ISEB
Independent Schools Examinations Board

DISCOVER NEW CE
TWILIGHT CPD SESSIONS

SCIENCE SPECIFICATIONS
NEIL INGRAM

THURSDAY 6TH MAY | 17:00 BST

ISEB 11+ & 13+ CE SCIENCE

NEIL INGRAM

Thursday 6th May 2021

Introducing the key features

For teaching from September 2021 onwards
For examinations from November 2022 onwards

Becoming equipped for future learning

Becoming enthusiastic, curious, active learners of science

Research and Analysis

Research Review Series: Science
Published 29 April 2021

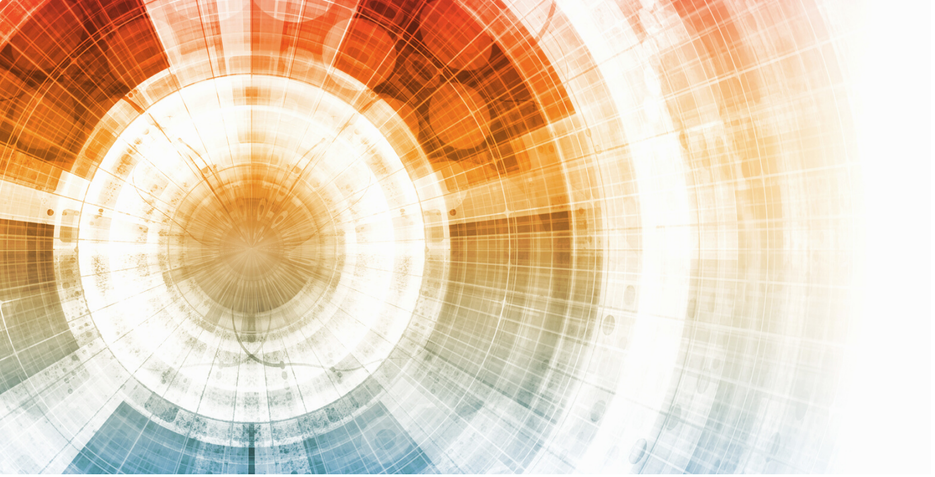
At the core of scientific expertise lies extensive, connected knowledge. This means that as pupils travel through the school curriculum, they need to build their knowledge of scientific concepts and procedures. By doing so, pupils can:

- reason scientifically about phenomena with increasing sophistication
- can use their knowledge to work scientifically with increasing expertise.

A useful framework for constructing science curriculums makes the distinction between the following:

- scientific knowledge and understanding (knowledge of the products of science, such as concepts, laws, theories and models)
- disciplinary knowledge (knowledge of how scientific knowledge is generated and grows): this is specified in the 'thinking and working as a scientist' TWAS

Ofsted
raising standards
improving lives



What is new in the specification?

The design of the new specification

Arose from consultation with key stakeholders in senior and preparatory schools.

Aims to balance the competing demands of:

