8:30 am to 4.30 pm via our webchat, which you can find on the bottom right-hand corner of all our web pages.

ACTIVITIES TO SUPPORT CONTINUING IN-SCHOOL DELIVERY

We have curated a selection of cross-curricular activities that can be used in school to engage young people of all ages. All these resources can be adapted for use with individual students, small groups or mixed-age classes.

■ www.stem.org.uk/home-teaching#activities-for-in-school-delivery

STEM CLUBS

We now offer a free new short online course focussing on how to run and deliver a STEM Club remotely along with two remote workshops for secondary schools and FE colleges on 'Getting started' and 'How to be successful and thriving'.

■ www.stem.org.uk/stem-clubs

STEM AMBASSADORS

Teachers can now request an online activity with a STEM Ambassador. This support is available for schools which are currently open and remote teaching, however a teacher must supervise each activity. For more information visit:

■ www.stem.org.uk/stem-ambassadors/find-a-stem-ambassador

STEM Ambassadors - Overview



Approx. **30,000** STEM Ambassadors in the UK

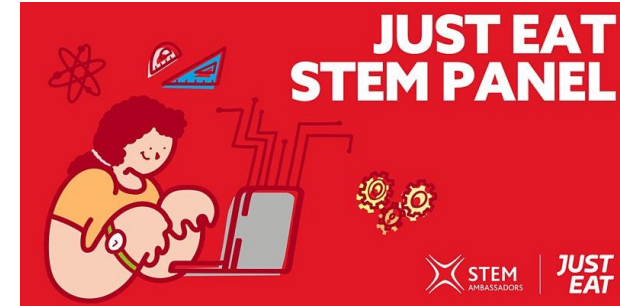
Approx. **3,000** in London

- **34%** BAME
- **54%** Women
- **65%** Under 35

19 Regional Hubs in the UK



STEM Ambassadors during Lockdown



MAYOR OF LONDON



STEM Ambassadors Online Activities



[Make your Computer Skills Legal with Cyber Choices: Thursday 16th July 14:00 – 15:00](#)

Hear from a member of the Metropolitan Police Cyber Choices Team talk about the work they do and how to keep your student's computer skills legal through the summer and through catch-up curriculum activities.



[Myth Busting Apprenticeships Webinar with BT: Tuesday 21st July 13:00 – 14:00](#)

Open for teachers, parents and students to find out more about apprenticeship opportunities at BT and have the opportunity to ask BT apprentices questions to bust common myths and misconceptions!



[STEM Sessions Podcast: The UK STEM Careers Podcast](#)

Every episode you'll hear from one of our London STEM Ambassadors and get to find out more about their STEM job, how they got there and how young people today can get there too!

Big Bang Digital 2020 Tuesday 14th July

Big Bang Digital 2020 – science, engineering & Covid-19
Tuesday 14 July



Big Bang Digital 2020 – science, engineering & Covid-19 celebrates the amazing work of scientists and engineers in a pandemic.

Mark it in your calendar for a day of inspiring online sessions to give young people a front row view of the incredible contribution of scientists, healthcare professionals, engineers, technicians and students in responding to Covid-19.

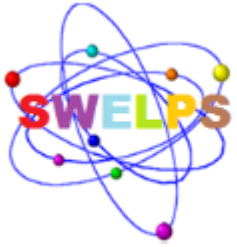
Join us as we hear from the people working to develop a vaccine, the teams involved in building the Nightingale hospitals, those keeping transport networks going and the companies innovating to respond to the UK ventilator challenge.

We'll meet inventive young people supporting frontline efforts across the world, get an insight into the environmental benefits of staying at home and celebrate healthcare heroes and learn how their jobs have changed.

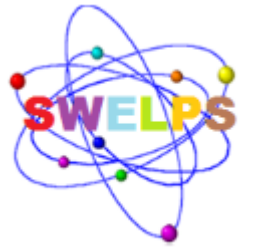
With interactive polls, live Q&A sessions with guests and associated activities throughout the day, there are lots of ways to get involved and even prizes to be won!

We'll be announcing more #BigBangDigital details in the run up to the day, meanwhile get the date in your diary and spread the word.

Visit www.digitalbigbang.co.uk to find out more.