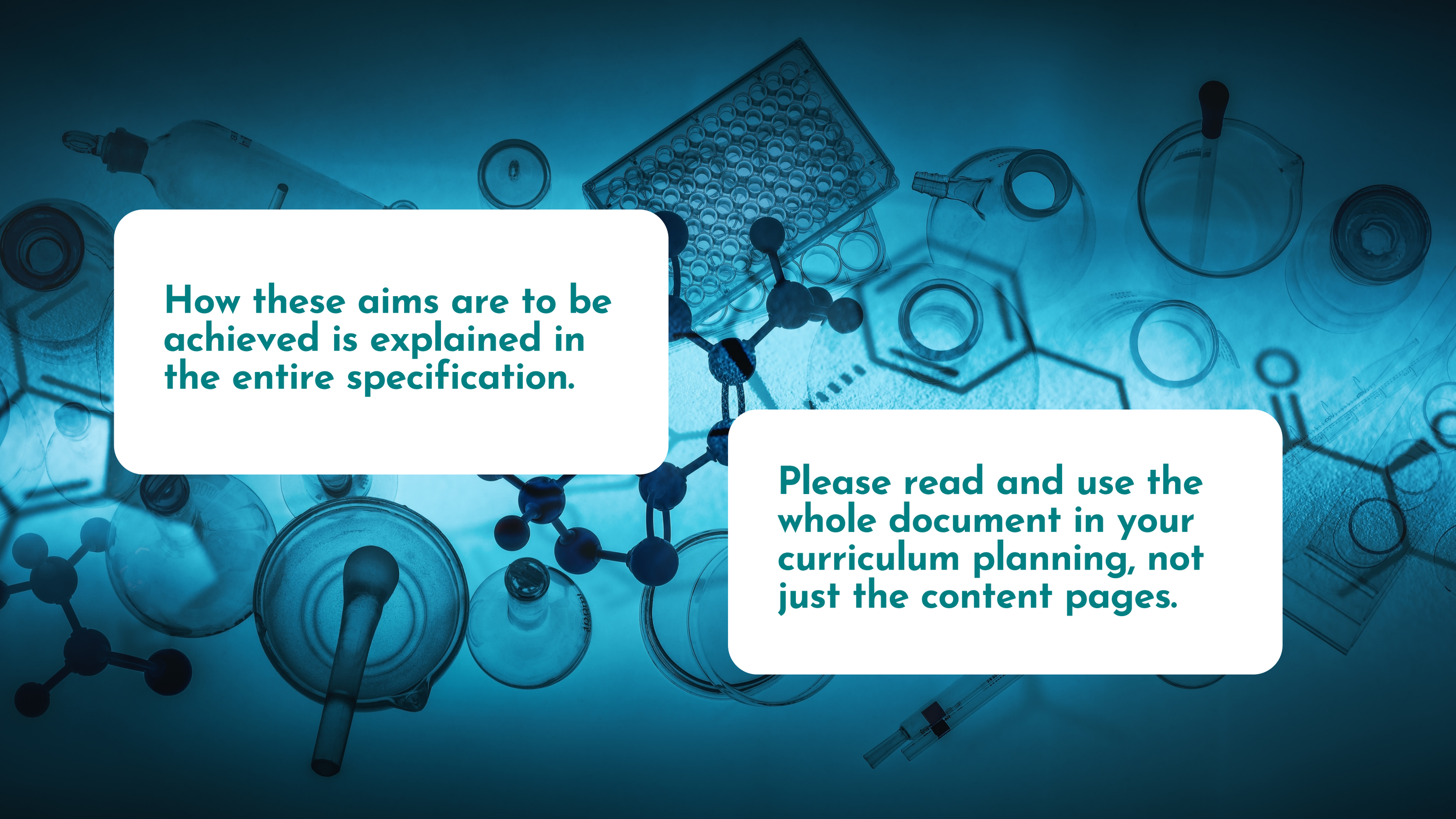
- a knowledge-rich curriculum
- with an enriching practical component
- allowing schools time and space to develop the broader 21st century skills which are an integral feature of the new ISEB specifications

The Course

- Reduce the size of the core content
- Reduce the prescription of the content
- Specifying "recommended practicals" that form the minimum basis for a practical course to achieve (Thinking and Working As a Scientist)

The Examinations

- Assess knowledge, understanding and practical competences within strong contexts, which provide contextual cues to prompt remembering
- Build on knowledge from 11+



How these aims are to be achieved is explained in the entire specification.

Please read and use the whole document in your curriculum planning, not just the content pages.

The knowledge and understanding framework

The learning outcomes have three command words:

Know specifies knowledge to be learned and recalled.

Understand requires pupils to apply their knowledge to familiar and novel contexts, including processes and applications.

Recognise requires pupils to show an awareness of the significance of their knowledge and understanding to science and society.

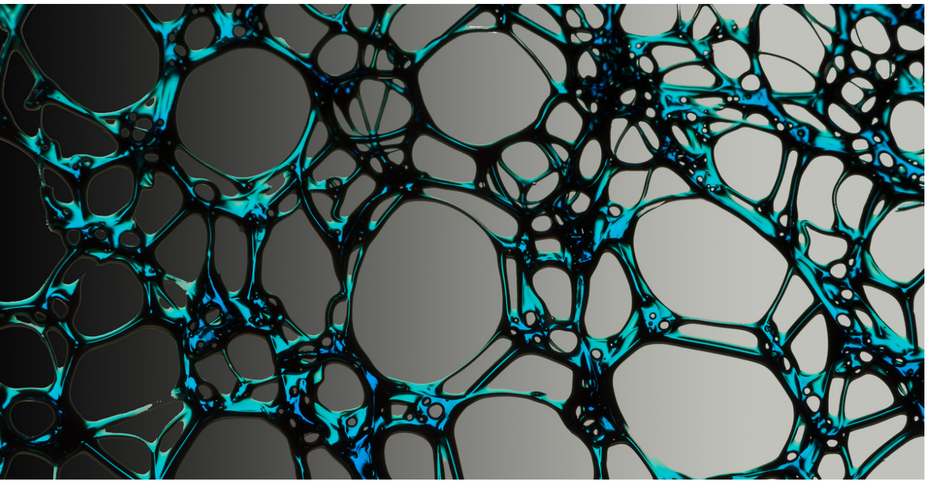
KNOW

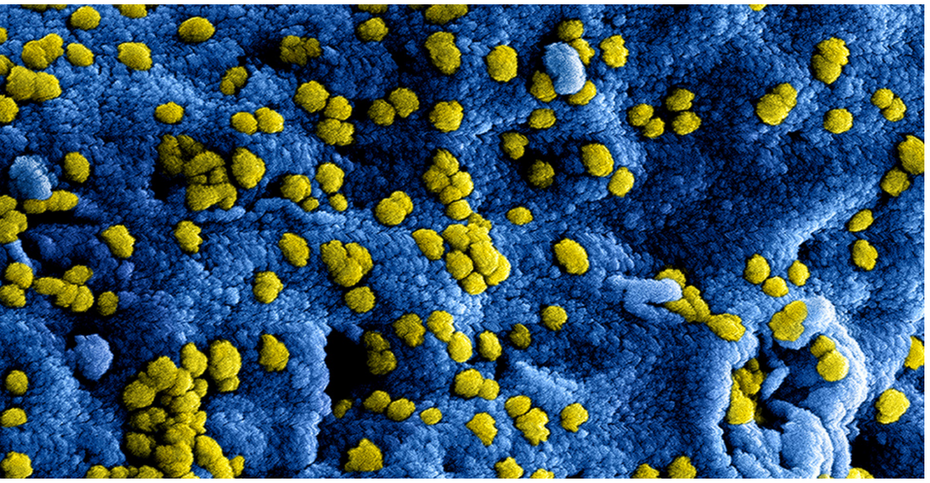
Only KNOW statements will be assessed as direct recall questions in 13+ examinations

KNOW the word equation for photosynthesis

KNOW that the properties of a mixture are the same as its components

KNOW that the Sun is the ultimate source of energy





UNDERSTAND

UNDERSTAND the importance of carbon dioxide, water and light in the production of new biomass

UNDERSTAND the idea of a reaction as a rearrangement of particles - conservation of mass

UNDERSTAND how to measure the density of regularly-shaped solids and irregularly-shaped solids (using the displacement of water to find a volume), and of liquids

UNDERSTAND statements require a greater depth and more conceptualisation. They will be asked as short short or extended writing questions in a specific context in 13+ examinations

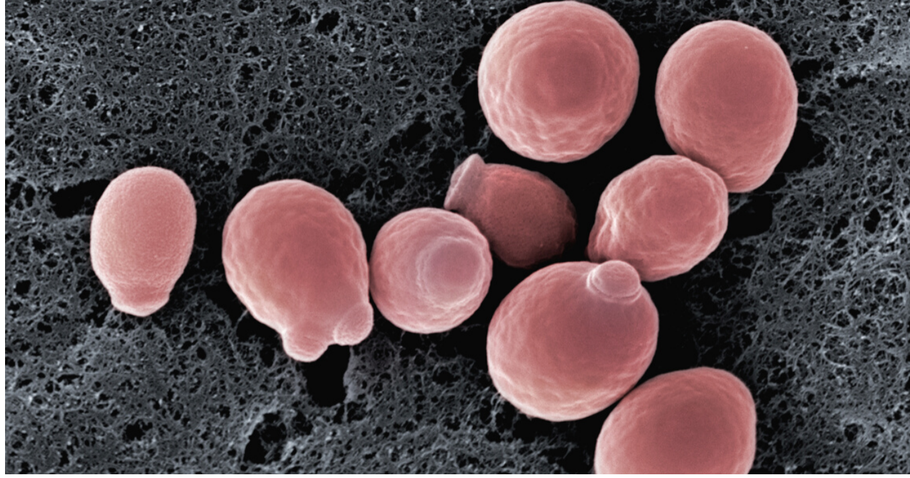
RECOGNISE

RECOGNISE the importance of fermentation in yeast to human society

RECOGNISE that compounds have different properties to the new elements from which they are made