South West London Practical Science



Established by Saba Tyson in 2012 with the aim of creating a warm and expert local network for science technicians. It has grown over the years into a large network with members across:

Surrey; Sutton; Merton; Morden; Croydon; Purley; Beckenham; Camberwell;
Kingston; Richmond; Hounslow; Wandsworth; Wimbledon

Our aims and activities include

- Sharing ideas, expertise and training
- Termly newsletters and advertising of vacancies
- Co-operation for problem solving and assistance with ideas and equipment or chemicals loans
- Liaise and coordinate chemical waste disposal and equipment repairs and servicing to reduce costs
- Annual summer CPD conference with workshops, outside speakers & suppliers exhibition

SWELPS



Saba Tyson
Team Leader Science
Greenshaw High School
SWELPS Science Technician Forum Coordinator
Tel: 020 8715 1001 Extn 256
Mobile 07734 257350

Email : styson@greenshaw.co.uk

Newstead Wood Technician conference 12/2/21

SCIENCE TECHNICIAN CONFERENCE



Newstead Wood School
Orpington.

Bring a packed lunch. Coffee/tea/water will be provided. Parking on site to be confirmed.

Keynote Speaker:

Simon Quinnell

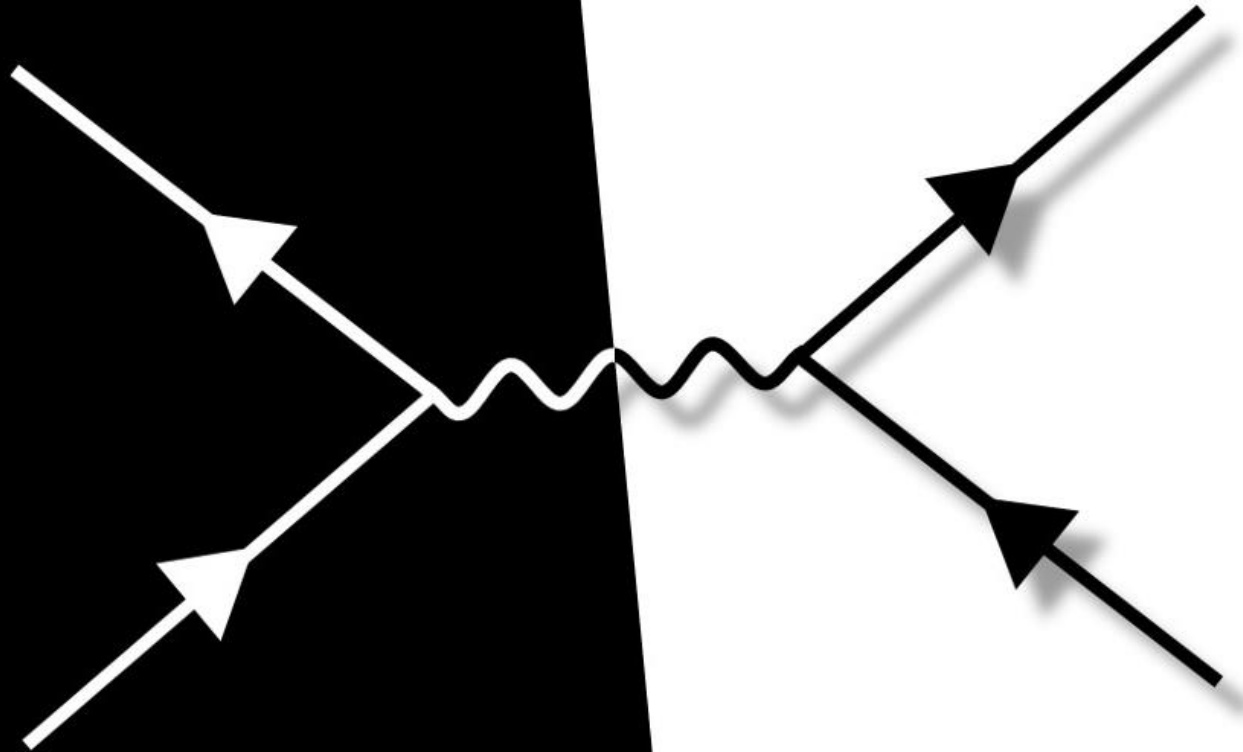
CSciTeach; Chair of ASE 2020-2021,
Science education consultant and PGCE
Science Lead, previously a Senior
Professional Development Leader at
National Technicians Lead and STEM
Learning

Hands-on, and make and take workshops and Biology, Physics and Chemistry focus sessions.

- Jane Major CLEAPSS – “Working with glass”
- Simon Quinnell - Chemistry (title tbc) Chemistry post COVID
- Robert Birke IoP – “Make and take ultrasound transmitters”
- Mary Philpott Ex CLEAPSS Biology Advisor (title tbc) Biology post COVID
- Lab on a Bus Kingston University Outreach
- Medical Mavericks
- Lablogger
- Labexpert
- ASE RsciTech accreditation advice
- Drop in session of supplier equipment highlights
- Biology hints and tips for getting those difficult practicals to work
- Datalogging and required practicals
-

- Southern region SLP- STEM
- Suppliers exhibition and raffle
- ASE Bookstall

GCSE and A Level Physics Online.com



The most comprehensive video resource for Physics, trusted by thousands of students and teachers.

Website with hundreds of videos for GCSE and A Level Physics, arranged by topic and exam board.

Individual Access - GCSE £9.99 / A Level £19.99

School Subscriptions also available from <50p per student



[/physicsonline](https://www.youtube.com/physicsonline)



Course Content

Required Practicals

- Required Practicals 13 Quizzes

Physical Chemistry - Year 12 / AS content

- Atomic Structure 4 Quizzes
- Amount of substance 12 Quizzes
- Bonding 9 Quizzes
- Energetics 4 Quizzes
- Kinetics 5 Quizzes
- Chemical equilibria, Le Chatelier's principle

Course Content

Biological Molecules

- Monomers and Polymers 1 Quiz
- Carbohydrates 3 Quizzes
- Lipids 2 Quizzes
- Proteins 6 Quizzes
- Nucleic acids are important life carrying molecules 3 Quizzes
- ATP 1 Quiz
- Water

Primrose Kitten

GCSE SCIENCE

Home - GCSE Science

GCSE and A-Level course from £1 per student for a years access

GCSE Science

Time until Biology paper 1...

31 5 31

Primrose Kitten

YouTube tutorials for GCSE and A-Level

Pearson Edexcel

Free online GCSE Science lessons

Table 3 - Electricity

Equation	Symbols	Units
$Q = It$	$Q = \text{Charge}$	$Q = \text{C (coulombs)}$
$V = IR$	$V = \text{Potential difference}$	$V = \text{V (volts)}$
$P = VI$	$P = \text{Power}$	$P = \text{W (watts)}$
$E = Pt$	$E = \text{Energy}$	$E = \text{J (joules)}$
$E = QV$	$E = \text{Energy}$	$E = \text{J (joules)}$

Table 3 - Forces

Equation	Symbols	Units
$W = mg$	$W = \text{weight}$	$W = \text{N (newtons)}$
$W = Fs$	$W = \text{work done}$	$W = \text{J (joules)}$
$F = ma$	$F = \text{force}$	$F = \text{N (newtons)}$
$E_p = mgh$	$E_p = \text{elastic potential energy}$	$E_p = \text{J (joules)}$
$E_k = \frac{1}{2}mv^2$	$E_k = \text{kinetic energy}$	$E_k = \text{J (joules)}$

Privacy & Cookies Policy

1 - Cell structure

Knowledge Checklist

Whole topic summary video <https://youtu.be/sdpmYQoo5YA> in only 12 minutes!!

Available as flashcards on my website

Positive	Negative	F
H ⁺	Fluoride	F ⁻
Li ⁺	Chloride	Cl ⁻
Na ⁺	Bromide	Br ⁻
K ⁺	Iodide	I ⁻
Cu ²⁺	Hydroxide	OH ⁻
Ag ⁺	Nitrate	NO ₃ ⁻
NH ₄ ⁺	Nitrite	NO ₂ ⁻
Mg ²⁺	Hydrogen carbonate	HCO ₃ ⁻
Ca ²⁺	Hydrogen sulfate	HSO ₄ ⁻
SO ₄ ²⁻	Sulfate	SO ₄ ²⁻
CO ₃ ²⁻	Carbonate	CO ₃ ²⁻
PO ₄ ³⁻	Sulfide	S ²⁻
Cl ⁻	Sulfite	SO ₃ ²⁻
NO ₃ ⁻	Sulfide	S ²⁻
NO ₂ ⁻	Oxide	O ²⁻
CO ₃ ²⁻	Nitride	N ³⁻
PO ₄ ³⁻	Phosphate	PO ₄ ³⁻

Knowledge P6

P6 Energy of matter

Changes of state

Conservation of mass

Particles and kinetic energy

Internal energy

Latent heat

Retrieval P6

P6 Questions

Answers

Practice P6

Exam-style questions

1. Name the eight energy stores.

2. Name the four ways in which energy can be transferred.

Free guides

Speciation statement

These are the bits the exam board wants you to know, make sure you can do all of these...