RECOGNISE that a variety of processes are used to generate electricity

RECOGNISE statements are applied statements that are important in science or society. They do not require a detailed in-depth understanding. They will be assessed in questions containing stimulus material for candidates to think about and respond to, usually as short or extended writing questions in 13+ examinations



Assessment objectives AOs

A01 remembering and understanding	KNOW and UNDERSTAND
A02 applying and analysing	TWAS
A03 evaluating and creating	RECOGNISE

13+ Foundation, L2 and CASE papers have published minimum % mark allocations and the papers have specification grids that we use to ensure that the mark allocation targets are met.

Assessment command words

Calculate	Use the numbers given in the question to work out the answer *Calculate the mass of air in the laboratory, in kg.*
Compare	Describe the similarities and / or differences between things *Compare how the mistletoe plant and the tree obtain their water.*
Complete	Add missing information to a table, diagram or graph *Complete the table by calculating the mean time taken to slide down the slide.*
Describe	Recall some facts, patterns in results or a sequence of events accurately *Describe the relationship between current and number of paperclips lifted.*

11+ Content

Food Nutrients	Know the roles of carbohydrates, lipids (fats and oils), vitamins, minerals, dietary fibre and water in maintaining healthy bodies.	Carry out test for food nutrients, in foods. (e.g. starch, sugar, fat, protein)	Y6: 2h

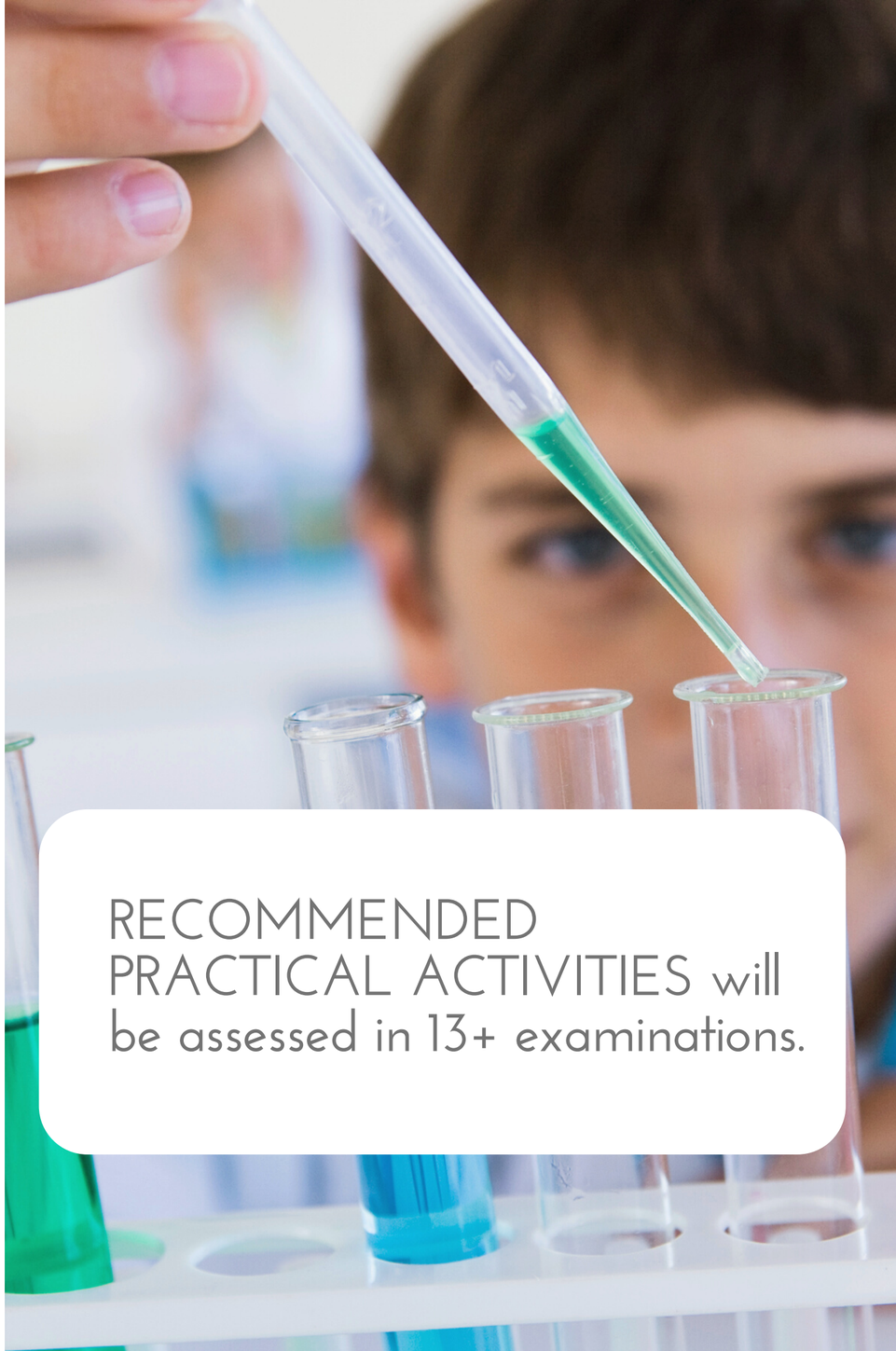
- Is highlighted in the specification
- It is not intended you re-teach all of the 11+content
- It is intended that you remind the pupils of what they have learned
- – or prompt them to remember at the start of each new topic