Self-assessment

Bits to help if you don't understand

Plant cell - Structure and Function

Animal cell - Structure and Function

Bacterial cell - Structure and Function

Microscopy

Microbiology

Aspen Microbiology

Answers

1. Which two quantities do you need to measure to find the density of a solid or liquid?

2. What happens to the particles in a substance if its temperature is increased?

3. Why are changes of state physical changes?

4. Why is the mass of a substance conserved when it changes state?

5. Why does the internal energy of a substance change when its temperature changes?

6. Why does a graph showing the change in temperature as a substance cools have a flat section when the substance is changing state?

7. What is the name given to the energy transferred when a substance changes state?

8. What is the specific latent heat of a substance?

9. What is the specific latent heat of fusion of a substance?

10. What is the specific latent heat of vaporisation of a substance?

11. On a graph of temperature against time for a substance being heated up or cooled down, what does the flat (horizontal) sections show?

12. What property of a gas is related to the average kinetic energy of its particles?

13. What causes the pressure of a gas on a solid surface?

Answers

1. kinetic, gravitational potential, elastic potential, chemical, electrical, nuclear, magnetic, electrostatic, heating, radiation, electric current, mechanically (by forces)

2. Name the four ways in which energy can be transferred.

3. Name the four ways in which energy can be transferred.

4. Name the four ways in which energy can be transferred.

5. Name the four ways in which energy can be transferred.

6. Name the four ways in which energy can be transferred.

7. Name the four ways in which energy can be transferred.

8. Name the four ways in which energy can be transferred.

9. Name the four ways in which energy can be transferred.

10. Name the four ways in which energy can be transferred.

11. Name the four ways in which energy can be transferred.

12. Name the four ways in which energy can be transferred.

13. Name the four ways in which energy can be transferred.

Practice

1. A student wants to calculate the density of modelling clay. To do this, they take a mass of clay and put it in a measuring cylinder containing water.

Figure 1 shows the water in the measuring cylinder before (A) and after (B) the clay was added.

1.1 Use Figure 1 to calculate the volume of the clay. [2 marks]

1.2 Write down the resolution of the measuring cylinders. Explain how you worked out your answer. [2 marks]

2. A student is learning about internal energy. They draw two diagrams, A and B, as shown in Figure 2.

2.1 Complete the sentences using the words in the box. [4 marks]

kinetic vibrating moving fast potential gravitational moving slowly

In diagram A the particles are ... Most of the internal energy is due to the ... energy of the particles.

In diagram B the particles are ... Most of the internal energy is due to the ... energy of the particles.

2.2 The sample shown in Figure 2 A is heated for a long time. Describe how the internal energy of the sample changes. [2 marks]

Oxford Revise

AQA A LEVEL CHEMISTRY for OCR A

AQA GCSE 9-1 CHEMISTRY HIGHER

AQA GCSE 9-1 BIOLOGY HIGHER

AQA GCSE 9-1 COMBINED SCIENCE: TRIOLOGY HIGHER

Oxford Revise: AQA GCSE Chemistry Revision

by Adam Boxer, Philippa Gardom Hulme, et al.

5 stars

Next steps:

What key actions will you take away from today?

Go to [menti.com](https://www.menti.com)

Use the code 29 23 47



Check out EEF audit

All of the different resources and links were extremely useful. I will definitely look over them and delegate within the science team. Thank you so much

lots of websites to browse for practical resources and demonstrations. i also liked the IOP Marvin and Milo cards to prompt discussions

Making use of PHET simulations whilst

Use recorded practicals

Circulate some of the key information to Science colleagues

Look at online practicals

use recorded practicals

Plan in videos of different versions of practicals

have vital discussions with technicians regarding practical work

will have a look at the resources provided as they were really good

Discuss with the team, a way forward with the limited time we have to cover the specifications and how to include practical work and forward details of networking to technicians.

use recorded practical

Making use of PHET simulations whilst we will not be able to use labs and still show practical work. Before and after ideas to extend their thinking.

Think about making recorded videos of demos and practicals to use in lessons and at home. Using concept cartoons to engage students in practical thinking more effectively

practicals

More ideas about online learning. Check EEF audit. Share information with teaching staff.

Really liked the Integrated Instructions demonstrated. Will look into those.

use recorded practical

Online videos built into lessons in September, promote more talking with a purpose linked to practical and investigation skills

Check out the EEF audit Circulate some of the information to colleagues