- The specification is built on constructivist principles, where each new idea fits into what pupils already know

Recommended practical activities

The recommend practical activities included in the specification should be regarded as the minimum practical experience that pupils should be given.

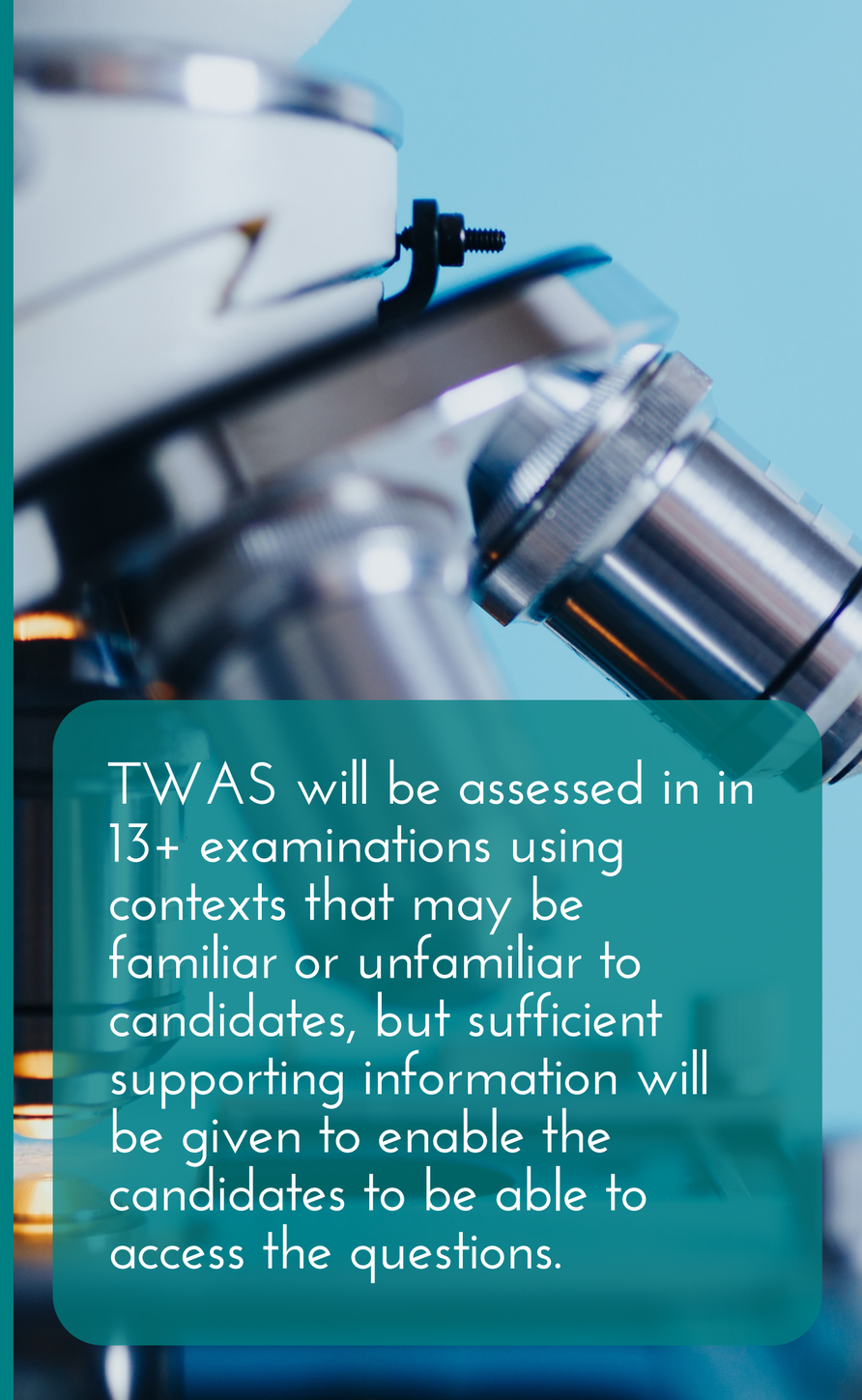
It is anticipated that teachers will use these as a foundation for building a scheme of work for practical activities that allow the full range of 'Thinking and Working as a Scientist' skills to be developed.



RECOMMENDED PRACTICAL ACTIVITIES will be assessed in 13+ examinations.

Thinking and working as a scientist

- Modelling scientific attitudes
- Developing experimental skills
- Devising and carrying out investigations
- Analysis, evaluation and problem-solving



TWAS will be assessed in in 13+ examinations using contexts that may be familiar or unfamiliar to candidates, but sufficient supporting information will be given to enable the candidates to be able to access the questions.

Teaching focus: the first year

Taking the first steps

Plan the course as a whole unit

Decide where you will teach students the TWAS content

Work on a notional one week for each syllabus topic, although this can be extended when TWAS skills are included in a topic

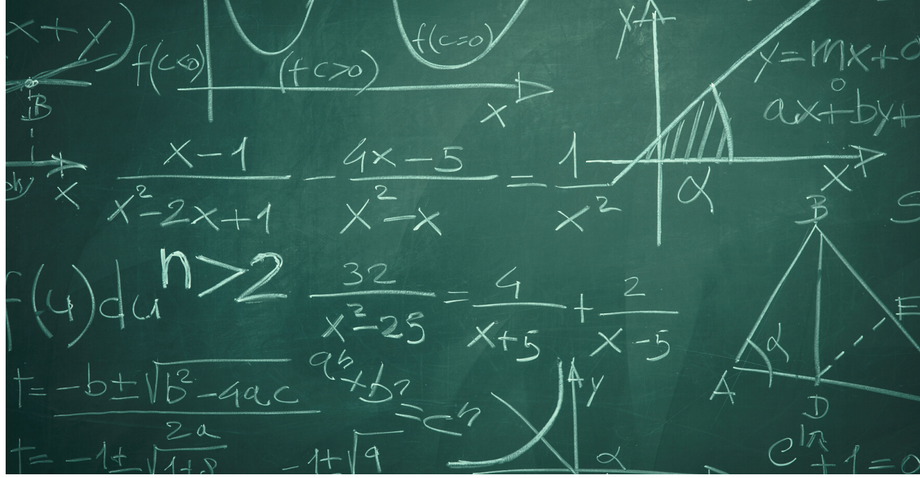
Think about where and how the wider aims of the course will be implemented

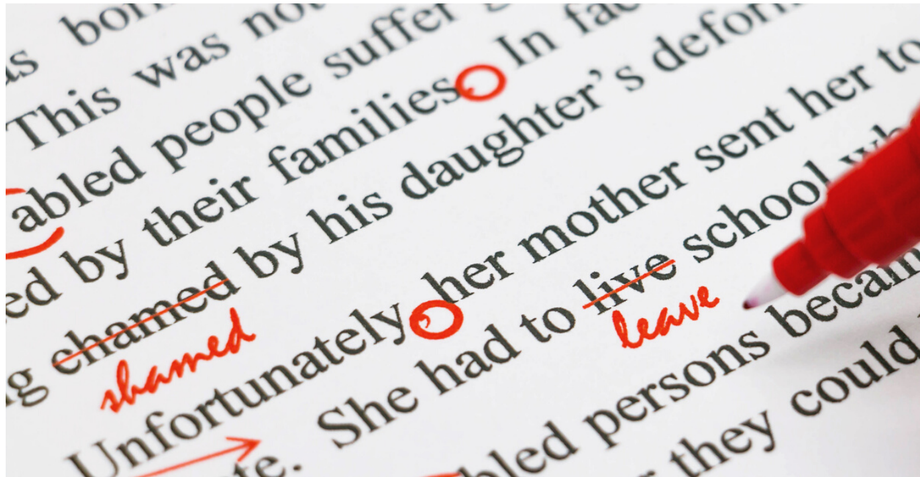
Liaise with other departments

The mathematical and statistical skills needed to analyse and interpret experimental data should be taught in conjunction with the Mathematics departmental scheme of work. Pupils should be made aware of the overlap between these two subjects.

Likewise, teaching the environmental aspects of the Science specification should be coordinated with the Geography specification

Literacy, a common feature in all aspects of the Science specification, should be taught in conjunction with the English specification.





13+ Assessement

There are changes to the content of the course, including a significant reduction in some topics and omission of other topics.

Otherwise, the structure of the assessments remains unchanged.

Greater use of multiple choice items within questions and closed questions to reduce the amount of free writing.

No marks awarded for spelling, punctuation and grammar

Online Specification

It is important to use the latest version of the specification that is published online at the ISEB site (https://www.iseb.co.uk).

We have made three minor changes in the specification since we published the first version:

Know the roles of carbohydrates, lipids (fats and oils), proteins, vitamins, minerals, dietary fibre and water in maintaining healthy bodies

Know the test for water using anhydrous copper sulfate

Understand that a non-renewable resource is one that cannot be replenished within a lifetime

We will announce any further changes in ISEB communication bulletins

Skills focus: the wider aims

Critical thinking and independence

As pupils gain knowledge and master scientific concepts, they should be considered to ask questions and think critically.

This is embedded within the TWAS section, especially modelling scientific attitudes.

Pupils should:

Be given opportunities to think about objectivity when measuring, with increasing awareness of the needs for accuracy, precision, repeatability and reproducibility; the should consider the validity of experimental results in terms of fair testing.

Understand that idea about science, its methods and theories, change as scientists modify earlier explanations to take account of new evidence and ideas.

Critical thinking and independence

Think about possible risks before undertaking practical work and plan suitable safety precautions for any practical work they undertake.

Begin to understand that there are questions that science cannot answer and be aware of the potential impact on scientific advance on society and the welfare of the planet. Pupils should discuss the advantages and disadvantage of scientific and technological developments.

Some questions in the 13+ examinations will be written to assess AO3, evaluating and creating, where candidates use the information in the question and their knowledge and understanding to create and argument, express an informed opinion of draw a conclusion.

These will usually be examples of extended writing and be towards the end of the papers.

Minimum of 5% Foundation
Minimum of 10% L2
Minimum of 25% CASE

Research and independence

As pupils gain knowledge and master scientific concepts, they should be considered to research ideas for themselves, using structured internet searches.

This can be developed into discovery learning or extended project work.

Practical science courses should include demonstrations, individual and group activities, investigations, opportunities for discovery learning and research through extended project work. The ISEB Project Qualification provides accreditation for extended project work.

Teachers adopting this approach need not be restricted to choosing topics that are in the 13+ CE specification. In these circumstances candidates need to be aware of what is, and is not, examinable.

Life-long learning and independence

Through engaging experiences, often interdisciplinary.
Explore links with geography (field course?), RE (the nature of scientific knowledge)
With English (literacy and a love of reading)

Possibilities for new kinds of activities: http://blog.neilingram.co.uk

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